

Proceedings of International Conference on Recent Explorations in Science, Engineering and Technologies

2017

ICRESET'17



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International Conference on Recent Explorations in Science and Engineering Technologies.

TABLE OF CONTENT

Preface	vii
Committees	viii
Abstract of Invited Lectures	xi

INDEX

S.NO	PAPER ID	TITLE OF THE PAPER	PAGE NO
1	ICRESET17301	INTELLIGENT ENERGY METER <i>BHAZIRIA J, L.SINDHU ,T.PRAVEENA ,J.ABIMATHI</i>	1
2	ICRESET17302	OVARIAN CANCER DETECTION AND IDENTIFICATION USING FUZZY C MEANS AND IMPROVED SOBEL EDGE DETECTION ALGORITHM <i>B.SASI PRABHA, R.UMA</i>	7
3	ICRESET17303	ENSURING AUTHENTICATION SERVER BASED LOAD BALANCING TECHNIQUE IN PRIVATE CLOUD SYSTEM <i>SREELAKSHMI P.N</i>	11
4	ICRESET17304	FEATURE SUPPORT ORDER EVALUATION TECHNIQUE ON USER OWN IMAGE IN MULTIFACTOR AUTHENTICATION <i>ASHWIN TITUS</i>	14
5	ICRESET17305	SECURITY MANAGEMENT FOR CONTROLLING THEFT USING ARDUINO UNO <i>S.DEEPIKA,M.NISHA ANGELINE</i>	17
6	ICRESET17306	ONLINE LOAN APPLICATION PROCESS <i>R.SURYA ,G.SHREE GAYATHRI,I P.UMAMAHESWARA, D.VIGNESH</i>	21
7	ICRESET17307	PREPARATION OF ANTIBACTERIAL LOTION USING SILVER INCORPORATED TIO₂ NANOPARTICLES AND ASSESSMENT OF THE PHOTOCATALYTIC ACTIVITY OF THESE NANOPARTICLES. <i>K.RAJESWARA</i>	25

8	ICRESET17308	MODERN HONEY POT TOOLS ON CLOUD VIRTUAL MACHINES FOR MACHINE LEARNING <i>E. NANDHINI ,V. MADHUMITA</i>	31
9	ICRESET17309	AUTOMATED BILLING SYSTEM IN SUPERMARKETS <i>SURYA M, SOWNDHARYA E R, RAJALAKSHMI</i>	37
10	ICRESET17310	EFFICIENT OPERATION OF SOLAR POWER BASED POWER MANAGEMENT FOR REMOTE POWER APPLICATION <i>T. A SIVASANGARI, A.SUDHANANDHI ,A.P.SAMBAVI</i>	42
11	ICRESET17311	ANN BASED DISFLUENT SPEECH CLASSIFICATION <i>ANJANA.R, T.PRABHU PANDIYAN, S.K.RANGANATH, PRADEEP RANGARAJAN</i>	46
12	ICRESET17312	SMART TROLLEY FOR MEDICATION AND HEALTH CARE <i>R.SAKTHIVEL, RITTESH G.KOTHARI, M.PRAWIN</i>	52
13	ICRESET17313	DESIGN AND FABRICATION OF AUTOMATIC SYSTEM OVERHEAD TANK CLEANING <i>S.ABHISHEKH, D.KIRAN ,P.PRAVEEN ,DK.L.SENTHILKUMAR</i>	57
14	ICRESET17314	PROTOTYPE MODEL FOR DROWSINESS DETECTION AND ACCIDENT PREVENTION <i>SAHAANA B, SOUNDARRAJAN R, SWETHAA K</i>	61
15	ICRESET17315	MULTI-OBJECTIVE GREY WOLF OPTIMIZATION FEATURE REDUCTION <i>A.P.SINDHU, RANGEELA RAJENDRAN, D.UDHAYA SURIYAN</i>	74
16	ICRESET17316	TOPIC MODELING:VIEW OF PUBLIC IN A PUBLIC ISSUSES USING SOCIAL MEDIA <i>CLINT PAXTON SAMUEL</i>	83
17	ICRESET17317	HARDWARE SOFTWARE CO-DESIGN FOR A CLOSED LOOP CONTROL SYSTEM <i>SANJU PRAKASH.K, VIJAY KUMAR.S</i>	88
18	ICRESET17318	MATHEMATICAL MODELING AND GENETIC ALGORITHM BASED EXPLORATION FOR BLANKING DIE DESIGN PARAMETERS OPTIMIZATION OF AISI 1020 SHEET MATERIAL <i>R.S.MOHAN KUMAR, DR. C.VELMURUGAN</i>	92

19	ICRESET17319	A NOVEL APPROACH FOR EFFICIENT USAGE OF INTRUSION DETECTION SYSTEM ON MOBILE AGENTS WITH GAMER MODEL IN MANET <i>S.JANANI, M.P. SUSHMITHA KAMU</i>	97
20	ICRESET17320	ESTIMATION OF SPEED IN LINEAR INDUCTION MOTOR DRIVE BY MRAS USING NEURAL NETWORK AND SLIDING MODE CONTROL <i>TN HARIPRIYA, A. HARITHA</i>	104
21	ICRESET17321	AN ENHANCED MULTI-FACTOR ACCESS CONTROL FOR CLOUD COMPUTING SERVICES <i>G.DEEPIK, S.PRAKADESWARAN</i>	110
22	ICRESET17322	DIGITAL GROCERY COMMERCE: EXPLORING THE POTENTIAL FOR GROCERY SHOPPING <i>M.PRAGADEESH, SHARMITAA .R, ANUSHA MANI</i>	116
23	ICRESET17323	ONLINE BUSPASS RENEWAL SYSTEM USING WEBAPPLICATION <i>NISHANTHINI.K.T, KOKILA.S, GETHSIA.S</i>	120
24	ICRESET17324	LI-FI TECHNOLOGY <i>DINI KOKILA.K, PADMAJAA.B</i>	126
25	ICRESET17325	LIBRARY MANAGEMENT APPLICATION <i>POONGODI.D, RANJITH.M.S, STEPHEYPREETHI.P.K</i>	131
26	ICRESET17326	BACK TO COLLEGE-ALUMNI APPLICATION <i>THIRUGNANAKUMAR.A.K.D, SUGHA.K, SREEDHI.S</i>	135
27	ICRESET17327	HOTEL RESERVATION SYSTEM <i>AISHWARYA.R, POOVARASAN.E, ROSHINI.</i>	142
28	ICRESET17328	E LABOUR MANAGEMENT SYSTEM <i>SARAVANA KUMAR.S, ARTHI.A, KARUNYA.P</i>	147
29	ICRESET17329	CITIZEN VOICE (PUGAR PETTI) <i>AKSHAYA DEVI.S, KAVERI.S, PRAVEEN.R</i>	154
30	ICRESET17330	A SURVEY ON CLOUD COMPUTING <i>DHARSAN K, JAHAZIEL SAMRAJ M</i>	162
31	ICRESET17331	AN INITIAL STUDY ON THE BASIC DOMAIN TO DEVELOP A HUMAN TO MACHINE <i>VALLIKANNU.AR, ARPANA .S, NIVETHA.M</i>	168
32	ICRESET17332	SMART FARMING <i>MAGESHWARAN.S , NITHIN.G, SACHIN SWAMINATHAN</i>	171
33	ICRESET17333	PHARMACY MANAGEMENT SYSTEM <i>MAHALAKSHMI.K, NANDHINI.K, VANITHA.P</i>	176
34	ICRESET17334	BLUE BRAIN TECHNOLOGY <i>HARI KOWSHICK. L</i>	203

35	ICRESET17335	BLOOD BANK MANAGEMENT <i>ASWIN.R, EMI THARANYA.L, MINUSHA.R</i>	209
36	ICRESET17336	CALL TAXI CUSTOMER APPLICATION <i>RATHI.R.NAIR, SINDHUJA.V, SIVAPRIYA.R</i>	217
37	ICRESET17337	FIND YOUR DOCTOR <i>ABINAYA.R, KEERTHIKA.J, POOJA</i>	222
38	ICRESET17338	GAME BASED APPROACH FOR CHANNEL SELECTION IN COGNITIVE RADIO AD HOC NETWORKS <i>SOWMIYA M SREEMATHI C.P SWATHI K</i>	227

PREFACE

KGiSL Institute of Technology (KiTE), is started in 2008 by Padmashri Dr. G. Bakthavathsalam, MS, FICS, FCCP, FAMS, FMMC Founder-Chairman of KG Hospital. The college has been approved by the All India Council for Technical Education and is affiliated to Anna University of Technology, Coimbatore. The college offers Five Undergraduate Programmes and Two Post graduate Programmes in Engineering.

International Conference on Recent Explorations in Science, Engineering and Technology aims to bring together leading academic scientists, researchers, research scholars and industry professionals to exchange and share their experiences and research results on all aspects of information technology. A total of 200 papers authored by were received for conference. Among them, 38 papers were selected for presentation by reviewers. Accepted papers in each area will be presented in separate session by the respective authors. At this juncture, we would like to appreciate our review committees for their valuable contribution and efforts in ensuring quality of the proceedings.

We would like to express our sincere thanks to Padmashri Dr. G. Bakthavathsalam, Founder-Chairman of KG Hospital, for providing us all the support for the conduct of this Conference. We also express our sincere gratitude to Dr. Ashok Bhakthavathsalam, Managing Director, KGSL Group, for the support towards the Conference. We gratefully acknowledge Dr. Ravichandran Rajagopal, Director, KGSL Groups for having shared his decades of experience in configuring this conference. We extend our sincere thanks to Dr. D. Govindharajalu, Principal, KGSL Institute of Technology for his valuable support.

We sincerely thank Dr. G. Vijaya, Head of the Department of IT for her suggestions in making this conference a grand success. We express our thanks to all the technical and advisory committee members for their cordial relation during various process of the conference. We also thank all the students who gave their tremendous support towards the conference at all time.

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DR. V. N. MANI

Brief Technical Profile:

Dr. V. N. Mani completed his (B.Sc-Physics) in 1983 and (M.Sc, Physics-Electronics, Presidency College, University of Madras) in 1985 and Ph.D. (III-V epitaxial Semiconductors Modeling areas-Anna University-Technical, Chennai) in 1990. He has joined Department of Electronics, Govt. of India, New Delhi in 1991 as Scientist-B. Presently holding the post of Scientist-E at Centre for Materials for Electronics Technology (C-MET), Department of Information Technology, Govt. of India, Hyderabad. He has more than 24 years of experience and expertise in the areas of pure electronic and energy materials purification, processing, class clean packaging and devices development. He has carried out his postdoctoral research works at LCM & MCI, France, NRC-Taiwan in the select areas of GaAs and ZnO epitaxial semiconductor devices and solar systems development areas. He has take-up the following major and critical R&D projects with a view to develop indigenous process and product technologies relevant to DRDO/ISRO/DAE.

He is directly involved in the capacities of (Project Leader/Manager/Principal Investigator/ Team Leader) for projects such as:

1. Gallium refining (3N to 5N purity level).
2. ILTP-Indo-Russian Project on New Crystals /Materials for Modern Technology Indian Side Project Collaborator- Completed.
3. Gallium Purification (5N to 6N purity level).
4. Automation and Upgradation of Basic Zone Refiner.
5. Development of nano pure gallium and GaN for devices applications.
6. Design & Development of Controlled Melting and Freezing System for Preparation of Ultra Pure Materials for Optoelectronics, DST.

He and his team have developed the following indigenous critical systems namely:

1. Gallium Chlorinating System.
2. Directional Solidification System.
3. Zone-Refiners-Vertical/Horizontal.

He has received and awarded the following major fellowships/awards:

1. Young physicist award.
2. Commonwealth research fellowship.
3. Postdoctoral fellowship-National science council, Taiwan.
4. Overseas research fellowship- CNRS, France,
5. Best research paper awards.
6. UGC/CSIR junior/senior research fellowship.
7. Best indigenous process & product technology award(2010).

He has 67 publications, 07 review reports, 04 technology development reports and 02 patents to his credit.

He has attended more than 170 national/International Conferences/ workshops / schools/ tutorials/ training programs and presented papers/ talks. He has delivered about 98 invited lectures/talks and chaired about 70 technical sessions in international / International Conferences/ workshops/ schools/ tutorials.

He also served/ serving as in Expert Member-DST/CSIR/ DIT/UGC Projects Reviewer/ Committees and Editorial Board-Materials Research/ Bulletin of Materials Science/ Nano Technology – Journals.

He is a member in 07 scientific societies/associations. He is a Visiting Professor/ Examiner/ Board of Studies/ Research Council Member in KL University, Vijayawada, GITAM University, Hyderabad, PSN Engg. College, Trinelveli, SRM/VIT University, Chennai and SR & VC Colleges of Engineering.

He has guided 11 Ph.D scholars and 12 M.Tech students. As a mentor, he has delivered 34 talks & exhibited products / gave demonstrations in DST Inspire Science Camps.

His and his team's SIGNIFICANT contribution include:

1. Relying and revolving around the solidification & Bridgman crystal growth ideas, an indigenous rotational directional solidification system & ultra- high and nano purification process technology for 7N pure gallium' was developed.

2. Successful Maiden Attempt in Developing Indigenous Zone-refining Systems & Process Technology for Indium Ultra-Purification and Related Instrument Development. These efforts were appreciated by DIT/DST/DRDO/ISRO.

ICRESET 2017 Original Papers

INTELLIGENT ENERGY METER

Bhaziria J¹, Sangavi K.B², Sasikala³

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Abstract- An automatic remote meter-reading system based on GSM is presented in this paper. It is much useful to obtain meter reading when desired so meter readers don't need to visit each customer for the consumed energy data collection and to distribute the bill slips. The Intelligent Energy Meter is an electronic device records the consumption of an electric energy and it communicates that information periodically to the energy provider for monitoring and billing automatically. Unlike home energy monitors, Intelligent Energy meter can gather data for remote reporting. A Microcontroller can be used to monitor and record the meter readings. The system gives information of meter reading, power cut, total load used, power disconnect and tempering on regularly in particular interval through SMS. This information is being sent and received by concerned Energy provider Company with the help of Global system for Mobile communication (GSM) network. Energy provider receives the meter reading within a second without visiting a person. This system minimizes the number of traditional visits required by employs of energy Provider Company. This system not only reduces the labor cost but also increase meter reading accuracy and save hugs amount of time.

Key term: Intelligent Energy Meter, Short message service(SMS), GSM, Energy provider.

I. INTRODUCTION

Electricity is the most indispensable concern in today's world, as technologies are developing day by day our mankind expects automation in every aspects of life. Traditional method for measuring energy consumption using electromechanical energy meter involves a lot of manpower i.e. to measure energy consumption a person from Electricity Department has to visit each customer house, this is a sluggish and laborious process. And more it also involves more economical cost. Sometimes there

may be error in measurements due to person's careless, weather conditions, improper grounding and so on. This metering system becomes very difficult especially in rainy season. If any consumer did not pay the bill, the electricity worker needs to go to their houses to disconnect the power supply. It is inefficient way for measuring power consumption. Power line communication and Zigbee technology also use for meter reading. The stability and reliability of meter reading data are low of power line communication because the carrier wave signal (power/telephone line) is very easily disturbed by noise. The ZigBee devices are extremely limited in resource including processing, memory, and power, short operating range. So there is increased need for automation. GSM based automatic meter reading system is a succor. This will be implemented by interfacing GSM and microcontroller with the energy meter. This system is also integrated with the other module for intimating load usage, power cut alert, power disconnect in the case of delayed payment of bill, tempering on request and PIR sensor for the purpose of energy conservation.

In this system, the meter reading is monitored continuously by the ATMEGA16microcontroller and sends SMS to the energy provider and user through the GSM periodically. The interfaced microcontroller continuously reads the energy used and displays on LCD. A GSM modem is connected to the microcontroller which transmits the reading on a regular interval to the energy provider and the user. The interfaced relay circuit is proved to be very useful feature for energy provider, which helps to remotely switch into cutoff mode from power on mode of any customer due to nonpayment of bills within a specific period of time. The power disconnect feature is done by Energy provider through GSM to the microcontroller which automatically disconnect the supply and when the bill is paid by the consumer, again when Energy provider

makes a call through GSM power supply will be automatically reconnected. For the information of power cut, microcontroller unit is driven by a battery. In normal case the system is driven by the power supply and when there is a power cut, the energy meter system will continue to work without any power off to the system. At the mean time output of battery power supply pin is connected to the microcontroller and when the pin connected to the power supply becomes 0 it sends the message to energy provider intimating the power cut through GSM. Another parameter of Intelligent Energy Meter is that it alerts the consumer about the energy usage when it reaches the threshold level by means of buzzer. Additional to this tempering circuit is also used for alerting the consumer about the power theft by means of transmitting the information through GSM modem.

II. LITERATURE SURVEY AND RELATED WORKS

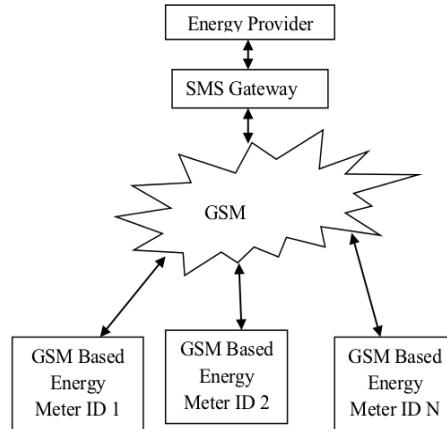
Utility billing is yet unavoidable in the World as for concern post-paid energy meter. In India, utilities are using a conventional way of billing. A meter reader goes Home home takes the meter reading and note down it, manually. These readings are brought to utility administration office. Human operator is inefficient to meet the future residential needs. Human efforts and errors in Electrical Department can be reduced by Automated Energy Meter. There are many AMR systems which are based on GPRS, Bluetooth, and GSM technology. For long distance data transmission GPRS is used but it is not possible to implement practically. In GSM technology instant billing system is introduced but there may be chances of missing SMS which decreases system performance but in proposed system this problem is overcome.

S.No	Title of the Project	Year of Publishing and Author	Methodology	Merits and Demerits
1.	Embedded Based Digital Energy Measurement for Improved Metering and Billing System	S.Gopuram, R.Suresh, T.Devika, N.Divesh, N.Suthanthra Vanitha PG Student, Embedded System Technologies, Knowledge Institute of Technology, Salem, India December-2013	Automatically meter reading is given to the user and EB office and uses two micro controllers are connected via RF wireless network to avoid any competition in meter reading.	Project cost is high and using RF communication over a long range is not possible.
2.	A Smart Wireless Electronic Energy Meter Reading Using Embedded Technology	Shradha Malai, Pallavi Vethkar, Kavita More, Prof. V. K. Bhushan (JSPM's BSIOTR (W), Pune University, India) January-2014	Traditional systems replaced by metering module and uses database for creation of bill through web portal	It can be accessed to remote areas but it becomes tedious for uneducated people
3.	Automatic Energy Meter Reading using Smart Energy Meter	H.M. Zahid Iqbal, M.Waseem, Dr. Tahir Mahmood, University of Engineering & Technology Taxila, Pakistan	Automated Energy Meter transmits information through GSM and connects and disconnects the power supply in case of consumer fails to pay bill.	It has no additional features for energy conservation.
4.	GSM Based Automatic Energy Meter Reading System with Instant Billing	Ashna k PG Scholar, Electronics & Communication Dept., Sudhish N George, National Institute of Technology, Calcutta	Traditional systems replaced by metering module and uses database for creation of bill through web portal	It simply transmits the generated bill and has no additional features

II. SYSTEM ARCHITECTURE

Figure 1 shows the complete system description. In this system each and every meter is provided a particular ID number. This ID number is provided according to SIM card unique service number. This system continuously monitors every meter reading and sends the energy meter reading to the energy Provider Company and consumer. Intelligent Energy Meter system also sends the information of power cut to the Energy provider and over usage of power consumption to consumer through SMS. This system also disconnects the power supply in case of consumer fails to pay the bill in a specified period. This SIM card service number is used to identify and retrieve customers detail for billing and identification purpose.

Figure 1: Overview of Intelligent Energy Meter



IV. DESIGN OF INTELLIGENT ENERGY METER

Automated energy Meter cannot be used for the detection of illegal use of electricity. Only power consumption is intimated to the consumer through GSM. It doesn't provide information about the power cut. Intelligent Energy Meter is designed to overcome all these drawbacks, and more it is designed to control the power consumption automatically using PIR Sensor. Here the load consumed is measured by pulses and noted as unit (meter reading), it counts continuously according to the load connected and it is given to the Microcontroller. The information is stored in EEPROM and periodically sent to the service provider and user through GSM Modem 900A. The output from the energy meter is given to the microcontroller when the clock signal reaches the count say, 180s (3 minutes) the data will be automatically send to the consumer and the service provider through GSM Modem. And also it displays the information with the help of 16*2

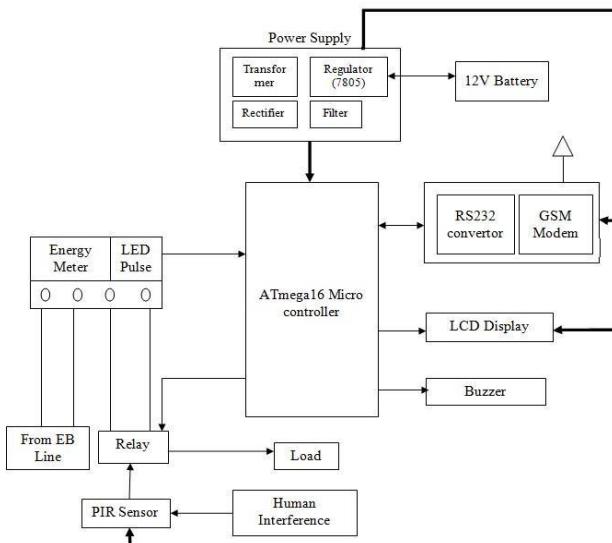


Figure 2: Block diagram of Intelligent Energy

If any person tries to tempering (power theft) with energy meter, the tempering unit will be activated and sends an alert message through GSM to consumer. Next parameter of the project is about intimation of power cut to the Electricity department. This is done by the means of 12V Rechargeable battery .Output from IC7805 voltage regulator (power supply module) is directly given to port D PD6 i.e., it always remains in high state. When there is no power then this pin becomes 0 through pull down resistor. Then automatically the service provider will get the intimation about the power cut through GSM when the circuit runs through battery. In normal case the entire system is driven by power supply and when there is a power cut the microcontroller unit gets supply through battery and hence it intimates the Energy provider. Figure 2 shows the block diagram of Intelligent Energy Meter.

V. HARDWARE DESIGN:

In Intelligent Energy Meter system single phase supply is given to the energy meter for calculating the power consumption. The microcontroller which is interfaced with the energy meter gets the readings continuously by means of pulses from the energy meter. For the information of power cut microcontroller unit is interfaced with the RTC clock and relay. For communication purpose microcontroller unit is also interfaced with GSM modem. Also for the

intimation of over consumption of energy buzzer is interfaced with the microcontroller. Further all the information of Intelligent Energy meter is displayed in 16*2 LCD display unit

i. POWER SUPPLY

The microcontroller and other devices get power supply from direct AC line through voltage regulator. Normally electronic devices such as microcontrollers, relays etc... require some DC voltage for its basic operation. For satisfying that requirement 230V AC is converted into constant 12V DC.

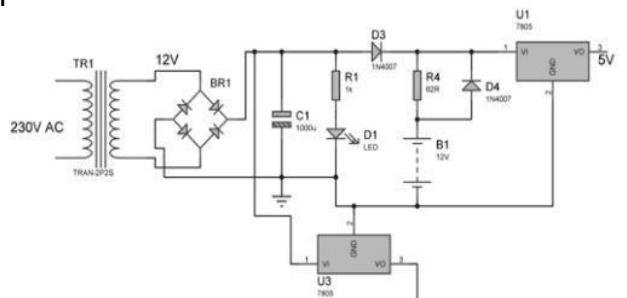


Figure 3: Power supply

A block diagram containing the parts of a typical power supply and the voltage at various points in the unit is shown in Figure 3. The AC voltage, typically $120 \text{ V}_{\text{rms}}$, is connected to a transformer, which steps that AC voltage down to the level for the desired DC output. A diode rectifier then provides a full-wave rectified voltage that is initially filtered by a simple capacitor filter to produce a DC voltage. This resulting DC voltage usually has some ripple or AC voltage variation. A regulator circuit can use this DC input to provide a DC voltage that not only has much less ripple voltage but also remains the same DC value even if the input DC voltage varies somewhat, or the load connected to the output DC voltage changes.

ii. MICROCONTROLLER UNIT

Microcontroller unit is used for controlling the entire Intelligent Energy Meter. The ATmega16 is a low-power CMOS 8-bit microcontroller based on the AVR enhanced RISC architecture. By executing powerful instructions in a single clock cycle, the ATmega16 achieves throughputs approaching 1 MIPS per MHz allowing the system designed to optimize power consumption versus processing speed. The ATmega16 is a powerful microcontroller that provided a highly flexible and cost effective solution to many embedded control applications. Figure 4 represents the pin diagram of ATmega 16 microcontroller.

(XCK/T0) PB0	1	40	PA0 (ADC0)
(T1) PB1	2	39	PA1 (ADC1)
(INT2/AIN0) PB2	3	38	PA2 (ADC2)
(OC0/AIN1) PB3	4	37	PA3 (ADC3)
(SS) PB4	5	36	PA4 (ADC4)
(MOSI) PB5	6	35	PA5 (ADC5)
(MISO) PB6	7	34	PA6 (ADC6)
(SCK) PB7	8	33	PA7 (ADC7)
RESET	9	32	AREF
VCC	10	31	GND
GND	11	30	AVCC
XTAL2	12	29	PC7 (TOSC2)
XTAL1	13	28	PC6 (TOSC1)
(RXD) PD0	14	27	PC5 (TDI)
(TXD) PD1	15	26	PC4 (TDO)
(INT0) PD2	16	25	PC3 (TMS)
(INT1) PD3	17	24	PC2 (TCK)
(OC1B) PD4	18	23	PC1 (SDA)
(OC1A) PD5	19	22	PC0 (SCL)
(ICP1) PD6	20	21	PD7 (OC2)

Figure 4: ATmega16 pin diagram

iii. ENERGY MEASURING AND AMPLIFIER MODULE

Energy measuring

module continuously measures the instantaneous voltage and current for finding the electric power. This data are display on to the Liquid crystal display. It spouts the power in the form of pulses and also gives information to the microcontroller for further process. The output pulses taken from the energy meter is a low level signal for processing. Therefore it is amplified by LM358 op-amp and fed to the micro controller. In amplifier module, the output pulses are given to the non inverting input of LM358 op-amp. The inverting input of an op-amp is maintained at low voltage level than the output pulses from energy meter by potentiometer.

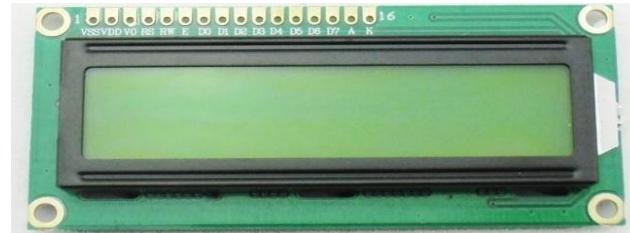
iv. RELAY SECTION

Relay circuits are interfaced with the microcontroller and PIR sensor. Relay allows one circuit to switch a second circuit which can be completely separate from the first. Relay circuit are used for switching the consumer's main consumption line between cut-off and power supply mode. It is proved to be very helpful feature for Energy Provider Company, who can remotely switch into cut off mode from power on mode of any consumer due to nonpayment of electricity bills / has large outstanding dues. It can reconnect the power supply after payment of dues.

v. LIQUID CRYSTAL DISPLAY

A liquid crystal display is interfaced with the microcontroller unit that are used to display the

meter reading, date, power factor, power status, total load used etc.,



vi. GSM MODEM

GSM is suitable for long distance communication to implement Intelligent Energy Meter system. A GSM modem is connected to microcontroller which would transmits data from meter system to consumer mobile phone and to the energy provider. It also receive command from the energy provider .AT commands set which stands for attention terminal are used by energy meter to communicate with the GSM modem. Figure 5 shows the GSM SIM 900A.



Figure 5: GSM SIM 900A

VI. IMPLEMENTATION MODEL OF PROPOSED SYSTEM

Figure 6 shows the Circuit diagram of Intelligent Energy Meter. In this project the pulse and unit (meter reading) count continuously according to load connected. Accordance to their demand of meter reading, Intelligent Energy Meter sends information to the energy Provider Company and th

Prototype based modal of Intelligent Energy Meter is shown below

Figure 6: Circuit diagram of Intelligent Energy Meter in Proteus 8.0

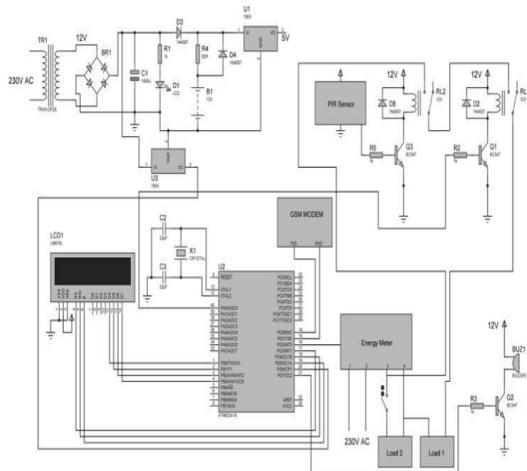


Figure 7: Prototype based modal of Intelligent Energy Meter Figure 8 shows the simulation output of Intelligent Energy Meter in AVR Studio.

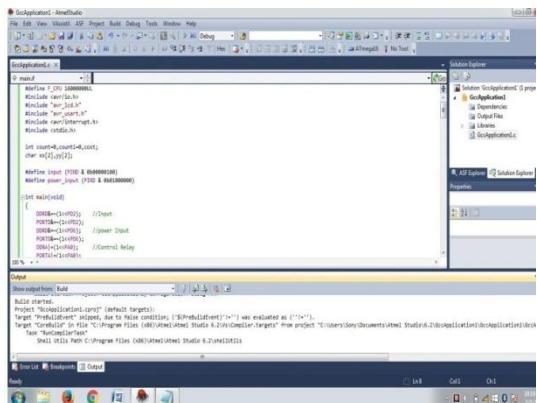


Figure 8: simulation output of Intelligent Energy Meter.

Figures listed below shows the execution output oer



Figure 9: Intelligent Energy Meter during execution

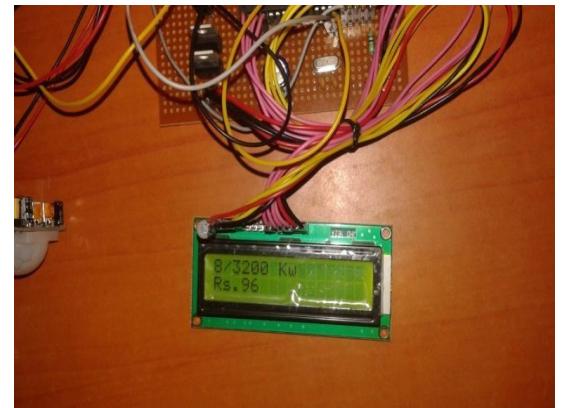


Figure 10: Total load consumed and bill amount displaying in LCD

VII. CONCLUSION

The project describes the design and working of Intelligent Energy Meter and represents how the Energy Meter can be used for Automatic Meter Reading. It is the most economical implementation to develop mankind in this era of technology. This GSM based energy meter is easy to installation and beneficial for both energy provider and consumer. With the present enhancement in the use of technology to facilitate mankind, it is an efficient and practical utilization of present networks. Intelligent Energy Meter not only solve the problem of manual meter reading but also provide additional feature such as power disconnect due to outstanding dues, power reconnect after pay dues, power cut alert, tempering alert. The statistical load used and profile can help customer manage their energy consumption. This system is secure and reliable because it can be

accessed only by an authorized person. If any unauthorized person tries to access the system this system send an alert to energy provider and consumer. This paper also shows that how customer can manage the load by using the Energy Meter. It provides ease in taking the meter readings, accuracy, detection of faulty conditions, power factor calculation, less operation cost and removal of possible corruption related to meter reading. Intelligent Energy Meter has the capability to revolutionize the energy meter market.

VIII. FUTURE ENHANCEMENT

it can't be hacked. Smart energy Meter can be modified for the detection of illegal use of electricity.

ACKNOWLEDGEMENT

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Lastly, we offer our regards and blessings to all of those who supported us in any respect during the completion of the project.

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There are few possibilities which can also be done on this project in future as we have provided flexibility in the project especially in controller section. The future research should include the proper methodology for measuring the power factor of the load.

Recommendations for future are as follows:

Instead of GSM networks, some other means of communication should be used.

Instead of sending information through SMS, Voice calls will be more efficient one.

In case of GSM, there must be security

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OVARIAN CANCER DETECTION AND IDENTIFICATION USING FUZZY C MEANS AND IMPROVED SOBEL EDGE DETECTION ALGORITHM

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Abstract- Now a day's image processing technique are very exigent and extensively used in charitable medical area for image amplification, where the time facet is very crucial to discover the anomalous tissues, especially in various cancer such as ovarian cancer, vagina cancer,etc.Ovarian cancer is the fifth most pervasive cancer for women in India. The PET/CT scan is most persistently used device for diagnosis. In this research, well organized algorithm is proposed for ovarian cancer, edge are detected based on improved sobel edge detection algorithm and nuclei segmentation of ovarian from PET/CT scan image using Fuzzy c means clustering algorithm, the behavior patterns of the algorithm are analyzed[1].Finally, edge detected image will be binary image, this image is converted into color image using olive color map function. The olive colormap function consists of colors that are shades of green and yellow.The improved sobel edge detection algorithm takes less computational time than edge detection algorithm and it has the greatest PSNR value than sobel edge detection algorithm.

Key words-Image processing, PET/CT scan, Fuzzy c means, improved sobel edge detection

1.INTRODUCTION

Image processing is a method to convert an image into digital form and perform some operation on it, in order to get an enhanced image or to extract some useful information from it. In this method, input can be image, video frames, etc and output may be image or characteristic associated with that image. Segmentation means partitioning an image into distinct region contain each pixel with similar attributes. The segmented image to be meaningful and used for image analysis and interpretation, the region are strongly related to depicted object or features of interest. A cancerous (malignant) tumor is a lump or growth of tissue made up from cancer

vision and machine vision. Edge detection refers to the process of identifying and locating shape discontinuities in an image [4]. The discontinuities are abrupt changes in pixel intensity which characterize boundaries of object in a scene. The most popular method is Fuzzy C-Means algorithm is a form of clustering in

cell which continue to multiply^[2]. Ovarian cancer is a type of cancer that begins in a woman's ovaries. Women have two ovaries that produce eggs as well as the hormones estrogen and progesterone. Real time diagnosis of cancer by using more reliable algorithms has been an active of the latest development in medical imaging and detection of ovarian cancer in PET and CT scan images.

Image segmentation method can be classified as thresholding, region based, supervised and unsupervised techniques. A CT/PET scan used to diagnose a cancer cell in whole body. The initial PET/CT scan the patient was sent for a CT guided biopsy, and during the procedure, the physician who could not see the lesion, sent for the fused images^[3]. The power of combined PET/CT imaging is in localizing disease before an abnormality is apparent on CT images. Physicians gain added confidence in their decision to treat a patient that has a negative CT scan, but has rising CA-125 levels and abnormal increased radiopharmaceutical uptake on the combined PET/CT scan.

Clustering algorithm is mainly divided into two techniques they are, hierarchical algorithm and partition algorithm. A hierarchical clustering algorithm divides the given data set into smaller subset. A partition clustering algorithm partition the data set into desired number of set in a single step. From the machine learning perspective, clustering can be viewed as unsupervised learning concept. Supervised machine learning means that the cluster depending on the predefined classes and training samples while classifying the data object. But in unsupervised machine learning, cluster does not depends the predefined classes and training samples.

Edge detection is an image processing technique for finding the boundary of object within images. It works by detecting discontinuities in brightness. Edge detection is used for image segmentation and data extraction in area such as imageprocessing,computer

which each data point can belong to more than one cluster or partition, this algorithm refers to soft clustering. This algorithm is prominent to cluster massive data rapidly and efficiently so it can be used in image processing techniques

especially in segmentation^[5]. This algorithm is used to detect the nuclei edge and highlight the cancer cell. And minute edges are detected by using improved sobel edge detection algorithm. The output image will be binary image, that image is converted into color by using olive colormap function.

2. PROPOSED METHOD

In this paper, we have proposed segmentation of ovarian PET/CT scan images for detection of cancer using FCM clustering technique and edge are detected by using improved sobel edge detection algorithm. A clustering can be defined as grouping of similar pixels where all the pixels within the group defined by similar relationship. Clustering is unsupervised classification because the algorithm automatically classifies object based on user given criteria. Edge detection refers to the process of identifying and locating shape discontinuities in an image. The discontinuities are abrupt changes in pixel intensity which characterize boundaries of object in a scene. In this paper, well organized algorithm is proposed for the

2.2 SEGMENTATION USING FUZZY C MEANS CLUSTER

Fuzzy clustering is a form a form of clustering in which each data point can belong to more than one cluster or partition. Fuzzy C-Means clustering also referred to as soft clustering^[7]. This algorithm work by assigning membership to each data point corresponding to each cluster center on the basis of distance between the cluster and the data point. The data near to the cluster center more its membership towards the particular cluster center. Fig1 .shows the steps for the Fuzzy C-Means clustering algorithm.

2.3 IMPROVED SOBEL EDGE DETECTION

The sobel edge filter is used to detect edge based on applying a horizontal and vertical filter in sequence. The sobel operator performs a two dimensional spatial gradient measurement on an image and so emphasized region of high spatial frequency that correspond to edge. Typically it is used to find the approximate absolute gradient magnitude at edge point in a n input gray scale

1	2	1
0	0	0
-1	-2	1

Fig 3. Vertical filter

The sobel operator is very similar to prewitt operator. Like prewitt operator, sobel operator is also used to detect two

detection of ovarian cancer, edge are detected based on improved sobel edge detection algorithm and nuclei segmentation of ovarian from PET/CT scan image using Fuzzy c means clustering algorithm. Finally, edge detected image will be binary image, this image is converted into color image using olive color map function. The olive color map function consists of colors that are shades of green and yellow.

2.1 ANTIQUE OF OVARIAN CANCER IMAGE

A 56-year-old woman with a history of ovarian cancer undergoes resection of the cancer followed by chemotherapy. The patient presented with rising CA-125 levels. A recent CT scan was negative. The physician referred the patient for a PET/CT scan^[6].

The power of combined PET/CT imaging is in localizing disease before an abnormality is apparent on CT images. Physicians gain added confidence in their decision to treat a patient that has a negative CT scan, but has rising CA-125 levels and abnormal increased FDG uptake on the PET/CT sc

Let us consider $X = \{x_1, x_2, \dots, x_n\}$ be the set of data points and $v = \{v_1, v_2, \dots, v_n\}$ be the set of clusters
Step 1: Randomly select ‘c’ cluster centers.
Step 2: Calculate the Fuzzy membership ‘ μ_{ij} ’ using:

$$\mu_{ij} = 1 / \sum_{k=1}^c (d_{ij} / d_{ik})^{(2/k_m - 1)}$$

Step 3: Compute the Fuzzy centers ‘ v_j ’ using:

$$v_j = (\sum_{i=1}^n (\mu_{ij})^m x_i) / (\sum_{i=1}^n (\mu_{ij})^m), \forall j = 1, 2, \dots, c$$

Step 4: Repeat step 2 and 3 until the minimum ‘j’ value is achieved or $\|U^{(k+1)} - U^{(k)}\| < \beta$
Where,
‘k’ is the iteration step
‘ β ’ is the termination criterion
between [0, 1]
‘U’ = $(\mu_{ij})_{n \times c}$ is the fuzzy membership matrix.
‘j’ is the objective function.

Fig 1 Fuzzy c means clustering Algorithm image^[8]. The sobel operator consist of 3*3 convolution masks as

-1	0	1
-2	0	2
-1	0	-1

Fig 2 .Horizontal filter

kind of edge in an image as vertical direction and horizontal direction. In this research improved sobel edge detection algorithm is proposed, this algorithm is same as that of sobel edge detection algorithm. But the minority differences is that, in sobel edge detection algorithm the dividend value is eight and in improved sobel edge detection algorithm the dividend value is two. The advantage of improved sobel edge detection algorithm takes less computational time than other edge detection algorithm.

2.4 OLIVE COLORMAP FUNCTION

MATLAB supports a number of build in colormap function such as jet, HSV, hot, cool, spring, etc. In this research, a novel color map function is introduced and it named as olive colormap function. The olive colormap function consists of color that is shades of green and yellow as

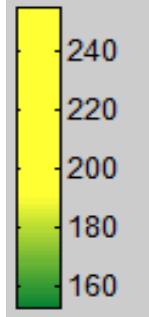
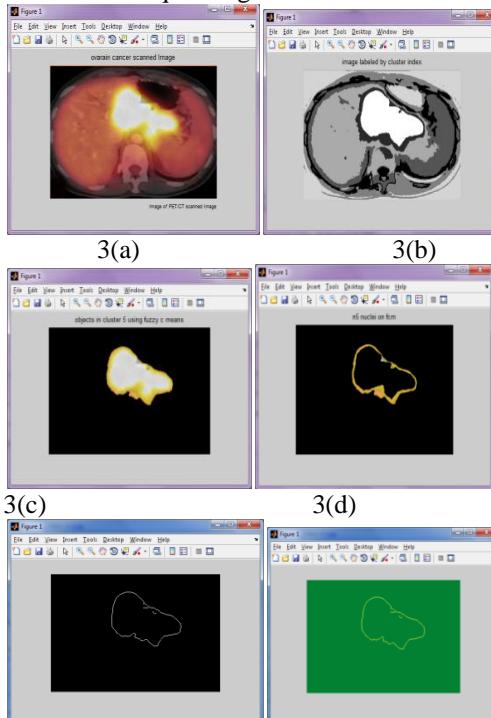


Fig 4 olive colormap

This function returns the colormap "olive". A colormap is a real $[:,3]$ array where every row represent a color with the option argument "n-color" the number of rows of the returned array can be defined. The default value is "n-color = 64".

3.EXPERIMENTAL RESULT

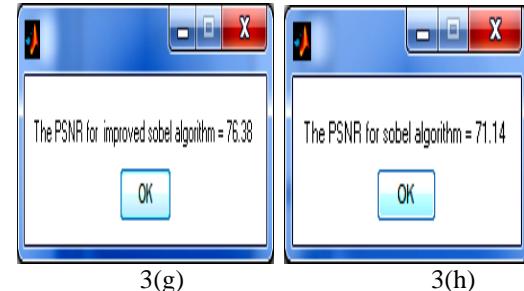
The various experiment carried out in ovarian cancer image data set algorithm of k means and fuzzy c means in MATLAB 7.6(2008R). The complete process of image segmentation for ovarian cancer images and the standard are summarized in subsequent figure.



5. CONCLUSION

Segmentation of ovarian cancer image is imperative in diagnosis and treatment in the field of medicine. Two segmentation methods are used to detect the ovarian

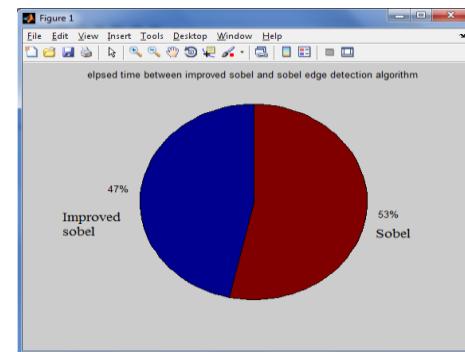
3(e) 3(f)



3(a). Original image, 3(b). Conversion of RGB into L*a*b color conversion, 3(c). Fifth clustered image using Fuzzy c means,3(d). Fifth nuclei image using FCM. 3(e). Minute edge are detected by using improved sobel edge detection algorithm, 3(f). olive colormap function, 3(g). The PSNR value for improved sobel edge detection algorithm, 3(h). The PSNR value for sobel edge detection algorithm.

4.COMPARISON WITH IMPROVED SOBEL AND SOBEL EDGE DETECTION ALGORITHM

This experiment reveals the fact that improved sobel edge detection algorithm consumes less elapsed time i.e. 4.038698 seconds than sobel edge detection algorithm, which takes 4.636568 seconds. On the basic of the result drawn by this experiment it may be safely stated that improved sobel edge detection algorithm less time when compared to sobel edge detection algorithm. Fig3. Shows the comparative analysis for improved sobel edge detection and sobel edge detection algorithm.



cancer such as cluster technique and edge based method. In this research, well organized algorithm is proposed for ovarian cancer, edge are detected based on improved sobel edge detection algorithm and nuclei segmentation

of ovarian from PET/CT scan image using Fuzzy c means clustering algorithm, the behavior patterns of the algorithm are analyzed. Finally, edge detected image will be shades of green and yellow. The improved sobel edge detection algorithm takes less computational time

be binary image, this image is converted into color image using olive color map function. The olive color map function consists of colors that are better than edge detection algorithm and it has the greatest PSNR value than sobel edge detection algorithm.

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ENSURING AUTHENTICATION SERVER BASED LOAD BALANCING TECHNIQUE IN PRIVATE CLOUD SYSTEM

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Abstract—Cloud computing has been considered as a new model of enterprise IT infrastructure, which can organize huge resource of computing, storage and applications, and enable users to enjoy ubiquitous, convenient and on-demand network access to a shared pool of configurable computing resources with great efficiency and minimal economic overhead. Attracted by these appealing features, both individuals and enterprises are motivated to contract out their data to the cloud, instead of purchasing software and hardware to manage the data themselves. So far, abundant works have been proposed under different threat models to achieve various search functionality, such as single keyword search, similarity search, multi-keyword boolean search, ranked search, multi-keyword ranked search, etc. Among them, multi-keyword ranked search achieves more and more attention for its practical applicability. In this project, we propose a secure and ranked multi-keyword search protocol in a multi-owner cloud model over encrypted cloud data, which simultaneously supports dynamic update operations like deletion and insertion of documents. A special tree-based index structure is constructed and efficient multikeyword ranked search is proposed. Due to the use of the special tree-based index structure, the proposed scheme can achieve sub-linear search time and deal with the deletion and insertion of documents flexibly. As a result, different data owners use different keys to encrypt their files and keywords. Authenticated data users can issue a query without knowing secret keys of these different data owners. Extensive experiments on real-world datasets confirm the efficacy and efficiency of our proposed schemes.

Index Terms—Searchable encryption, multi-keyword ranked search, dynamic update, cloud computing

1. INTRODUCTION

Cloud computing, or something being in the cloud, is an expression used to describe a variety of different types of computing concepts that involve a large number of computers connected through a real-time communication

network such as the Internet. In science, cloud computing is a synonym for distributed computing over a network and means the ability to run a program on many connected computers at the same time. The phrase is also more commonly used to refer to network-based services which appear to be provided by real server hardware, which in fact is served up by virtual hardware, simulated by software running on one or more real machines. Such virtual servers do not physically exist and can therefore be moved around and scaled up (or down) on the fly without affecting the end user—arguably, rather like a cloud. As cloud computing is achieving increased popularity, concerns are being voiced about the security issues introduced through adoption of this new model. The effectiveness and efficiency of traditional protection mechanisms are being reconsidered as the characteristics of this innovative deployment model can differ widely from those of traditional architectures. An alternative perspective on the topic of cloud security is that this is but another, although quite broad, case of "applied security" and that similar security principles that apply in shared multi-user mainframe security models apply with cloud security. The relative security of cloud computing services is a contentious issue that may be delaying its adoption. Physical control of the Private Cloud equipment is more secure than having the equipment off site and under someone else's control. Physical control and the ability to visually inspect data links and access ports is required in order to ensure data links are not compromised. Issues barring the adoption of cloud computing are due in large part to the private and public sectors' unease surrounding the external management of security-based services. It is the very nature of cloud computing-based services, private or public, that promote external management of provided services. This delivers great incentive to cloud computing service providers to prioritize building and maintaining strong management of secure services. Security issues have been categorized into sensitive data access, data segregation, privacy, bug exploitation, recovery, accountability, malicious insiders, management console security, account control, and multi-tenancy issues. Solutions to various cloud security issues vary, from cryptography, particularly public key infrastructure (PKI), to use of multiple cloud providers, standardization of APIs, and improving virtual machine support and legal support. With the character of low

Unfortunately, sharing data in a multi-owner manner while preserving data and identity privacy from an untrusted cloud is still a challenging issue, due to the frequent change of the membership. In this paper, we propose a secure multi keyword search, for dynamic groups in the cloud. By leveraging group signature and dynamic broadcast encryption techniques, any cloud user can anonymously share data with others. Meanwhile, the storage overhead and encryption computation cost of our scheme are independent with the number of revoked users. In addition, we analyze the security of our scheme with rigorous proofs, and demonstrate the efficiency of our scheme in experiments.

2.RELATED WORK

Searchable encryption schemes enable the clients to store the encrypted data to the cloud and execute keyword search over ciphertext domain. Due to different cryptography primitives, searchable encryption schemes can be constructed using public key based cryptography or symmetric key based cryptography. These early works are single keyword boolean search schemes, which are very simple in terms of functionality. Afterward, abundant works have been proposed under different threat models to achieve various search functionality, such as single keyword search, similarity search, multi-keyword boolean search, ranked search, and multi keywordranked search etc. A general approach to protect the data confidentiality is to encrypt the data before outsourcing. Searchable encryption schemes enable the client to store the encrypted data to the cloud and execute keyword search over ciphertext domain. So far, abundant works have been proposed under different threat models to achieve various search functionality, such as single keyword search, similarity search, multi-keyword boolean search, ranked search, multi-keyword ranked search, etc. Among them, multi-keyword ranked search achieves more and more attention for its practical applicability. Recently, some dynamic schemes have been proposed to support inserting and deleting operations on document collection. These are significant works as it is highly possible that the data owners need to update their data on the cloud server.

A secure multi keyword search method which utilized local sensitive hash (LSH) functions to cluster the similar documents. The LSH algorithm is suitable for similar search but cannot provide. In this scheme, different data owners use different secret keys to encrypt their documents and keywords while authorized data users can query without knowing keys of these different data owners.

2.1 PROBLEM DEFINITION

- Existing System methods not practical due to their high computational overhead for both the cloud sever and user.
- All these multi-keyword search schemes retrieve search results based on the existence of keywords, which cannot provide acceptable result ranking functionality.
- Some early Works have realized the ranked search using order-preserving techniques, but they are designed only for single keyword search.
- Identity privacy is one of the most significant obstacles for the wide deployment of distributed system. Without the guarantee of identity privacy, users may be unwilling to share the data's in distributed systems because their real identities could be easily disclosed to attackers.

3.OUR PROPOSED MODEL

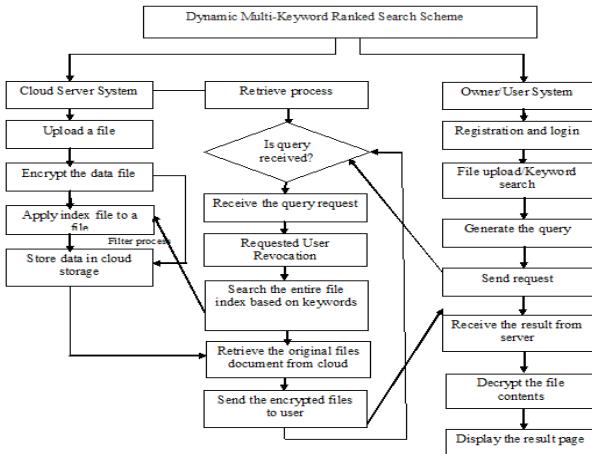
In this project, we present a secure multi-keyword ranked search scheme over data sharing cloud system, which simultaneously supports dynamic update operations like deletion and insertion of documents. Specifically, the vector space model and the widely-used TF * IDF model are combined in the index construction and query generation. We construct a special tree-based index structure and propose a “Greedy Depth-first Search” algorithm to provide efficient multi-keyword ranked search. The secure kNN algorithm is utilized to encrypt the index and query vectors, and meanwhile ensure accurate relevance score calculation between encrypted index and query vectors. In order to resist statistical attacks, phantom terms are added to the index vector for blinding search results. Due to the use of our special tree-based index structure, the proposed scheme can achieve sub-linear search time and deal with the deletion and insertion of documents flexibly.

Main contributions

- We define a multi-owner model for dynamic keyword search over encrypted cloud data.
- We propose an efficient data user authentication protocol, which not only prevents attackers from eavesdropping secret keys and pretending to be illegal data users performing searches, but also enables data user authentication and revocation.
- We systematically construct a novel secure search protocol, which not only enables the cloud server to perform secure ranked keyword search without knowing the actual data of both keywords and trapdoors, but also allows data owners to encrypt keywords with self-chosen keys and allows authenticated data users to query without knowing these keys.

Despite of the various advantages of cloud services, outsourcing sensitive information (such as e-mails, personal health records, company finance data,

government documents, etc.) to remote servers brings privacy concerns. The cloud service providers (CSPs) that keep the data for users may access users' sensitive information without authorization. A general approach to protect the data confidentiality is to encrypt the data before outsourcing. However, this will cause a huge cost in terms of data usability. For example, the existing techniques on keyword-based information retrieval, which are widely used on the plaintext data, cannot be directly applied on the encrypted data. Downloading all the data from the cloud and decrypt locally is obviously impractical.



3.1 proposed system architecture

5.CONCLUSION

In this project, a secure, efficient and dynamic search scheme is proposed, which supports not only the accurate multi keyword ranked search but also the dynamic deletion and insertion of documents. In this paper, we explore the problem of secure multi-keyword search for multiple data owners and multiple datausers in the cloud computing environment. We construct a special keyword balanced binary tree as the index, and propose a “Greedy Depth-first Search” algorithm to obtain better efficiency than linear search. In addition, the parallel search process can be carried out to further reduce the time cost. The security of the scheme is protected against two threat models by using the secure kNN algorithm. Experimental results demonstrate the efficiency of our proposed scheme. In future work, we focus schemes to deal with secure data sharing for dynamic groups in the cloud, we expect to combine the group signature and dynamic broadcast

encryption techniques. Specially, the group signature scheme enables users to anonymously use the cloud resources, and the dynamic broadcast encryption technique allows data owners to securely share their data files with others including new users. The authentication server compute the revocation parameters and make the result public available by migrating them into the cloud. Such a design can significantly reduce the computation overhead of users to encrypt files and the cipher text size. Specially, the computation overhead of users for encryption operations and the ciphertext size is constant and independent of the revocation users. To enable cloud servers to perform secure search without knowing the actual data of both keywords and trapdoors, we will systematically construct a novel secure search protocol.

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FEATURE SUPPORT ORDER EVALUATION TECHNIQUE ON USER OWN IMAGE IN MULTIFACTOR AUTHENTICATION

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Abstract— User authentication is one of the most important procedures required to access secure and confidential data. Authentication of users is usually achieved through text-based passwords. Attackers through social engineering of modern days have thus gone for alternative methods wherein graphical pictures are used as passwords. Image based authentication allows user to create graphical password which has advantages over text-based passwords. Graphical passwords have been designed to make passwords more.

Index Terms—Graphical password, input, live video, observation, user study.

1. INTRODUCTION

Human factors are often considered the weakest link in a network security system. Basically point out that there are three major areas where human network interaction is important: authentication, security operations, and developing secure systems. Here we focus on the authentication problem.

Passwords are used for –

- (a) Authentication (Establishes that the user is who they say they are).
- (b) Authorization (The process used to decide if the authenticated person is allowed to access specific information or functions) and
- (c) Access Control (Restriction of access-includes authentication & authorization).

Current authentication methods can be divided into three main areas:

- Token based authentication
- Biometric based authentication
- Graphical based authentication

cannot easily remember such random passwords. An authentication system should encourage strong passwords while still maintaining memorability. We

techniques easily obtain the text based password of a user. Apart from being vulnerable to social engineering attacks, text based passwords are either weak-and-memorable or secure-but-

Token based techniques, such as key cards, bank cards and smart cards are widely used. Many token-based authentication systems also use knowledge based techniques to enhance security. For example, ATM cards are generally used together with a PIN number.

Biometric based authentication techniques, such as fingerprints, iris scan, or facial recognition, are not yet widely adopted. The major drawback of this approach is that such systems can be expensive, and the identification process can be slow and often unreliable. However, this type of technique provides the highest level of security.

Graphical based techniques are the most widely used authentication techniques and include both text-based and picture-based passwords.

Graphical password schemes have been proposed as a possible alternative to text-based schemes, motivated partially by the fact that humans can remember pictures better than text. People select predictable passwords. This occurs with both texts based and graphical passwords. Users tend to choose passwords that are memorable in some way, which unfortunately often means that the passwords tend to follow predictable patterns that are easier for attackers to exploit. While the predictability problem can be solved by disallowing user choice and assigning passwords to users, this usually leads to usability issues since users

propose that users be persuaded to select more secure passwords.

2.RELATED WORK

Text passwords and personal identification numbers (PINs) are the dominant authentication method as they are simple and can be deployed on systems including public terminals, the web, and mobile devices. Here we focus on the authentication problem. The most common

knowledge-based authentication techniques that leverage peoples' ability to memorize and recognize visual information more readily than alphanumeric information. Some types of graphical password are,

Locimetric Password Schemes

Cued-recall - involve users selecting regions on one or more images. During login, users are shown a previously selected image, and they enter a password by clicking on a sequence of locations on the image. Authentication is successful if the XY coordinates of these clicks match a previously stored set of password points. While simple and effective, cued-recall graphical passwords present new security issues.

Cued-Click Points (CCP) - Addressing this issue, the cued-click points system presented a series of images and allowed users to select only a single point per image, reducing the need to select common hotspots.

2.1 PROBLEM DEFINITION

For instance, users typically select hotspots locations on an image that are highly distinguishable memorable, and also predictable to attackers.

Although more secure, this technique was prohibitively slow and error prone.

A second key problem with locimetric systems is observation, as password click-points can be acquired by attackers after viewing a single authentication process.

Securing against observation attack for graphical password systems is critical.

Multifactor authentication, based on the combination of two or more independent processes, can boost security. In typical multifactor authentication schemes, physical tokens are used to generate and store secrets for user authentication. For example,

- One-time password generation
- User snapping a picture of a QR code
- While these tools offer increased security, they

are susceptible to particular kinds of attack, such as Man-in-the-Middle schemes that snoop on, or alter, messages transmitted between a user and the system.

computer authentication method is to use alphanumerical usernames and passwords. This method has been shown to have significant drawbacks. Graphical password systems are

• 3. OUR PROPOSED MODEL

Various password schemes have been proposed as alternatives to text-based passwords. Research and experience have shown that text-based passwords are fraught with both usability and security problems that make them less than desirable solutions. To address this issue, we present a new point-click graphical password system, PassBYOP—Bring Your Own Picture that increases resistance to observation attack by coupling the user's password to an image.

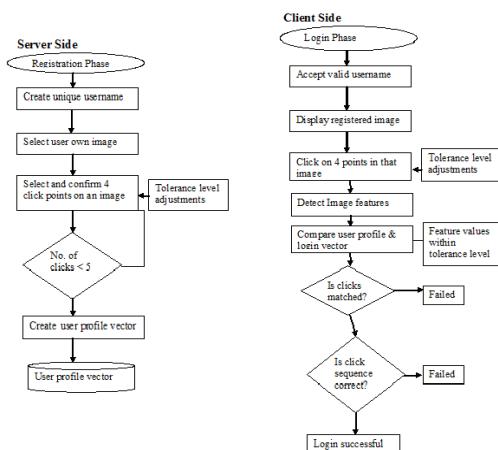
PassBYOP seeks to make graphical passwords more secure against intelligent guessing and shoulder-surfing attacks. PassBYOP tackles this problem by introducing a physical token into the authentication process. PassBYOP is a multifactor authentication system—both a physical token and a password are needed to authenticate. This way, PassBYOP transforms a graphical password, which is traditionally a single factor authentication mechanism, to a more secure multifactor authentication method. Assuming users have previously created a password, login involves users identifying themselves at a PassBYOP terminal in a manner fitting the system and use context. We argue this raises the resistance of PassBYOP to attacks based on password observation and guessing as attackers need to possess a user's genuine token or a high fidelity copy.

We present an implementation for the scheme based on SIFT image features. PassBYOP selections are stored on the authentication server as a set of optical features computed with the SIFT image processing algorithm. After login attempt the matching process involved which minimizing the Euclidean distance between the sets of feature points in the original and entered password items. Subsequently, a threshold on the percentage of matching features was used to determine whether the entered password matched the original.

• PassBYOP substantially increases resistance to shoulder-surfing attacks compared with existing graphical password schemes.

• PassBYOP conserves the beneficial properties of graphical passwords while increasing their security.

- The proposed scheme shows promise as a usable and memorable authentication mechanism.
- PassBYOP approach is flexible and user friendly.
- Avoided guessing attacks and several possible attacks
- Provide high level user security with minimal cost
- Supports more number of user authentication applications



3.1 Proposed system architecture

5.CONCLUSION

In summary, this project proposed improving the security of graphical password systems by integrating live video of a physical token that a user carries with them. It first demonstrates the feasibility of the concept by building and testing a fully functional prototype. It then illustrates that user performance is equivalent to that attained in standard graphical password systems through a usability study assessing task time, error rate, and subjective workload. Finally, a security study shows that PassBYOP substantially increases resistance to shoulder-surfing attacks compared with existing graphical password schemes. Ultimately, we argue this project demonstrates that PassBYOP conserves the beneficial properties of graphical passwords while increasing their security. While this approach was simple and effective, greater speed and efficiency would be attained with a native application. By taking

advantage of users' ability to recognize images and the memory trigger associated with seeing a new image, PassBYOP has advantages over other systems in terms of usability. But in proposed system user verification process is not achieves high level security so we focus on verification process and propose Feature points with order evaluation approach i.e not only verify feature points but also verify the order of feature points. During registration the feature points are stored in the server with its order sequence and match the feature points and its sequence thus achieve high level security and also provide better usability.

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Security Management for Controlling Theft Using Arduino UNO

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Abstract—Now-a-days theft has become a big threat to people and their property. Securing and monitoring has become the main objective for controlling theft. Several technologies have been developed to control theft. The existing technologies can control only theft but not the culprits who steal the properties. The proposed system is used to provide security to control theft and giving alert to owner when there is a break-in, using Bluetooth. The advanced locking system technology is implemented along with the traditional locking system. There are three techniques to prevent theft. First, IR sensor which is placed in front and rear side of the house. This IR sensor senses the object passes near it. Then the passcode lock system is used to detect the passcode is correct or not. If the entered passcode is incorrect the Arduino UNO controller will be activated. Third is using indicators, it consists of two switches. The two switches are considered as the main power line and fuse box which is placed at the house. When these two switches are on off mode it is considered as power cut. But incase only when the fuse box switch is off the controller activates automatically and the alert is send to the owner through the Bluetooth application which is installed in the mobile phone. If there is any interrupt in any of these techniques, the message will be send to the owner and police station. Total system shutdown option is activated using this application. Then the security system starts monitoring the house. This shutdown option can be made on whenever necessary. This may reduce the power consumption. Such security system gives service at low cost compared to the cost of the available security systems.

Keywords—Theft, Arduino UNO, Android application, Bluetooth.

I. INTRODUCTION

In recent years theft has been seriously increased and there is no safety for people and their property. Security plays a vital role in monitoring a building in the absence of presence of people. Theft refers to the crime involving the taking of a person's property without their permission. Most of the theft happens by

door break-ins. 75% of theft occurs during night time. The thief may take off the fuse, so they cannot be easily identified and if they caught, they can be easily escaped. Bluetooth is mainly used to provide the message and the application which is used to conserve the power when the system is not in use. This will also give alert to the owner through mobile phone. In this industrialized world, stealing valuable and prosperous things has become a serious concern for police and common people. Theft may mentally affect the people because their hardwork for years has been lost in a

single day. List of crimes which are increased in recent years are given in the below Table I.

TABLE I. CRIME RATE STATISTICS

Cases	2015	2016
Burglary	449	2,132
Vehicle theft	2,893	4,447
Robbery	206	901

II. LITERATURE REVIEW

Even though many technologies have been developed to prevent and stop theft, still many thefts occur despite of these techniques. Theft mainly occurs on the carelessness of the people. So a proper security system is to be developed. In some cases people inside the house will be attacked by the intruders. All home security systems work on the basic principle of securing entry points like doors and windows. Despite of the size of the house or the number of doors and windows or inner rooms a house owner needs to protect, the only difference is in the number of security components employed throughout the house and monitored.

Theft mainly occurs on the carelessness of the people. In such case one should ensure that their house doors and windows are closed and locked. A detailed inventory must be kept of the valuable possessions.

A. Existing Methods

The existing method uses various technologies for controlling theft and providing security for houses. Technologies such as GSM, ZigBee, WSN are used.

Let us consider the different existing systems as follows.

placed to detect the person. On detecting a person pass code will be opened to enter the secret code. By entering the correct pass code based on owner's reply door will be opened. Whereas on wrong pass code buzzer alert is given. The communication is carried out by GSM.[12]

The evolution of fingerprinting technology gives security to various places. Two stage verification process are used for smart homes, they are by using device fingerprints and login credentials. It provides geographical location while computing fingerprint. This device identification can identify about 97.93% of the devices. [3]

Microcontroller based automated home security system is password protected with an LED based resistive screen which operates by detecting difference in light intensity captured by photo diode which is emitted by surrounding red LEDs and reflected. Fire alarm system uses temperature sensor which senses sudden increase in temperature and activates the alarm.

B. Home Security

Security has becoming an important issue. Home security is becoming a necessity as the intrusions are increasing. A traditional home security system gives the signals in the form of alarm. Monitoring systems are common in many areas in this industrialized world. Home security is the best deterrent. It should provide security and safety features for home by alarm. These alarms can be the residents from natural and human dangers.

III. PROPOSED METHOD

The proposed method provides a safe and secured environment designed by microcontroller which control theft. A security system is designed to control theft at home, when there is a break-in or when the entered pass-code is incorrect. In case of any break-in the Bluetooth connected to the controller sends message to both the owner of the house and to the police station without any intimation to the thief. In addition to this using android we can make the home under total shutdown, so that at any critical situation Bluetooth sends message. Therefore people's assets and properties are saved easily from theft and the thief can be easily caught. So it will be a big warning to all the thieves who are trying to steal assets from home. By doing so we can control theft and make a safe and developed country all over the world. Thus, this project protects the theft and saves the properties from intruders.

The problem with the theft and how it occurs are identified. A microcontroller based security system is designed; by this method the house is fully protected. The conceptual block diagram shows the concept of the proposed method, this is shown in Figure 1.

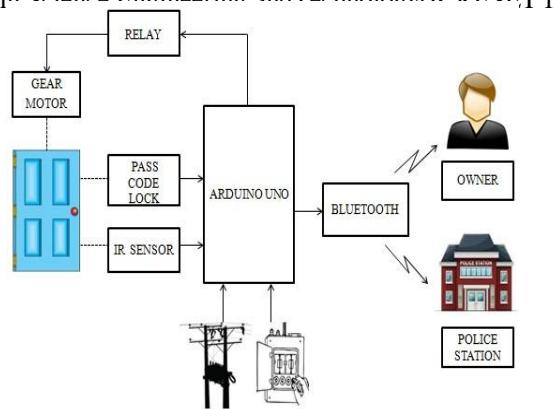


Fig. 1. Block Diagram of Proposed System

A. Working of the Design

The proposed system is placed at the door where the house is to be protected. The IR sensor is placed in front and back side of the house. When the sensor detects an object, information is given to the microcontroller, and then a passcode lock system is also placed at the door. The microcontroller is programmed to monitor the break-ins or wrong passcode at the door. When there occurs any disturbance or the entered passcode is wrong, Bluetooth will be activated. Using Android the home security can be activated when there is total shutdown in the Bluetooth application. The Bluetooth sends message to both the owner of the house and to the police station. The indicator interfaced with the controller is to know that, the power off is in the main line or in the fuse box.

B. Sensor and Passcode Lock System

Two IR sensors and a passcode lock is place at the door which is used to protect the house form theft. Either the passcode or ordinary lock is used or both the passcode lock and the traditional lock system. The IR sensor detects an object near it and sends information to controller.

Whereas the passcode lock system is connected to the microcontroller. The passcode lock is always enable to enter the passcode. In this project a 4pin lock is set for simplicity. The buttons are pressed according to the pattern arranged. When the entered passcode is correct the door will be opened, on wrong passcode message will be send to the owner and police station.

The mechanical connections include IR sensor, passcode lock and a gear motor. The gear motor which is connected to the relay runs only when the controller gives intimation that the entered passcode is correct. When the instruction is given by the controller the door will be opened with the help of a gear motor. If passcode is incorrect no connection is set then the door will not be opened.

C. Indicator

fuse box which is fixed in the house. Whenever the both switch is made off no beep sound is heard from the phone which is placed near the Bluetooth. If one line is off a beep sound from phone is heard. This is made when the thief tries to off the switch at the fuse box. So that theft could be easily happened in the dark. By the beep sound the owner will be intimated that someone tries to illegally enter the house.

D. Controller and Output Unit

The microcontroller is the heart of the system. Arduino UNO is used. The controller continuously monitors the position of the door. If there is any disturbance, occurs at the door or the entered passcode is wrong or the fuse indicator is alone off or the sensor senses the object, the microcontroller immediately activates the Bluetooth. Output unit, this performs the important functioning of security system. It sends message to mobile devices via Bluetooth.

Bluetooth alert system is designed to detect intrusion from the unauthorized entry into a building area. Security alerts are used in residential, commercial, industrial and military purpose for protection against theft or property damage, as well as personal protection against intruders.

When an unauthorized persons enters into a house using the wrong authentication, Bluetooth automatically generated and the security alert is sent to the police officer and owner of the house. So that within a fraction of time the properties can be protected against unauthorized persons.

IV. HARDWARE DESCRIPTION

A.

Arduino UNO

The Arduino Uno is a microcontroller board, based on the ATmega328. It has 14 digital input/output pins which 6 can be used as PWM outputs, 6 analog inputs, a 16 MHz crystal oscillator, a USB connection, a power jack, an ICSP header, and a reset button. It contains everything needed to support the microcontroller; simply connect it to a computer with a USB cable or power it with an AC-to-DC adapter or battery to get started. It can operate at a wide range of power-supply voltages, from 1.8V to 5.5V. Thus it can be used for battery-powered applications. ATmega328 can operate upto 20MHz frequency.

Arduino UNO board contains various models; here Arduino UNO R3 model is used. The front view of Arduino board is shown in the figure 2.

B. IR Sensor An infrared sensor is an electronic instrument which is used to sense certain characteristics of its surroundings by either emitting and/or detecting infrared radiation. A non contact infrared sensor is a device that measures the energy radiated from an object, without touching it. Infrared sensors are also capable of measuring the heat being



Fig. 2. Arduino UNO R3 Model Board

The AVR core combines a rich instruction set with 32 general purpose working registers. All the registers are directly connected to the Arithmetic Logic Unit (ALU), allowing two independent registers to be accessed in one single instruction executed in one clock cycle. The technical specification of Arduino UNO board is shown in the table II.

TABLE II. TECHNICAL SPECIFICATION OF ARDUINO UNO BOARD

Parameters	Specification
Microcontroller	ATmega328
Operating Voltage	5V
Input Voltage(recommended)	7-12V
Input Voltage (limits)	6-20V
Digital I/O Pins	14 (of which 6 provide PWM output)
Analog Input Pins	6
DC Current per I/O pin	40 mA
DC Current for 3.3V Pin	50 mA
Flash Memory	32 KB of which 0.5 KB used by boot loader
SRAM	2 KB
EEPROM	1KB
Clock Speed	16 MHz

emitted by an object and detecting motion. A simple IR transmitter and receiver is shown in the figure 3.

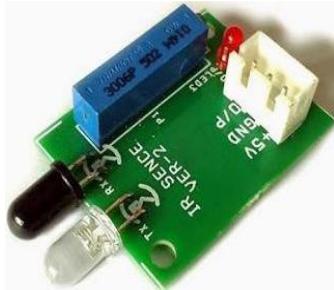


Fig. 3.
IR
Sensor

The IR transmitter part consists of an Infrared light emitting diode that can capable of sending modulated data within infrared band. The receiver module require the incoming data to be modulated at a particular frequency and would ignore any other IR signals. The technical specification of IR Sensor is given in the below Table III.

TABLE III. TECHNICAL SPECIFICATION OF IR SENSOR

Parameters	Specification
Transmitter frequency	38.7 kHz
Receiver frequency	32kHz to 42 kHz
Maximum current	1A
Maximum voltage	1.8V
Lenses length	15mm

V. SOFTWARE DESCRIPTION

A. Installing Arduino IDE

The Arduino IDE runs on all the latest versions of Microsoft Windows. To download the newest version of the IDE from the download page access the Arduino website www.arduino.cc. In the Arduino IDE, new versions of the windows IDE are available as an installer that we can download and run, instead of downloading a ZIP file. Install drivers for the Arduino USB port and this process depends on the Arduino board. After the drivers have been installed, start the executable from the archive's main directory by double clicking on it.

B. Arduino UNO Programming

The Arduino board can be programmed using the Arduino IDE software. The editorial window will open when the Arduino IDE software is opened. This window consists of two important parts, one is setup part and the second is main loop. The Arduino ports such as input, output and constant functions are defined in setup part and looping conditions are coded in main loop. Then the program is compiled for errors and warnings. On successful debugging the code is embed to the controller through the upload option.

C. Bluetooth Application

The Bluetooth application use here is ‘Blue Act’. This is used to send message. By using this

application power consumption can be reduced by simply activating the total shutdown option. The message can be typed according to the

owner’s convenience. Whenever the mentioned interrupt occurs this will intimates the owner. The Blue Act design is given in the Fig. 4.



Fig. 4. Security using Blue Act

VI. CONCLUSION

In this proposed paper, a theft monitoring embedded security system is designed using Arduino UNO to detect theft at home from intruders. Movement of any object near the sensor is sensed and alert is given when the system is under total shutdown. In addition passcode lock system and indicator are used as for further security. Hence the status of the house can be monitored and leads to effective security management. The system is more effective and the cast is than the previous one.

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ONLINE LOAN APPLICATION PROCESS

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Abstract

ct—

Online loan application process facilitates a customer to apply for a loan through online and track the status from time-to-time. The customer can directly apply for loan by selecting a bank and loan type from the available list. This system can be controlled by the administrator. This not only helps the customer but also the loan section to check and process the task quickly. The employee of particular section undergo few documents verification through online and sends notification to the customer which contains date and time to visit the bank along with the necessary documents listed.

Keywords—
banking,datamining,documentupload,online verification,

INTRODUCTION

Most of the bank prefer online loan application process to reduce burden of bank employees.once the customer enter into our site they can type which type of loan they need for example home loan,gold loan educational loan etc.,after the loan type is entered there displays a list of banks and their rate of interest.Now the customer can select the bank they wish to get loan.Then the customer needs to upload the documents necessary for loan. Once the customer uploads the documentsthey can track the status from time-to-time.The members of progress department collects all the documents and sends it to the verification

department. The members of the verification department verify all the documents and either accept/reject the document.

It is unique in such a way,it not only helps the customers but also the loan section to check the pending,assign it to the departments,complete the formalities and procedures between the departments and arrive at decision to verify fact in addition to providing a transparency system for everyone.Once the verification is completed the verification deparment sends message to the administrator.Then the administrator sends this

notification message to the customer.The notification coantains time and date along with the document listed.

RELATED WORKS

Types of loans:

- 1.Secured Loan:A secured loan is a loan in which the borrower pledges some asset as collateral. a.mortage loan
b.car loan
c.property loan
- 2.Unsecured Loan:Unsecured loans are monetary loans that are not secured against the borrower's assets.The interest rates applicable to these different forms may vary depending on the lender and borrower.

- a.credit card debt
- b.personal loans
- c.bank overdrafts
- d.corporate bonds
- e.peer-to-peer lending

3.Demand Loan:These are short term loan that are typically in that they do not have fixed dates for repayment and carry a floating interest rate which varies according to the prime lending rate.This may be secured or unsecured.

4.Subsidized Loan:This loan is a loan on which the interest is reduced by an explicit or hidden subsidy.

ordination between different departments in the Bank. The allowance to check the status of customers file which leads to customer dis-satisfaction. The customer cannot apply directly through online.The customer needs to download the application form and fill it and take it to the bank and the customer takes only few documents and they may not know what are all the necessary documents to be taken.This may lead the customer to go to bank too many times.If there are too many customers in bank means everyone has to wait for a long period of time.And if once the documents are submitted for verification the customer cannot easily know the status of verification and the verification also takes too many days. Once if the document is rejected its waste of time and effort for the customer.

Drawback

s:

It is slower and less efficient.

There is no good co-ordination between departments.

It does not provide effective forwarding system to move the document from one level to another.

It is not a user-friendly interface.

It cannot facilitate the services from online.

PROPOSED SYSTEM

This system maintains the information related to different departments and stored at a central database, which leads easy accessibility and consistency.Interest rates of different banks and the other details are also available at the click of a mouse.Customer can apply for a loan and track his file details from online.The decision process is faster and more consistent.Provides good communication between two departments.Provides a facility to

5.Concessional Loan:A concessional loan, sometimes called a "soft loan", is granted on terms substantially more generous than market loans either through below-market interest rates, by grace periods or a combination of both.

EXISTING SYSTEM

The existing system is a manual one. The bank employee cannot effectively interact with different branches and there is lack of security and cannot track details easily. It doesn't provide proper co-

generate the reports very easily.In this system the customer can apply through online for loan.The customer can fill the application and submit through

Online and the documents can also be submitted through online as a scanned copy.Once submitted,the progress department collects all the documents and sends it to the verification department.The verification department after verification accepts/rejects the document.this message is sent to admin and the admin sends this notification to the customer.If the document is accepted,the date and time to submit the document in bank along with the list of documents to be brought for submission is sent as notification message to the customers mail.

DESIGN

The three major designs are
1.Input design 2.Output design 3.High level design

Input design: The input design is the link between the information system and the user. It comprises the developing specification and procedures for data preparation and those steps are necessary to put transaction data into a usable form for processing can be achieved by inspecting the computer to read data from a written or printed document or it can occur by having people keying the data directly into the system. The design of input focuses on controlling the amount of input required, controlling the errors, avoiding delay, avoiding extra steps and keeping the process simple. The input is designed in such a way so that it provides security and ease of use with retaining the privacy. Input Design considered the following things:

What data should be given as input?

How the data should be arranged or coded?

The dialog to guide the operating personnel in providing input.

Methods for preparing input validations and steps to follow when error occur.

Output design: A quality output is one, which meets the requirements of the end user and presents the information clearly. In any system results of processing are 1. Designing computer output should proceed in an organized, well thought out manner; the right output must be developed while ensuring that each output element is designed so that people will find the system can use easily and effectively. When analysis design computer output, they should Identify The output form of an information system should accomplish one or more of the following objectivesConvey information about past activities, current status or projections of the Future Signal important events, opportunities, problems, or warnings.

Trigger an action.

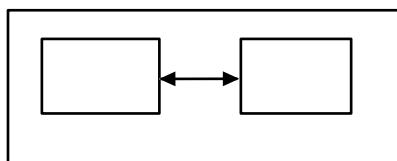
Confirm an action.

High level design: There are 2 types

1. System design

2. Sub-system design

System design: Understanding bigger application with its external interfaces is called System Design.



department check the details as per the documents provided by the

Figure 1:system design

Sub-system design: Understanding bigger system into smaller independent working systems is called subsystem design.

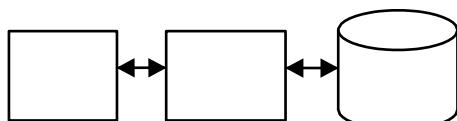


Figure 2: sub-system design

MODULES

communicated to the users and to other system through outputs. In output design it is determined how the information is to be displaced for immediate need and also the hard copy output. It is the most important and direct source information to the user. Efficient and intelligent output design improves the system's relationship to help user decision-making.

the specific output that is needed to meet the requirements.

2. Select methods for presenting information.

3. Create document, report, or other formats that contain information produced by the

application

n.

Customer module: This module allows the customer to view the list of banks and their interest rates .It provides customers to apply for the loan, check the status of the loan at any point of time and communicate with the bank employee who verifies the document if necessary. It allows the customer to upload the documents for the verification.It allows email facility for communication.

Checklist module: This module allows the checklist department to view their applications which are assigned to them.Checklist department collects the documents according to the checklist and forward it to verification department.This module is mainly used for transfer of document between different departments.

Verification module: This module allows the employees of verification department to view

applicants.Verification department sends

session and date along with the list of documents to be brought for submission to the administrator.The administrator sends the notification to the applicant provided by the verification department.

CONCLUSION AND FUTURE WORKS

The entire project has been developed and deployed as per the requirements stated by the bank , it is found to be bug free as per the testing standards that are implemented.

There are four types of module.They are

1.Administrator

module

2.Customer

module

3.Checklist

module

4.Verification

module

Administrator module: This module is responsible for coordinating the other customer through email and view the pending application and update the status of the

helps Bank Agents and Customers. It and provides effective communication between bank employes and the customers. It also provide the services very promptly with proper procedures. Any specification-untraced errors will be concentrated in the coming versions, which are planned to be developed in near future. The system at present does not take care payments information through this application since it requires payment gateway. Our team is planning to integrate in future and do it as an enhancement.

modules. It allows admin to create/update/delete and view different departments and it can create logins for different customers. It can manage loan interest rates of different banks and facilitates to view the new applicant details and assign it to different employees in checklist department. It sends the message to the

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Preparation of Antibacterial Lotion Using Silver Incorporated TiO_2 Nanoparticles and Assessment of the Photocatalytic Activity of these Nanoparticles.

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Abstract

Transition metal oxide based disinfectants offer an effective approach for water purification and it is easy way to prepare an antibacterial lotion without hazardous substances like triclosan and trichlocarbon which have been reported to cause health hazards in humans by FDA (Food and Drug Administration). In this study, silver (Ag) incorporated titania (TiO_2) nanoparticles were prepared by sol-gel method on P25 TiO_2 nanoparticles and were characterized by XRD, SEM, EDX and UV-Vis absorption spectroscopy. The

antibacterial potency of Ag incorporated TiO_2 nanoparticles was investigated against Gram-negative bacteria, *Escherichia coli* (*E. coli*) and Gram-positive bacteria, *Staphylococcus aureus* (*S. aureus*) by determining the minimal inhibitory concentration (MIC), the growth curve of bacteria and using the zone of inhibition technique under visible light and in dark media with different catalyst amounts of 12 and 24 mg, respectively. ,Keywords: Antibacterial lotion, Sol-gel method, Ag incorporated TiO_2 nanoparticles, Photocatalytic activity

1. Introduction: Airborne transmission of nosocomial pathogens is of clinical and public interest [1]. Microbial infections are a serious problem in hospitals of many countries [2]. In order to prevent the transmission of such airborne infectious diseases to and control the spread of several types of airborne pathogens, self-sanitizing environmental surfaces are receiving due recognition in public places and dwellings [3, 4]. In recent years, nanoscaled antibacterial materials as novel antimicrobial species have been observed as promising candidates for application owing to their high surface-to-volume ratio and their novel physical and chemical properties on the nanoscale level. Many kinds of nanometer-sized antibacterial materials such as TiO_2 , ZnO , MgO , chitosan, calamine, copper, and silver have been reported [5–10]. Titanium dioxide (TiO_2), a metal oxide semiconductor, has been found to be one of the most effective photocatalysts due to its high efficiency and stability (Hassan et al., 2011). TiO_2 is white, inexpensive, and nontoxic [11]. It is one of the most widely used photocatalysts for disinfection [12, 13]. Since the discovery of the photocatalytic splitting of water on a TiO_2 electrode under ultraviolet (UV) light [14], a great deal of research efforts have been made on semiconductor-based photocatalysts on both energy conversion and environmental applications. Bacterial cultures in contact with TiO_2 -Pt thin film irradiated with near-UV light had a significant reduction in the number of cultivable cells [15]. The photocatalytic property has been widely studied in a variety of microorganisms such as viruses, bacteria, fungi, and algae. The main advantages of photocatalytic method

are operation under ambient temperature and pressure, high stability and the low cost of catalyst, completed mineralization without creating secondary pollution, and possibility of using solar light ([12, 16–22] dheaya et al., 2008, [23]). The TiO_2 photocatalyst is investigated as inhibitory agent for bacterial growth. TiO_2 is used in form of powder, films, and nanocomposites with a strong UV light as well as visible light. Little research work has been done regarding coating of metal-doped and nondoped TiO_2 nanoparticles aqueous solutions on substrates [12, 15, 17, 19, 23]. Recently, nanosize (bandgap of the nanoparticles increases with the decrease of their size, and the small TiO_2 particles offer a very large surface area [25]. Conventional methods of manual disinfection with wiping are not effective in the longer term, cannot be standardized, and are time intensive and labor intensive. In addition, there are problems associated with the use of aggressive chemicals [26]. There certainly is an urgent need of “green” products and procedures that can serve as environmentally surface disinfectants. Self-cleaning surfaces can become a reality because of photocatalytic coatings containing TiO_2 nanoparticles. These nanoparticles initiate photocatalysis, a process by which pollutants are broken down by exposure to the sun’s ultraviolet rays [27]. Today’s self-cleaning surfaces are made by applying a thin nanoparticles coating film, painting a nanoparticles coating on, or integrating nanoparticles into the surface layer of a substrate material. Several studies show that TiO_2 nanoparticles create nontoxic, environmentally friendly, and hygienic photocatalytic coating. It creates a semipermanent invisible coating on most surfaces to provide antibacterial, antimold,

Proceedings For First International Conference on Recent Explorations in Science, Engineering and Technology(ICRESET'17) antifungal, UV protection, deodorizing, air purification, self-cleaning, and self-sanitizing functionality [20, 23]. TiO₂ nanoparticles can create a self-cleaning effect on glass and ceramic surfaces [27]. The hypothesis that coating on substrates with silver-doped TiO₂ nanoparticles will decrease bacterial colonization is promising. In this paper, we demonstrate the photocatalytic and bactericidal activity of metal-doped TiO₂ and silver-doped titanium. TiO₂ nanoparticles in aqueous solution are prepared by liquid impregnation method and dispersed to form coatings that can inhibit microbial growth on various substrates. The nanoparticles were characterized by X-ray diffraction (XRD), energy dispersive spectroscopy (EDS), and scanning electron microscopy (SEM). The antibacterial effects of those nanoparticles suspension and coatings were investigated, using *Pseudomonas aeruginosa* (gram-negative) and *Bacillus Subtilis* (gram-positive) bacteria.

2. Experimental Procedure

2.1. Materials System

One percent of Ag-TiO₂ nanoparticles was prepared by liquid impregnation method. Titanium (IV) dioxide (Sigma-Aldrich Laborchemikalien) and silver nitrate (Merck) were used in the liquid impregnation process as sources of titanium and silver, respectively. Distilled water was used as solvent in the process. The water employed in all preparations was purified by a distilled. Two bacteria strains, *P. aeruginosa* (ATCC 27853) and *B. subtilis* (ATCC 1174), were purchased from Microbiologics, Inc., USA. Other materials for bacteria cultivation, such as agar, sodium chloride, and plastic and pyrex petri dishes were of Merck grade.

2.2. Synthesis of Ag-TiO₂ Nanoparticles

2.2.1. Preparation of Photocatalyst: Liquid Impregnation Method

In the liquid impregnation method [28] silver ion (Ag⁺) doped on TiO₂ was prepared according to the following steps. We prepare 80 g of TiO₂-Ag nanoparticles, 79.2 g of TiO₂ was added to 500 mL of deionized water. Then for preparation of silver-doped TiO₂ nanoparticles, 1.7 g of AgNO₃ for doping was added to TiO₂ suspension; the silver concentration was of 1% (mole ratio) versus TiO₂. The slurry was stirred well for 6 hours and allowed to rest for 24 h and then dried in an air oven at 100° C for 12 h. The dried solids were crushed to fine powder in an agate mortar and calcined at 400° C for 6 h in a muffle furnace. In this method the metal gets deposited on the surface of the photocatalyst [29].

2.2.2. Characterization of Ag-TiO₂ Nanoparticles

The crystal structure of the Ag-TiO₂ nanoparticles was analyzed by X-ray diffractometer (Theta-Theta, Store, Germany). XRD measurements were carried out at room temperature with CuK α radiation ($\lambda = 0.15478$ nm) at 60 keV and 15 mA. The topography, chemical composition, crystalline structure and metal deposition effect of the TiO₂, were determined by using scanning electron microscopy (SEM). The SEM samples were previously sputter coated with a gold film. For identification of the elements present in the nanoparticles and for determination of its chemical composition, energydispersive spectroscopy (EDS) embedded within JEOL JSM 6490A was used.

2.3. Bacterial Cultures and Test of Antibacterial Activities in Solution Phase

2.3.1. Bacterial Cultures

Two types of bacteria, *P. aeruginosa* ATCC 27853, a gram-negative bacterium, and *B. subtilis* ATCC 1174, a gram-positive bacterium, were used as model bacteria in this study. *P. aeruginosa* is increasingly recognized as an emerging opportunistic pathogen of clinical relevance, ([20]; Eldere, 2003), while *B. subtilis* is known to cause disease in severely immunocompromised patients, and it can be conversely used as probiotic in healthy individuals [30]. *B. subtilis* has also been implicated in several cases of food poisoning [31]. Liquid culture of *P. aeruginosa* and *B. Subtilis* (*P. aeruginosa* strain ATCC 27853) was grown aerobically in nutrient broth (NB) at 37° C for 16 hours. The density of the microbial cells in liquid cultures was estimated by optical density (OD) at 600 nm wavelength. The OD was chosen in a range of 0.8–1.0, which is the optimal optical density of the cells for conventional bacterial activity testing. The cell suspensions used for antibacterial activity were approximately 9 × 10⁹ colony-forming units cfu/mL. The bacteria concentration was also determined by a viable count procedure on nutrient agar plates after serial dilutions of the culture in 0.85% saline solution.

2.3.2. Photocatalytic Reaction

(1) Bacterial Activity Test of Ag-TiO₂ Nanoparticles on *P. aeruginosa* and *B. subtilis*.

The photocatalyst used in this study was Ag-TiO₂ with a surface of 25 m²/g (Janz et al., 2010) and a primary particle size of 28–50 nm, well below the cut-off range (100 nm) that defines such particles. In the photocatalytic experiments, the flask containing 16-hour old culture of *P. aeruginosa* was adjusted on a magnetic stirrer. The required concentration of Ag-TiO₂ nanoparticle (10 mg/mL) was weighed and applied to the *P. aeruginosa* culture. The Ag-TiO₂-*P. aeruginosa* culture slurry was placed on a magnetic stir plate with continuous stirring at 250 rpm and was illuminated with simple fluorescent light. Bacterial activity test of TiO₂ nanoparticles on *B. subtilis* was tested in a similar fashion.

(2) Bacteria Viability Assay.

The loss of viability was examined by the viable count procedure. The Ag-TiO₂ nanoparticles and bacterial culture slurry were exposed to simple fluorescent light with continuous stirring. A *P. aeruginosa* culture without TiO₂ was illuminated as a control, and the reaction of the TiO₂-bacterial culture, in the dark, was also carried out. Samples were taken at 0, 10, 20, 40, 60, 90, and 120 min intervals for two hours. The viable count was performed on nutrient agar plates after serial dilutions of the sample in saline solution. All plates were incubated at 37° C for 24 hours. Similar viable culture and count procedures were performed for the *B. subtilis* (ATCC 1174).

2.4. Immobilization of Ag-TiO₂ Nanoparticles on Substrates

Immobilization was done over two kinds of substrates, pyrex glass petri dish and plastic venetian blinds. All petri dishes were etched with dilute hydrofluoric acid (20% v/v) for 24 hours and washed thoroughly with deionized water, making a rough surface for better contact of TiO₂ on the glass surface. To remove organic and inorganic materials from the surface of the both substrates, they were treated with acetone and distilled water and dried under atmospheric conditions. Immobilization of Ag-TiO₂ nanoparticles was done on both substrates using the following two coating methods.

2.4.1. Water-Based Coating

In this method, distilled water was used as solvent. Ag-TiO₂ slurry was prepared with 1.5 g of Ag-TiO₂ in 200 mL of deionized water, and the

Proceedings For First International Conference on Recent Explorations in Science, Engineering and Technology(ICRESET'17) suspension was placed in an ultrasonic bath for 15 min for dissolution. Substrates, glass and plastic venetian blinds, were immersed in the resultant slurry of Ag-TiO₂ for one hour and then removed from the suspension and placed in an oven for 1.5 hour at 150° C. The substrates, pyrex petri dishes and plastic venetian blinds, were subsequently placed in a furnace for 2 hours at 500° C and 160° C, respectively. The coated substrates were thoroughly washed with double-distilled water to remove any free Ag-TiO₂ particles (Khataee, 2009). 2.4.2. Ethanol-Based Coating. In this method, ethanol was used as solvent. Five grams of Ag-TiO₂ nanoparticles were dissolved in 180 mL of 99% ethanol to form the base medium of the slurry. Then, dilute nitric acid was added to adjust the pH to 3.5, which is necessary for dispersion of Ag-TiO₂ powder. This was followed by sonication for 15 min in an ultrasonic bath. Both substrates were immersed in the AgTiO₂ suspension for 60 min followed by drying in air for 24 hours. Then, pyrex glass petri dish and plastic venetian blind were heated at 475° C and 160° C, respectively, for 1 hour. Heating allows the Ag-TiO₂ nanoparticles to adhere more strongly to the substrate. Afterwards, the coated substrates were washed in deionized water to remove the unattached Ag-TiO₂ particles from the substrates (Vaez, 2012). 2.4.3. Bacterial Decontamination Effect of Ag-TiO₂ Nanoparticles-Coated Substrates. The viability of *P. aeruginosa* and *B. subtilis* was performed over coated substrates. Coated and uncoated (control) substrates were kept in sterile fume hood, and bacterial culture was sprayed on the plates as evenly as possible. The substrates were transferred to laminar flow cabinet while covered and exposed to fluorescent light (tube light in laminar flow cabinet). The sample for bacterial count was taken from coated and uncoated substrates at 0, 10, 20, 40, 60, 90, and 120 min intervals for two hours. The sample was prepared by taking swab thoroughly from the whole plate. Microbial count from substrate surfaces was performed using standard method [32]. 3. Results and Discussions 3.1. Characterization of Materials 3.1.1. Crystal Phase Composition of Ag-TiO₂ Nanoparticles. X-ray diffraction was used to investigate the crystal phase composition and the crystallite size of Ag-TiO₂ nanoparticles. XRD patterns show that the nanoparticles contain pure anatase phase (JCPDS Card number 73-1764). No rutile reflection was seen in XRD patterns. Usually, a heat treatment at approximately 400° C is required for the phase transition of TiO₂ from amorphous to anatase phase in the solid state. The average crystallite sizes of the anatase phase of metal-doped TiO₂ were in the range of 28 to 50 nm. The XRD patterns are shown in Figure 1. 3.1.2. SEM Observations. SEM was used for the direct observation of particle size and morphology of sample powders. Figure 2 shows the images of 1% silver-doped TiO₂ nanoparticles by JEOL JSM-6460 at 500 and 20,000 magnifications. SEM images of Ag-TiO₂ nanoparticles confirm the presence of porous, sponge-like structure of high roughness and complexity. Such structure indicates the high surface area which has been proven to be efficient for photocatalytic degradation purposes. Samples consisted of more fine particles but the surface morphology of all the

silver-doped TiO₂ samples was different from each other. The SEM pictures show that the distribution of silver on the surface of TiO₂ is not uniform, and silver-doped TiO₂ catalyst contains irregular shaped particles which are the aggregation of tiny crystals. Most of the particles were spheroid or oblate spheroid and loosed, and macropore can be clearly seen in the SEM micrographs. These nanoparticles are aggregated into microsized particles. The aggregation of these nanoparticles is beneficial to their removal from aqueous environment after the treatment. SEM image of Figure 3 shows Ag-TiO₂ nanoparticles-coated glass surfaces have rough surface. Coating has thick layer over surface of glass. Due to the high surface coverage of nanoparticles on the surface of the glass, it provides region for photodecomposition activity to act as good self-sanitizing layer. Titania itself is not decomposed or being used in the process of disinfection. So weathering of layer is only limiting factor for that coating. Thick layer of nanoparticles over coated glass surface is advantageous as it is less affected to chance of weathering of coating as it consumes more time to get removed from surface so it has more life time. blinds which are good surfaces for photocatalytic activity so that disinfection can be performed in a better manner.

1.3.1.3. Energy Dispersive Spectroscopy Analysis.

EDS analysis showed that the percentage composition of Ag-TiO₂ nanoparticles was not consistent. The results indicated that titanium, oxygen, and silver were the constitutive elements of the nanoparticles prepared by the liquid impregnation method, and no extraneous elements were present (Figure 3). It also varied from point to point showing that the composition of the prepared nanoparticles was not homogenous, which confirmed the SEM results.

2. 3.2. Loss of Viability of *P. aeruginosa* and *B. subtilis* under TiO₂ Photocatalytic Reaction by Ag-TiO₂ Nanoparticles

3. 3.2.1. Photocatalytic Disinfection in Solution Phase.

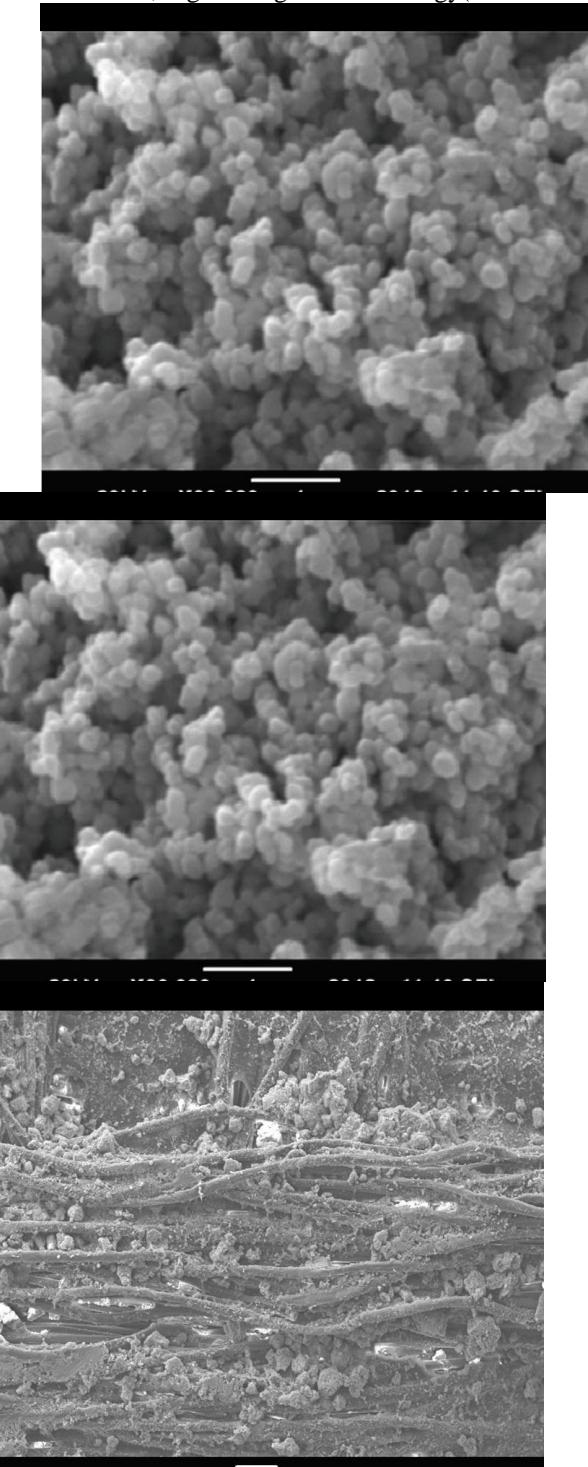
Photocatalytic Disinfection in Solution Phase. The antibacterial effect of nanoparticles on *P. aeruginosa* and *B. subtilis* was first tested for silver-doped TiO₂ solutions. The viability of Ag-TiO₂-treated bacteria cells was determined by colony counting after 24 h (*P. aeruginosa* and *B. subtilis*) of incubation. The viability of bacteria was significantly inhibited by the treatment of TiO₂ photocatalytic reaction.

In the photocatalyzed Ag-TiO₂ nanoparticles, the survival of intact *P. aeruginosa* and *B. subtilis* colonies dropped in solution phase as a function of time.

When the initial bacteria concentration was 9 × 10⁹ cfu/mL, the survival of *P. aeruginosa* and *B. subtilis* colony dropped significantly after 30 min of photocatalytic reaction; bacteria killing was nearly complete within only 90 min under the present experimental conditions. A great

decrease in the number of viable bacteria was observed on the illuminated TiO₂ nanoparticles, demonstrating their photokilling activity. The survival curve did not follow a simple single exponential decay process as a function of illumination time, but seemed to consist of two steps, a relative lower rate photokilling step, followed by a higher one. The result shows that there was no inhibition of bacterial growth in control solution. The bacterial load was reduced by 90% for *P. aeruginosa* and 90.5% for *B. subtilis* within our hour of treatment. The good antibacterial effect (100% killing efficiency) as observed in Figure 4 may be due to small size, large surface area, large bandgap energy, and more active sites of Ag-TiO₂ nanoparticles for carrying out photocatalytic reactions.

Anatase Ag-TiO₂ nanoparticles have shown bactericidal activities as they have inhibitory behavior to bacterial growth of *P. aeruginosa* (gram-negative bacteria) and *B. subtilis* (gram-positive bacteria) in the presence of light. This is attributed to the increasing visible absorption capacity due to the doping of silver in titanium nanoparticles [33]. The gram-positive bacteria have a relatively cell wall composed of many layers of peptidoglycan polymer and only one



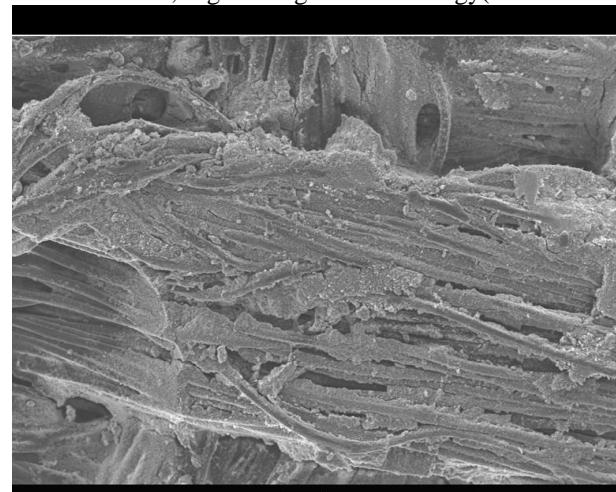
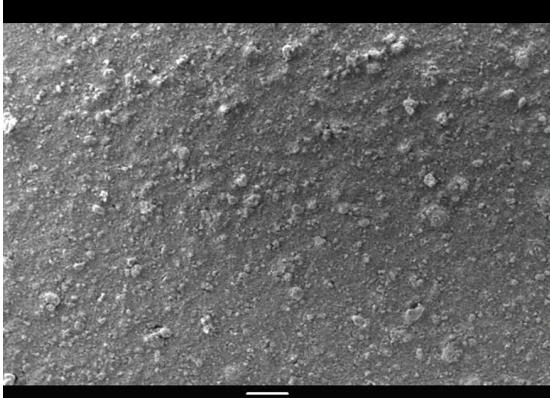


Figure 2: (a) SEM image of 1% Ag-doped TiO₂ taken at $\times 500$ and at $\times 20,000$. (b) SEM images of noncoated and TiO₂ nanoparticles-coated membrane (plasma membrane).

The gram-negative bacteria have only a thin layer of peptidoglycan and more complex cell wall with two cell membranes, an outer membrane, and a plasma membrane. The addition of the outer membrane of the gram-negative bacteria cells influences the permeability of many molecules. Under certain conditions, the Gramnegative bacteria are more resistant to many chemical agents than Gram-positive cells [34]. The photocatalytic process of anatase Ag-TiO₂ nanoparticles includes chemical steps that produce highly reactive species such as hydroxyl radical, hydrogen peroxide, and superoxides that can cause grave damage to microorganisms. Among these reactive oxygen species, the hydroxyl radicals are highly reactive and therefore short lived. The superoxide ions are relatively longer lived. Due to their

3.2.2. Bactericidal Effect of TiO₂ Nanoparticle-Coated Substrates.

The survival rate of *P. aeruginosa* and *B. subtilis* on TiO₂ nanoparticle-coated substrates, pyrex glass petri dish, and venetian blinds, under photo-catalytic reaction is shown in Figures 5 and 6.

The bacterial colonies of *P. aeruginosa* and *B. subtilis* above Ag-TiO₂-coated glass plates and venetian blinds were significantly dropped on various substrates as a function of achieved within 120 minutes of treatment. Control samples showed no reduction in bacterial load as a function of time. The decay of bacteria survival by the photokilling step was clearly demonstrated by bacteria viability assay. In control group of experiments, the number of bacterial count was above the countable range at the start of the experiment

4. Conclusion

pyrex glass petri dish. (c) SEM images of non-coated and TiO₂ nanoparticles-coated plastic venetian blinds.

negative charge, they cannot penetrate the cell membrane. They must contact directly the outer surface of bacteria unless the TiO₂ particle has penetrated the cell. Hydrogen peroxide is less harmful compared to hydroxyl radicals and superoxide ions, but it can enter the cell [35]. Several proposed mechanisms for cell killing by the TiO₂ photocatalytic processes were reported [17, 18, 20, 36]. One research group reported direct evidence of cell membrane damage by the irradiation of a thin transparent TiO₂ film to examine the photo-catalytic degradation of endotoxin from *P. aeruginosa*. The endotoxin is a component of the outer membrane of gram-negative bacteria and is released only when the cellular structure is destroyed. The results indicated that the TiO₂ photocatalyst destroys the outer membrane of the *P. aeruginosa* cell and causes the death of the bacteria, as damage of the cell membrane directly leads to the leakage of minerals, proteins, and genetic materials, causing cell death[15].

as well after 2 hrs. But a significant abatement in the bacterial count was observed within two hours: 0.4%, 9%, 4.7%, and 6.36% survival rates of *P. aeruginosa* on water-based coated glass, ethanol-based coated glass, water-based coated venetian blind, and ethanol-based coated venetian blind, respectively, and 0%, 4%, 7.1%, and 5.7% survival rates of *B. subtilis* on water-based coated glass, ethanol-based coated glass, water-based coated venetian blind, and ethanol-based coated venetian blind, respectively.

This illustrates that if 1% Ag-TiO₂ would be coated on a surface like glass and venetian blinds, that surface may be considered as self-sterilizing surface.

In this study, a novel and a simple liquid impregnation method was used for the synthesis of 1% silver doped

anatase TiO₂ nanoparticles. The antibacterial test those nanoparticles gave promising results which showed significant inhibition on both bacteria, *P. aeruginosa* and *B. subtilis*, even under room light.

Further testing of the survival ratio of *P. aeruginosa* and *B. subtilis* on the Ag-TiO₂ dispersed in coating formulations—coated glass and coated venetian blind—showed that Ag-TiO₂ nanoparticles coating over different substrates have 93%–100% killing efficiency towards bacteria. Ag-TiO₂ nanoparticles coatings when applied to substrate like glass or plastic venetian blinds disinfect the air that comes in contact with that substrate. So, ultimately these photocatalytic coatings containing silver-doped titanium dioxide (TiO₂) nanoparticles coating make self-sanitizing surfaces. Such Ag-TiO₂ coated surfaces should be employed in hospitals, public places, and dwellings to reduce the spread of infectious disease

Modern Honeypot tools on Cloud Virtual Machines for Machine Learning

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Abstract: *Honeypot is a computer security mechanism for trapping the hackers or tracking the unconventional hacking methods. It collects information about the activities of the hackers using machine learning code. In this description, we discuss about the tools that how an attacker proceeds the way for finding or detecting the honeypots on cloud virtual machines. Machine learning is the technique of embedding artificial intelligence to the system without human intervention. It can change the data automatically based upon the user feed.*

Keywords: Honeypot; Virtual Machines; Machine Learning; Security

Example of UML:

Host>> ps a

[...]

1039 pts/6 S 0:00 linux [(tracing thread)]

1044 pts/6 S 0:00 linux [(kernel thread)]

1049 pts/6 S 0:00 linux [(kernel thread)]

[...]

uml# mount -t hostfs /dev/hda1 /mnt

uml# find /mnt/proc -name exe | xargs ls -1

uml>> dmesg

Linux version 2.6.10-rc2

...

Kernel command line: ubd0=[...]

...

I. INTRODUCTION

In order to know the precise information about the attacks dealing with networks, the concept of electronic decoy has been applied to the area of IT security. “Sebek” is the data capture tool used for finding the activities of the hackers on the honeypots^[1]. To disable the effect of sebek on honeypot, they introduce the shell called “kebes”, which is used to avoid the logging mechanisms on the sebek. By using this ,the attacker can hide their activities on the honeypots. They also use some tools such as USER MODE LINUX(UML) and VIRTUAL MACHINE SOFTWARE (VMware) for detecting the honeypots.

The UML technique was implemented by a little tool called UMLfp. In the VMware binary , there is a presence of I/O backdoor, which is used for detection^[1].

The following ranges of MAC addresses are assigned to VMware:

tsLow-interaction Honeypot

High-interaction HoneypotLow-interaction Honeypot

Like this, High-interaction Honeypot has also many disadvantages. To overcome this disadvantages, they combine the advantages of existing distributed trap network embed a low alteration Honeypot into a virtual Honeypot, which can collect all the IP values unused in the network to set this trap. This trap network can easily interact with the hackers, so the risk of attacking the honeypot by the hackers will be reduced^[2].

One of the main component of honeypot defense system framework is Control center. Control center is a host which configures and manages the agents in the segment, the main function of the control center is to perform alarm receiving, display, analysis and result show functions which is composed by communication component, receiving component, alarm analysis component , alarm analysis and user interface.

From all the experimental analysis ,we can say that deployment of virtual Honeypot will lower the hit rate of the illegal Visitors to the real host. Therefore , the deployment of Honeypot on the network will improve the performance of security and safe defense mechanism.

VIRTUAL HONEYNET COLLABORATION SYSTEM(VHS)

The virtualization technologies (VTs) are combined with honeypot technologies to develop a virtual honeypot architecture implementing VHS. The honeypot redirect –outbound (HRO) algorithm and the honeypot redirect-inbound (HRI) algorithm are structured to solve the problems of honeypot module(HM) parallelism operation and bypass security module (SM) issues.

For the construction of VHS architecture involves design approach of VHS Virtual Networking and Xen Virtual Network-Bridge(XVNB) algorithm. Designing the VHS modules includes the Xen module,security modules like firewall and virtual intrusion prevention system(virtual IPS), Honeypot module (HM), database module(DM),Management module(MM). The Honeypot module adopt a ROOTKIT based on the Sebek technology which can return the information and maintain the log of each honeypot from the client to the server.

00-05-69-xx-xx-xx

00-0c-29-xx-xx-xx

00-50-56-xx-xx-xx

The following sequence is used to call backdoor functions:

needs fewer resources but has a greater limitation. Eventhough, it can simulate may webservices, but the service degree is limited.

XEN NETWORK-BRIDGE ALGORITHM:

Xen Network-Bridge Algorithm^[3] involves the following mechanism:

The Xen networking creates a new virtual network bridge in the VHS.The physical address (IP:MAC) of the Physical Ethernet Interface is duplicated and renamed to Virtual Interfaces and is attached to the bridge. Finally the duplicate physical Ethernet interfaces are brought up.

Xen Network-Bridge Algorithm^[3]

Input: The Xen virtual system is starts up.

Output: 1. The physical *eth0* and virtual interfaces are separated.

2. A *xenbrL* of Xen virtual networking in *dom0*.

- 1: Initialize $L = i = j = 0$, $\{ | L = i = j | _ Z \} = N$
- 2: *xenbrL* _ empty
- 3: **if** (There is no XNB) **then**
- 4: Creates the new bridge of XNB (*xenbrL*) /* Xen Network-Bridge = *xenbrL* _ Dom0 */
- 5: Stop and shutdown the Phys. *eth0* (Original IP:MAC)
- /* In order to keep the original IP and MAC addr. in the Phys. *eth0* */
- 6: **if** (Phys. *eth0* is brought down) **then**
- 7: Duplicate the Phys. *eth0* (Original IP:MAC) _ Virtual *eth0*
- 8: **while** (Virtual *eth0* _ Phys. *eth0* (Original IP:MAC)) **do**
- 9: Creates the *peth0* _ XNB
- 10: *peth0* _ Rename the Phys. *eth0* (Original IP:MAC) /* the *peth0* is only support for MAC Layer */
- 11: Phys. *eth0* (IP:MAC) _ Virtual *eth0* (IP:MAC) is renamed
- 12: **if** (Phys. *eth0* (IP:MAC) _ *peth0* (MAC)) **then**
- 13: Creates the *vif i.j* _ *xenbrL* __Dom0
- 14: *xenbrL* _ attaches both of the (*peth0* _ *vif i.j*)
- 15: **if** (Both of the (*peth0* _ *vif i.j*) is bound to *xenbrL*) **then**
- 16: Restart the Phys. *eth0* _ *peth0* _ *vif i.j* _ *xenbrL*)
- 17: **end if**
- 18: **end if**
- 19: **end if**
- 20: **else** (There is XNB) **then**
- 21: Not do any of that *peth0* stuff, nor will it add *vif i.j* _ *xenbrL*

22: **end if**

1) Steps XNB-1-2.

The XenNetworking creates a new virtual network bridge called *xenbrL* (*xenbrL* in the VHS is based on Xen virtual networking).

2) Step XNB-3.

The Physical Ethernet interface (Phys. *eth0*) is brought down.

3) Steps XNB-4-5.

The Phys. (Original IP:MAC) address of *eth0* are duplicated to Virtual *eth0* (*veth0*) virtual interfaces in the Xen Virtual Network-Bridge of XenoLinux.

4) Steps XNB-6-8.

The Physical Ethernet interface Phys. *eth0* is renamed as the virtual interface *peth0*.

5) Step XNB-9.

The virtual *eth0* virtual interface is renamed as the physical network interface Phys. *eth0*.

6) Steps XNB-10-12.

The *peth0* and *vif i.j* virtual interfaces are attached to bridge *xenbrL*.

7) Steps XNB-13-16.

The physical Ethernet interfaces *eth0*, *xenbrL*, *peth0*, and *vif i.j* are brought up.

DESIGN AND IMPLEMENTATION :

The major difficulties in the design and implementation of virtual networking is default inbound and outbound path. To solve this network flow and parallel issue, the proposed system uses HONEYNET REDIRECT-OUTBOUND (HRO) algorithm and HONEYNET REDIRECT-INBOUND algorithms.

The mechanism under HRO is as follows:

HRO Algorithm^[3]

```

1: if (outPktx are prepare to send out from hpM-vmk) then
2: Make all outPktx that redirect to IVN of XVNs
3: while (outPktx are into the IVN) do
4: Make all outPktx that redirect to sM-veth1
5: outPktx are in sM-veth1 must go through v-Firewall and v-IPS
6: Forward all outPktx from sM-veth0 to xenbr0
7: if (outPktx are into the xenbr0) then
8: physical eth0 _ all outPktx are forward by vif i.j of xenbr0
9: outPktx via physical eth0 of xM _ physical network
10: dM _ all network activities will be log by mM
11: end if
12: end while
13: else (there are no outPktx in hpM-vmk) then

```

14: Not do any of that *XVNs*, nor will it redirect *outPktx* _ *IVN*

15: end if

The following steps describe outbound flows:

1) Steps 1-2. The *hpM-vmk* to *IVN* module.

The first step is to redirect packets inside the honeypot module toward the *IVN* module of the Xen virtual networks in Dom0.

2) Steps 3-4. The *IVN* module to *sM-veth1*.

From *IVN* module, directs *outPktx* flows to the Veth1 of security module.

3) Steps 5-6. The *sM-veth1* to *sM-veth0*.

In this step uses Layer 2 to lead packets from the *IVN* module to the network interface *sM-veth1*. *outPktx* flows then proceed

through *sM-veth0* in Dom U.

4) Steps 7-8. The *sM-veth0* to *xenbrL*.

All packet flows go through the virtual network interface *sM-veth1* to the *sM-veth0*, passing *v-IPS* and *v-Firewall*,

respectively. Next, *outPktx* flows directly connect to the *xenbrL* of the network-bridge driver in *xM*.

5) Steps 9-15. The *xenbrL* to PED.

All *outPktx* flows go through the bridge connection mode

from *sM-veth0* direct connect to the *xenbrL*, which is the *xenbrL* of network-bridge driver component in Dom0.

Finally, in the XenoLinux environment, this study uses bridge mode to transfer *outPktx* to the physical Ethernet driver (PED) *eth0*.

The HRO algorithm directs the packet flow from Honeypot Module(HR) to the network backend driver(NBD). Then the packet flows from NBD to virtual Ethernet of security module after being processed into IVN module .Then it directs from SM to Xen bridge and from bridge to Physical Ethernet Driver .

HRI ALGORITHM^[3]

```

1: if (inPktx are into the physical eth0 of xM) then
2: Forward all inPktx via physical eth0 to vif i.j of xenbr0
3: Make all inPktx that direct to IVN of XVNs
4: while (inPktx are into the IVN) do
5: Make all inPktx that redirect to sM-veth0
6: _inPktx are in sM-veth0 must go through v-Firewall and v-IPS
7: if (inPktx arrive to the sM-veth1) then
8: Re-forward all inPktx from sM-veth1 _ hpM-vmk
9: dM _ all network activities will be log by mM
10: end if
11: end while
12: else (there are no inPktx in hpM-vmk) then
13: Not do any of that XVNs, nor will it redirect inPktx

```

_ IVN yet

14: end if

HRI involves solving the Bypass issue of VHS. The HRI algorithm redirects packets to Security Module. Moreover, the virtual network interface of the Security uses the transparent mode to transfer packet flows. At the same time, the VHS logs and monitors all network events through Database Module and Management Module is to collect all network activities in the virtual machine of Honeypot model.

SCADA HONEYBOT:

SCADA Honeybot-Supervisory Control and Data Acquisition Honeybots are the effective tool for finding or detecting the threats which pertain to SCADA devices. It is also used for the early detection of potential malicious tampering within a SCADA device network. In this paper, we briefly discuss about the SCADA Honeybots and Conpot.

Hackers are mainly targeting the governments, corporations and individuals to obtain their valuable secrets and informations. For this, Honeybots are introduced, which is used to detect the attacks of the hackers on the network.

These Honeybots promotes the existence of SCADA Honeybots^[4]. Nowadays, SCADA Systems are a critical target ,but with the advent of SCADA Honeybots ,the attempt to access the SCADA systems or causing harmful attack to SCADA devices can be easily identified and detected.

SCADA Honeybots are used to perform some actions on SCADA systems. It is composed of four main parts: a central computer(host), Remote Terminal Units(RTU) ,a wide area of telecommunication system to connect them, and an Operator interface to allow the operator to access the system.

Conpot are the low interactive SCADA Honeybots^[4], which is extremely easy to implement. It would support the Simulation of Hyper text Tranfer Protocol(HTTP), Modbus (a serial communication protocol),Simple Network Management Protocol(SNMP). Conpot utilizes a logging system to monitor any changes that are made by the intruders.

The experimental analysis of SCADA Honeybot, Conpot were conducted, and then virtualized image was created ,it is used in multiple Amazon Web Services(AWS)^[4].

The main advantage of AWS is its key management and port security options. For the depth analysis of Honeybots , the review of both Guardian AST gas pump monitoring system and Simens S7-200 ICS was performed together with the brief analysis of the IPMI - 371 and Kamstrup -382 smart meter SCADA devices.

The Nmap scan data and SHODAN scan data are used to check the open ports after starting Conpot. Nmap is a security scanner and a connection oriented security

tool, that has been widely used for many protocols.

The following Nmap commands are used:

nmap -A -v[IP Address]

nmap -A -v -Pn[IP Address]

Different scanning techniques are available in Nmap;

The flag -A results in Nmap turning on version detection.

The flag -Pn resulted in Nmap suppressing pings when conducting scans to determine if a host is up.

The flag -p- was also used to conduct the scan over the entire range of ports.

SHODAN scan data was also used to determine which ports it detected as open within the conpot template. It mainly works on the IP4 Internet address space.

From all the analysis, it is found that Nmap failed to recognize the ports which are detected as open in their respective devices such as:

Siemens S7-200

IPMI:623

Kampstrup smart meter:50100

While SHODAN scan data detect the open ports in the Siemen S7-200 device.

Eventhough these devices accurately depict the nature of SCADA Honeybots^[4],if there is any additional open ports present on the devices, that could reveal their identity as honeypots to the hackers/attackers.

[4]- Arthur Jicha, Mark Patton, and Hsinchun Chen, SCADA Honeybots, Information and Security Informatics(ISI),2016.

Twitter:

Twitter is one of the most popular social systems,which provides a set of distinctive posting services operating in real time. The flexibility of these services has attracted unethical individuals, so-called "spammers", aiming at spreading malicious, phishing, and misleading information.

In this paper ,we examine the time property through advancing the design of some features used in the literature ,and proposing new time based features.The experimental results show that the new form of features is able to classify correctly the majority of spammers with an accuracy higher than 93% .

TIME PROPERTY:

By examining the information that can be

gathered from social networks, the attributes are found to be: (i) the creation date of account is an unmodifiable attribute . (ii) and the posting time of the tweet object is not changeable once the user posts information on his timeline. to maximize their benefits and reach their goals quickly, spammers often create a bot of accounts in a short period, with automating intensively the posting behavior in a systematic way. Otherwise ,we implicitly success in fighting and reducing the spam accounts.

Twitter's Anti-Spam Mechanism:

Twitter has released some rules to reduce the spam problem, with suspending permanently the accounts that violate those rules .However, Twitter's rules are easy to avoid by spammers. Twitter spam detection approaches can be categorized under two different types based on the automation detection level, including machinelearning level as a fully automated approach, and social honeypot as a manual approach.

Spammer's Principles:

Spammers are goal-oriented and beneficiary persons aiming to achieve unethical goals, and thus they leverage their intelligence to accomplish the spam tasks in an effective way. Spammers often create and launch bots of spam accounts in a short period to maximize their profits. Spammers utilize APIs provided by social networks to automate spamming tasks in a systematic way as the random posting behavior approach decreases spammers' profits and decelerate the spamming behavior.

MACHINE LEARNING APPROACH:

This approach involves three levels of detection tweet-level detection, user level detection and campaign-level detection. At tweet level, identification of spam tweet is through applying probabilistic language models to determine the topic of then considered tweet^[12], also identified spam tweet via extracting a set of features such as number of words and number of characters from each tweet individually with using then SVM learning algorithm on a manually created

data-set to get a binary classifier^[6]. The user-level detection, ^[7, 6, 9,10] focused on extracting more of account features including account age, number of friends, number of followers, similarity between tweets posted or re-tweeted by the user, ratio of URLs in tweets. The campaign level, ^[11] detected spam campaign through clustering users' accounts based on the URLs retrieved from their posted tweets, and then a set of features is extracted from the clustered accounts to be incorporated in identifying spam campaign via using machine learning algorithms.

HONEYBOT APPROACH:

Social honeypot is defined as an information system resource that can monitor spammers' behavior by logging their information such as profiles' information and any available content ^[7]. There is no major difference between Twitter's mechanism in fighting spammers and social honeypot approach. Both of them

require administration control to take the final decision about the accounts that downed in the honeypot trap.

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Spammers,pages-109-117.

AUTOMATED BILLING SYSTEM IN SUPERMARKETS

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ABSTRACT

Super market is a place where people get their daily necessities and the major problem faced by users is that they have to wait in long queues for billing. Some improvement is required in the traditional billing system to improve the quality of shopping experience to the customers. The proposed system helps to eliminate all such difficulties by using RFID. This system makes use of a microcontroller which controls the overall process. Once the purchase is completed the total amount will be calculated and the customer can pay their bills using a Smart Card.

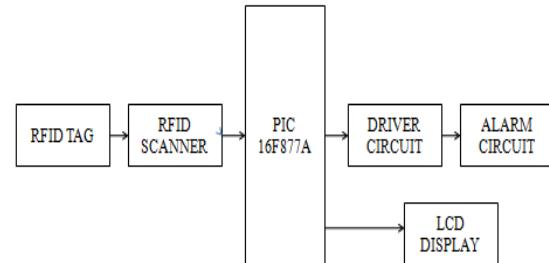
KEYWORDS: **RFID READER, RFID TAGS, MICROCONTROLLER, BUZZER, LCD DISPLAY**

INTRODUCTION

Super market is a place where people get their daily needs such as food products, clothing, electrical appliances etc. Now a days, super markets have increased throughout the globe due to increasing public demand. Sometimes customers have problems regarding the information about the product on sale and waste of time at the billing counters. Most shoppers buy groceries on a budget, and it is only at the end of purchase shoppers they come to know that the overall purchase amount is greater than their budget after which they spend much time in searching for their desired products and finally overall shopping process becomes more time consuming. Another major problem faced by users is that they have to wait in long queues for billing. Some changes is required in the traditional billing system to improve the quality of shopping experience to the customers. The proposed system helps to eliminate all which can be placed on trolleys. The RFID tags are placed on each and every product of the super market. During their purchase the customers have to hold the RFID tag near to the scanner. With this unique code on the product, the name, price and the number of the product purchased are automatically displayed on a LCD display. This system makes use of a microcontroller which controls the overall process. The microcontroller stores all the data and it sends the information to the users with the help of serial data transfer protocol. Keys are used for the purpose of increment/decrement of the products purchased. After the purchase a key is pressed to indicate the completion of process only after which the payment process starts. Finally the total amount will be calculated and the customer can pay their bills using a

Smart Card. When this card is inserted for payment it displays the amount in the particular card and also displays the remaining amount after the payment of bill

BLOCK DIAGRAM



METHODOLOGY:

The concept is to design a trolley with a user interface screen (LCD), RFID Scanner along with a Smart Card, in order to make automatic billing system. The products will be tagged with the RFID tag containing the codes for the desired data of the product. Once the purchased products are scanned through the RFID scanner with the RFID tag, the data of the product will be displayed on the LCD. After purchasing, the total amount of the purchased products will be calculated and will be displayed for the customer's perception. Once purchased, the payment can be done using the Smart Card which will be owned by every customer for the smart-payment. This can skip the time consumption of the customers by standing in the queue for a period of time during rush hours. The Smart Trolley comes with all the basic services including scanning an item to check for price and details. This also allows the user to pay their bill using a Smart Card.

HARDWARE DESIGN:

LCD DISPLAY:

A Liquid Crystal Display (LCD) is a thin, flat electronic visual display that uses the light modulating properties of liquid crystals (LCS) as they do not emit light directly. Liquid crystal displays (LCDs) have materials which combine the properties of both liquids and crystals. Rather than having a melting point, they have a temperature range within which the molecules are

almost as mobile as they would be in a liquid, but are grouped together in an ordered form similar to a crystal.

An LCD consists of two glass panels, with the liquid crystal material sandwiched in between them. The inner surface of the glass plates are coated with transparent electrodes which define the character, symbols or patterns to be displayed polymeric layers are present in between the electrodes and the liquid crystal, which makes the liquid crystal molecules to maintain a defined orientation angle.



Liquid Crystal Display

They are usually more compact, light weight, portable, less expensive, more reliable, and easier on the eyes. They are available in a wider range of screen sizes than CRT and plasma displays, and since they do not use phosphors, they cannot suffer image burn-in. LCDs are more energy efficient and offer safer disposal. Its low electrical power consumption enables it to be used in battery-powered electronic equipment. Once the product is scanned using the RFID scanner the LCD will display the name, quantity and price of the product. This also displays the total amount to be paid and the amount remaining in the smart card after the payment of bill. This also displays the notifications to the customers such as insertion of card and regarding the payment of bills.

MICROCONTROLLER:

Here we make use of the microcontroller PIC 16F877A. It has a program memory of 8kb, a data memory of 368 bytes and an inbuilt analog to digital converter. It has 33 I/O pins which can be effectively used for the connection of peripheral devices such as the LCD, alarm circuits etc.

Busy flag:

When the busy flag is, the controller is in the internal operation mode, and the next instruction will not be accepted. When RS = 0 and R/W = 1, the busy flag is output to DB7. The next instruction must be written after ensuring that the busy flag is 0.

Address Counter:

The address counter allocates the address for the DD RAM and CG RAM read/write operation when the instruction code for DD RAM address or CG RAM address setting is input to IR, the address code is transferred from IR to the address counter. After writing/reading the display data to/from the DD RAM or

CG RAM, the address counter increments/decrements by one the address, as an internal operation. The data of the address counter is output to DB0 to DB6 while R/W = 1 and RS = 0.

Display Data RAM (DD RAM):

The characters to be displayed are written into the display data RAM (DD RAM), in the form of 8 bit character codes present in the character font table. The extended capacity of the DD RAM is 80 x 8 bits i.e. 80 characters.

Character Generator ROM (CG ROM):

The character generator ROM generates 5 x 8 dot 5 x 10 dot character patterns from 8 bit character codes. It generates 208, 5 x 8 dot character patterns and 32, 5 x 10 dot character patterns.

Character Generator RAM (CG RAM):

In the character generator RAM, the user can rewrite character patterns by program. For 5 x 8 dots, eight character patterns can be written, and for 5 x 10 dots, four character patterns can be written.

Interfacing the microprocessor controller:

The module, interfaced to the system, can be treated as RAM input/output, expanded or parallel I/O. The module is selected by gating a decoded module – address with the host – processor's read/write strobe. The resultant signal, applied to the LCDs enable (E) input, clocks in the data. The 'E' signal must be a positive going digital strobe, which is active while data and control information are stable and true. The falling edge of the enable signal enables the data / instruction register of the controller. All module timings are referenced to specific edges of the 'E' signal. The 'E' signal is applied only when a specific module transaction is desired. The read and write strobes of the host, which provides the 'E' signals, should not be linked to the module's R/W line. An address bit which sets up earlier in the host's machine cycle can be used as R/W. When the host processor is so fast that the strobes are too narrow to serve as the 'E' pulse

- Prolong these pulses by using the hosts 'Ready' input
- Prolong the host by adding wait states
- Decrease the Hosts Crystal frequency

When the controller is performing an internal operation he busy flag (BF) will set and will not accept any instruction. The user should check the busy flag or should provide a delay of approximately 2ms after each instruction. The module presents no difficulties while interfacing slower MPU. The liquid crystal display module can be interfaced, either to 4-bit or 8-bit MPU. For 4-bit data interface, the bus lines DB4 to DB7 are used for data transfer, while DB0 to DB3 lines are disabled. The data transfer is complete when the 4-bit data has been transferred twice. The busy flag must be checked after the 4-bit data has been transferred twice. Two more 4-bit operations then transfer the busy flag and address counter data. For 8-bit data interface, all eight-bus lines (DB0 to DB7) are used.

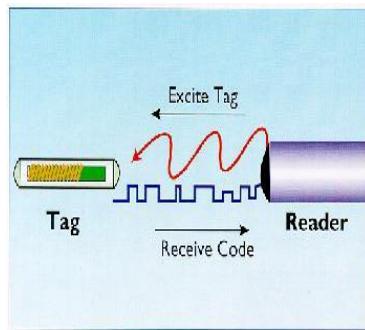
TRANSPONDER:

The Transponder or tag is fixed on to the baggage to be tracked in the airport. When this tag comes within the range of the reader or integrator, the tag is energized. Now, this tag transmits the data to the reader. This data is automatically sent to the micro-controller for further processing. The time at which the tag is sensed is sent to the micro-controller from the RTC (Real Time Clock). These details are displayed on LCD (Liquid Crystal Display). The same is sent to the EEPROM (Electrically Erasable and Programmable Read Only Memory), which is used as a backup. It can be stored, and retrieved.

PASSIVE TAG AND READER:

Passive tags are those energized by the reader itself, they contain no power source, typically have very long lifetimes (near indefinite) a drawback over active tags is the read range, typically 2cm (1in) to 1.5m (4.5 ft), a strong positive is individual tag cost. RFID Passive tag is composed of a integrated electronic chip and a antenna coil that includes basic modulation circuitry and non-volatile memory.

For most general applications passive tags are usually the most cost effective. These are made in a wide variety of sizes and materials: there are durable plastic tags for discouraging retail theft, wafer thin tags for use within "smart" paper labels, tiny tracking tags which are inserted beneath an animal's skin and credit card sized tags for access control. In most cases the amount of data storage on a passive tag is fairly limited - capacity often being measured in bits as opposed to bytes.



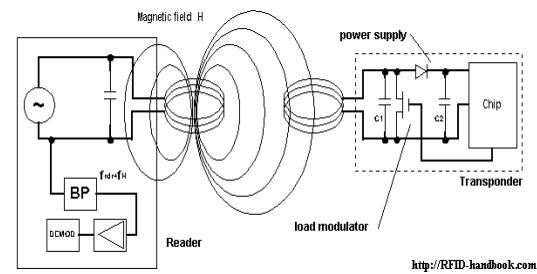
Interaction between tag and reader

The reader powers the tag (transponder), by emitting a radio frequency wave. The tag then responds by modulating the energizing field. This modulation can be decoded to yield the tag's unique code, inherent in the tag. The resultant data can be passed to a computer for processing. Tags have various salient features apart from their physical size: Other available features are: Read Only, Read Write, Anti-Collision.

Operating Principles Of RFID Systems:

There are a huge variety of different operating principles for RFID systems. The most important principle is inductive coupling, which is described in detail below.

Inductive coupling: An inductively coupled transponder comprises of an electronic data-carrying device, usually a single microchip and a large area coil that functions as an antenna.



<http://RFID-handbook.com>

Inductive Coupling

Inductively coupled transponders are almost always operated passively. This means that all the energy needed for the operation of the microchip has to be provided by the reader. For this purpose, the reader's antenna coil generates a strong, high frequency electromagnetic field, which penetrates the cross-section of the coil area and the area around the coil. Because the wavelength of the frequency range used (< 135 kHz: 2400 m, 13.56 MHz: 22.1 m) is several times greater than the distance between the reader's antenna and the transponder, the electro-magnetic field may be treated as a simple magnetic alternating field with regard to the distance between transponder and antenna.

A small part of the emitted field penetrates the antenna coil of the transponder, which is some distance away from the coil of the reader. By induction, a voltage V_i is generated in the transponder's antenna coil. This voltage is rectified and serves as the power supply for the data-carrying device (microchip). A capacitor C_1 is connected in parallel with the reader's antenna coil, the capacitance of which is selected such that it combines with the coil inductance of the antenna coil to form a parallel resonant circuit, with a resonant frequency that corresponds with the transmission frequency of the reader. Very high currents are generated in the antenna coil of the reader by resonance step-up in the parallel resonant circuit, which can be used to generate the required field strengths for the operation of the remote transponder.

The antenna coil of the transponder and the capacitor C_1 to form a resonant circuit tuned to the transmission frequency of the reader. The voltage V at the transponder coil reaches a maximum due to resonance step-up in the parallel resonant circuit. As described above, inductively coupled systems are based upon a transformer-type coupling between the primary coil in the reader and the secondary coil in the transponder. This is true when the distance between the coils does not exceed 0.16 times the wavelength, so that the transponder is located in the near field of the transmitter antenna.

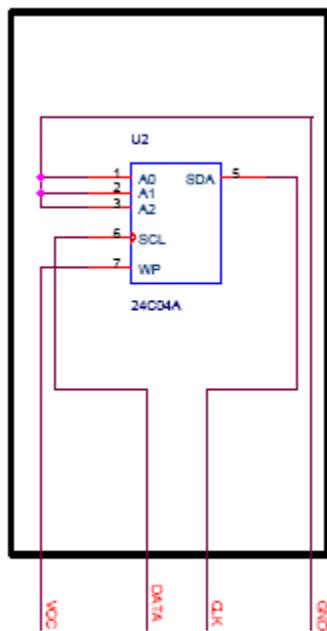
The advantages of a passive tag are:

The tag functions without a battery; these tags have a useful life of twenty years or more.

- The tag is typically much less expensive to manufacture.
- The tag is much smaller (some tags are the size of a grain of rice).
- These tags have almost unlimited applications in consumer goods and other areas.
- Tags can be read through a variety of substances such as snow, fog, ice, paint, crusted grime, and other visually and environmentally challenging conditions, where barcodes or other optically read technologies would be useless.
- RFID tags can also be read in challenging circumstances at remarkable speeds, in most cases responding in less than 100 millisecond

SMART CARD:

A smart card, chip card, or integrated circuit card (ICC), is any pocket-sized card with embedded integrated circuits. There are two broad categories of ICCs. Memory cards contain only non-volatile memory storage components, and perhaps dedicated security logic. Microprocessor cards contain volatile memory and microprocessor components. The card is made of plastic, generally polyvinyl chloride, but sometimes acrylonitrile butadiene styrene or polycarbonate. Smart cards may also provide strong security authentication for single sign-on within large organizations.



DRIVER CIRCUIT:

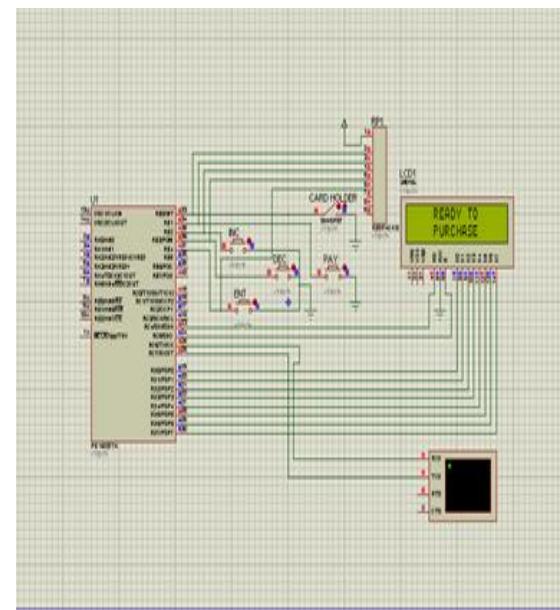
In electronics, a **driver** is an electrical circuit or other electronic component used to control another circuit or other component, such as a high-power transistor. The term is used, for example, for a specialized computer chip that controls the high-power transistors in AC-to-DC voltage converters. An amplifier can also be considered the driver for

loudspeakers, or a constant voltage circuit that keeps an attached component operating within a broad range of input voltages.

The following circuit will allow you to drive a 12V relay using logic voltage (an input of 4V or greater will trip the relay). The circuit has its own 12V power supply making it self contained but the power supply portion can be left out if an external supply will be used. The circuit shows an output from the power supply that can be used to power other devices but it should be noted that the supply is unregulated and not particularly powerful with the parts stated. The 12V DC output is suitable for powering a few LEDs or low voltage lights but should not be used to power other electronic boards or motors. An **alarm** gives an audible or visual warning about a problem or condition. Usually these were hooked up to "driver" circuits which varied the pitch of the sound or pulsed the sound on and off.

SIMULATION:

- ✓ The software used for simulation is PROTEUS 7.8 and MPLAB
- ✓ The microcontroller used here is PIC 16F877A
- ✓ Four push buttons are used for the purpose of,
 - 1) Increment
 - 2) Decrement
 - 3) Enter- for confirmation
 - 4) Payment



ADVANTAGES:

- ✓ This system is,
 - Time saving
 - Portable
 - Affordable
 - Consumes less power
 - User friendly

CONCLUSION AND RESULT:

- ✓ The introduction of this electronic product to the supermarkets will be a boon for off-line purchase as it would make shopping easier
- ✓ The device records the data of the different products with the help of RFID Tags

- ✓ The recorded data helps the shop owner with detailed analysis of shopping by the customer and their preferences through the computer and the printout of the same can be obtained

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[6]https://www.google.co.in/search?q=RFID+reader+ELESOF&biw=1366&bih=667&source=lnms&tbo=isch&sa=X&ved=0CAYQ_AUoAWoVChMI8eO35u_6xgIVhwqOCh2vVAqG

[7]https://www.google.co.in/search?q=RFID+reader+ELESOF&biw=1366&bih=667&source=lnms&tbo=isch&sa=X&ved=0CAYQ_AUoAWoVChMI8eO35u_6xgIVhwqOCh2vVAqG#tbm=isch&q=ZIGBEE+MODULE+DIGI

[8]<http://www.sharpsma.com/download/ARM7-TRMpD>

EFFICIENT OPERATION OF SOLAR POWER BASED POWER MANAGEMENT FOR REMOTE POWER APPLICATION

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ABSTRACT-The growing need of electrical energy can be fulfilled by harnessing energy from Renewable Energy Sources (RES) along with conventional sources of energy. By understanding need of electricity and available energy sources and storage, energy management can be done. The task of Energy Management System (EMS) is to manage the energy between source and load. In recent decades photovoltaic power generation has become very important due to its many benefits such as needs a few maintenance and far many researches are conducted and many papers were published and suggested different methods for extracting maximum power. This paper presents in detail the power management of the extracted power of PV system. The simulation has been accomplished in Proteus software containing photo-voltaic array, controller and energy management block. From the perspective of consumers, we can investigate how to minimize the expected costs with real time electricity pricing, which is the focus of this paper.

Keywords- Pulse Width Modulation, Photo Voltaic, Renewable Energy Sources, Power Management.

I.INTRODUCTION

As the demand is going on increasing day-by-day , it is responsible for our engineers to make it available as per the demand .Many of the power generating plant are using non-renewable energy sources as their primary source. But these may become extinct at any time and before facing the situation we have to choose an alternative to avoid the power crisis.

One of the best alternative is choosing non-conventional sources like solar energy, wind

Here we make use of the microcontroller PIC 16F877A. It has a program memory of 8kb, a data memory of 368 bytes and an inbuilt analog to digital converter. It has 33 I/O pins. It has flash technology, so that data is retained even when the power is switched off. Easy Programming and Erasing are other features of PIC 16F877. Here it is used to control the entire process and to give command to the relay on which supply relay should operate. It also generates the pulse by Pulse Width Modulation (PWM) Technique to boost converter.

energy, tidal energy, bio-mass energy, etc as primary sources for power generation in power stations. The power from these sources is several times greater than the one, which we are using at the present. Out of these energy sources, the best one which suits for our country is solar energy.

Electrification, as made possible by the electric power grid, has been selected as the most significant engineering achievement, which transforms the century-old power grid to smart grid. The smart grid would be the enabler for meeting environmental target, accommodating a greater emphasis on demand response, and supporting widespread plug-in hybrid vehicles as well as distributed generation and storage capabilities.

II.BLOCK DIAGRAM & ITS PROCESS

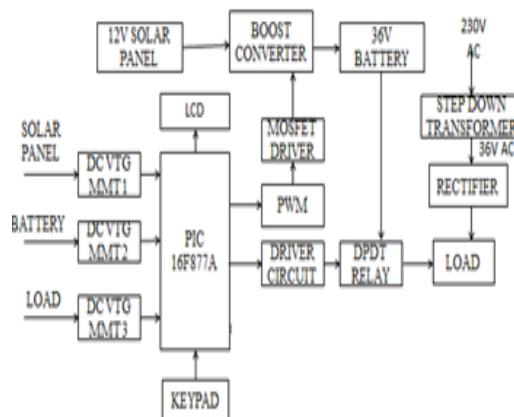


Fig 1. Block Diagram

A.PIC MICROCONTROLLER (16F877)

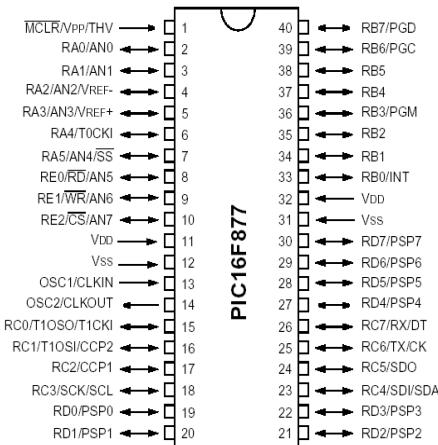


Fig 2. PIC 16F877a- Pin diagram

B.PHOTO VOLTAIC PANEL

Solar panels use light energy (photons) from the sun to generate electricity through the photovoltaic effect. Here, we use the solar panel of 9V that has 18 cell which is connected in series. Each cell gives the output of 0.64V. In this paper, it acts as the main source. Only in the case of failure from this supply, relay connects the main supply from EB to load.

C.LIQUID CRYSTAL DISPLAYS

A Liquid Crystal Display (LCD) is a thin, flat electronic visual display that uses the light modulating properties of liquid crystals (LCS) as they do not emit light directly. Liquid crystal displays (LCDs) are used to display the voltages of PV, load and supply and also it acts as an load.



Fig 3. LCD

D.RELAY

A relay is an electrically operated switch. The coil current can be on or off so relays have two switch positions and they are double throw (changeover) switches. Relays allow one circuit to switch a second circuit which can be completely separate from the first. Here relay connect either to PV or to supply based on the command from the microcontroller

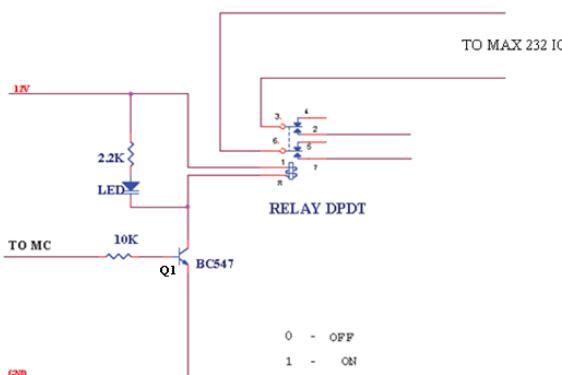


Fig 4. Relay

In this circuit transistor Q1, DPDT relay and LED are placed. Q1base terminal is connected with the micro controller. Relay is connected with the Q1 collector terminal and emitter will be grounded. If base terminal input High (5 Volt) signal means transistor will ON and collector and emitter will conduct so relay will be ON. If base terminal input Low (0 Volt) signal means transistor will OFF and collector and emitter will not conduct so relay will be OFF. This relay mainly used to interface the microcontroller and other serial data handling devices. If any microcontroller having only one serial port but we should connect two serial data devices at that time we need this relay. Common terminals of the relay are connected with the Max232 IC. Max IC is interfacing with the controller or processer.

E.DRIVER CIRCUIT

MOSFET driver circuits are used to boost up the voltage to the required level. Here, two MOSFET driver circuits are used. The output from the PIC microcontroller is not enough to operate the boost converter and relay. Hence, here driver circuit is used to boost up the voltage to about 12V for the operation of boost converter and relay operation.

F.CONTROL CIRCUIT OF MOSFET:

This circuit is designed to control the MOSFET depending upon the signals from PIC. In our circuit there is two transistor connected back to back. we use npn transistor as a Q1 and pnp transistor as a Q2 transistor. When high pulse signal is given to base of the Q1 transistors, the transistor is conducting and shorts the collector and emitter terminal and zero signals is given to base of the Q2 transistor. So Q2 is turned ON so MOSFET'S gate get high pulse and it will be turned ON

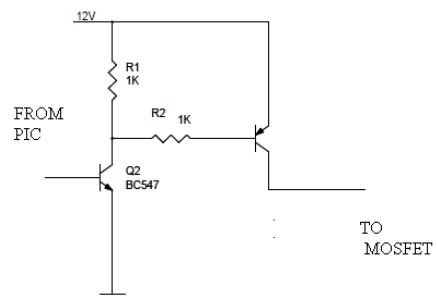


Fig 5. Control circuit of MOSFET

This circuit is designed to control the MOSFET depending upon the signals from PIC. In our circuit there is two transistor connected back to back. we use npn transistor as a Q1 and pnp transistor as a Q2 transistor. When high pulse signal is given to base of the Q1 transistors, the transistor is conducting and shorts the collector and emitter terminal and zero signals is given to base of the Q2 transistor. So Q2 is turned ON so MOSFET'S gate get high pulse and it will be turned ON.

When low pulse is given to base of transistor Q1 transistor, the transistor is turned OFF.

Now 12v is given to base of Q2 transistor so the Q2 is turned OFF. Now MOSFET'S gate get low pulse now it goes to off state.

G.PULSE WIDTH MODULATION

Pulse-duration modulation (PDM) is a modulation technique that conforms the width of the pulse, based on modulator signal information. its main use is to allow the control of the power supplied to electrical devices. Here it is used to generate the required PWM based on the requirement of supply. While comparing the PV voltage to the constant 36V, the difference voltage that is to be boosted is given as a signal to the boost converter.

H.BATTERY

An electrical battery is one or more electrochemical cells that convert stored chemical energy into electrical energy. In our project we use 36V Lead acid battery.

I.BOOST CONVERTER

A boost converter (step-up converter) is a power converter with an output DC voltage greater than its input DC voltage. Here, the boost converter is used to supply constant 36V to the battery even when there is fluctuation in the supply.

III.SOFTWARE DESCRIPTION

The Proteus Design Suite is an Electronic Design Automation (EDA) tool including schematic capture, simulation and PCB Layout modules.

IV.CIRCUIT DIAGRAM

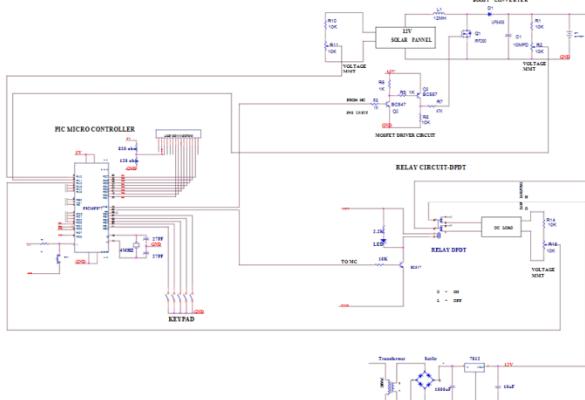


Fig 5.Circuit diagram

A. WORKING

- Measuring the DC output voltage of Solar PV and Battery.
- The solar output voltage is increased using Boost converter.
- The battery voltage is compared with the load voltage.
- When battery voltage is not sufficient to operate the load the relay is turned on so that the solar output voltage is connected to the battery to operate the load.

- If the battery voltage is more than the required load voltage the relay does not operate and the excess power remains in the battery.

V.SIMULATION

A. SIMULATION CIRCUIT

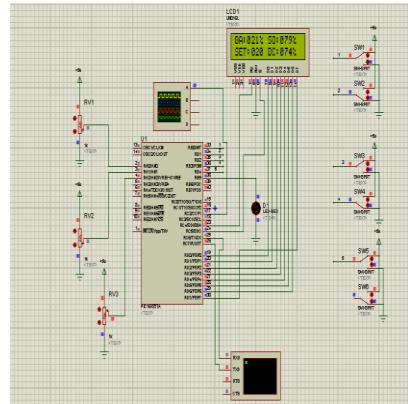
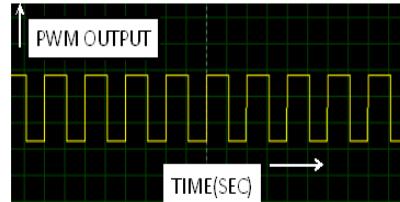


Fig 5 Simulation circuit

B.SIMULATION OUTPUT



For different output of PV, Pulse is generated using Pulse Width Modulation technique which gives command to the boost converter to boost up the voltage.

VI.CONCLUSION

In this paper, we illustrate the effectiveness of power management of renewable energy source (RES),Photovoltaic which includes a battery storage unit. The proposed system utilizes the PV instead of contrary to the supply from EB.The performance of the proposed system is tested with different values of photovoltaic voltage output. One can observe that the EB supply contribution to the load is reduced efficiently while the load is supplied continuously by PV output. Thus, the simulation results show that the proposed method provides a better power management.

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ANN BASED DISFLUENT SPEECH CLASSIFICATION

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Abstract - About 1% of the world population suffer from stuttering, a continued involuntary repetition of sound; especially initial constants. Another name for this is speech dis-fluency or Disturbed Speech. This includes word repetition, syllable repetition, prolongation, and interjection. The existing algorithm focuses wholly on either extraction or classification. This paper uses "Artificial Neural Network" or ANN and implements automatic analysis of dis-fluent speech by extracting "Mel frequency cepstral coefficient" or MFCC, Delta MFCC, Delta Delta MFCC and prosodic features like pitch, energy, duration. This paper aims at improving the fluency of the stuttered speech.

KEY TERMS: ANN and MFCC.

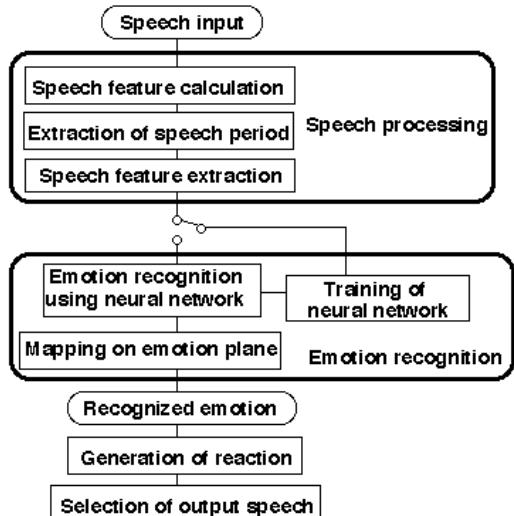
I. INTRODUCTION

[1]In 1956, the profession of speech-language pathology was started in Japan. The paper contains the assessment of the speech disorder and was published by three Japanese professors in which they discussed the disorders in the particular age group. [2]As of 2013, there were 70 institutions in the United States of America which provide speech therapy and 250 institutions in the Japan. This paper mainly focuses on repetition and prolongation detection in stuttered speech signal.

The acoustic and pitch related features such as Mel-frequency cepstral coefficients (MFCCs), formants, pitch, and Energy are used to test the effectiveness in recognizing repetitions and prolongations in stammered speech. The ANN or Artificial Neural Networks are used as a classifier. [3]The results show that the ANN classifier trained using MFCC feature achieves an average accuracy of 87.39 % for repetition and prolongation recognition. Speech recognition is the process of identifying the spoken speech. Speech stuttering, also known as stammering is a disorder that affects the fluency of speech. It occurs in about 1% of the population and has found to affect four times as many males as females. Stuttering is one such disorder in which the fluent flow of speech is disrupted by occurrences of disfluencies such as silent-pauses, prolongations, interjections, word repetitions and syllable repetitions. The objective of the work is to develop a software application which is feasible and is capable of finding the dis-fluencies in stuttered speech and identify the corrected speech. This helps people with speech disorder to easily communicate and exchange their ideas and emotions.

II. METHODOLOGY

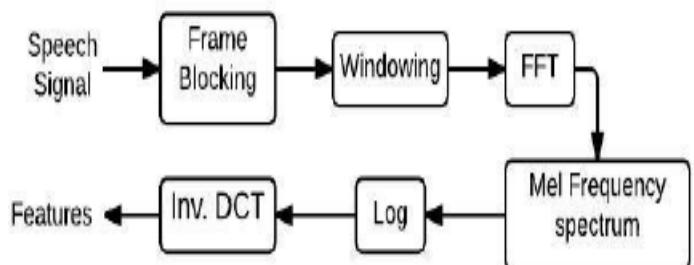
(i) BLOCK DIAGRAM



The feature extraction includes MFCC, DMFCC, DDMFCC and Prosodic features. [4] There are two classifications in Emotional features viz. Phonetic and Prosodic. Prosodic features include understanding emotions, pitch, intonations and stress of the word spoken. MFCC combines the advantage of the cepstrum analysis with a perceptual frequency scale based on critical bands. Cepstral analysis is a popular method for feature extraction in speech recognition applications and can be accomplished by using MFCC analysis. The network is trained to recognize and classify the incoming words into the respective categories. The output from neural network is loaded into pattern classification. MFCC is a feature extraction whereby we get to know the details of the speech. Delta MFCC (DMFCC) is the first order derivative of the cepstral co-efficient which signifies the speech rate and Delta Delta MFCC (DDMFCC) is the second order derivative of the cepstral co-efficient which signifies the acceleration of the speech. DDMFCC gives us more details about the speech. The MFCC feature extraction is clearly illustrated using a block diagram.

(ii) MFCC feature extraction

The speech signal is at first computed using FFT algorithm and the corresponding frequency spectrum is filtered using Mel Scale and Mel frequency spectrum is obtained which is then digitized further to obtain the Mel Frequency Cepstrum Co-efficient and its derivatives using inverse discrete cosine transform.

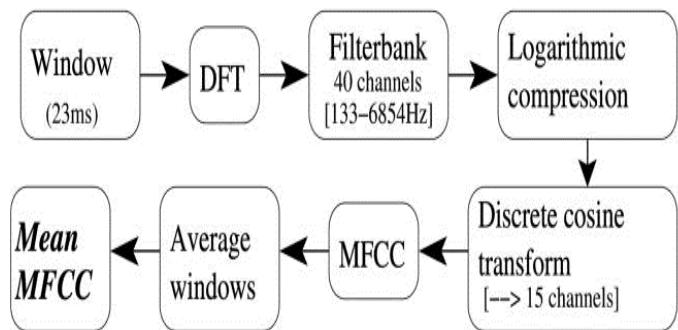


(iii) MFCC COMPUTATIONS

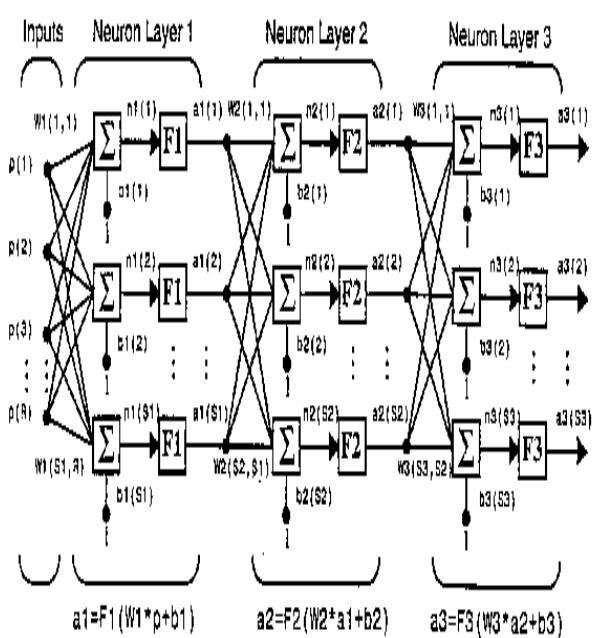
$$M(f) = 1125 \ln(1 + f/700)$$

$$M^{-1}(m) = (700 \exp(m/1125) - 1)$$

The Formula for converting from frequency to Mel scale and from Mel scale to frequency back is given respectively. The MFCC computation process is illustrated using a block diagram.



III. (i). ARTIFICIAL NEURAL NETWORK ARCHITECTURE



The Network Architecture consists of 39 layers each of 13 layers. The input layer consists of 13, the hidden layer consists of 13 and the output layer consists of 13 coefficients. In speech processing, it is often a must to do framing and windowing. The width of the frames is generally about 30ms with an overlap of about 20ms (10ms shift). Each frame consists of N sample points of the speech signal. Overlap the rate of frames between %30 and %75 of the length of the frames. The speech is stationary for a short duration of a time. Frame the signal into short frames. For each frame, calculate the periodogram estimate of the power spectrum. Apply the Mel filter bank to the power spectra; sum the energy in each of the filter. Take the logarithm of all filter bank energies. Take the Discrete cosine transformation of the log filter bank energies.

(ii). TRAINING PHASE/ TESTING

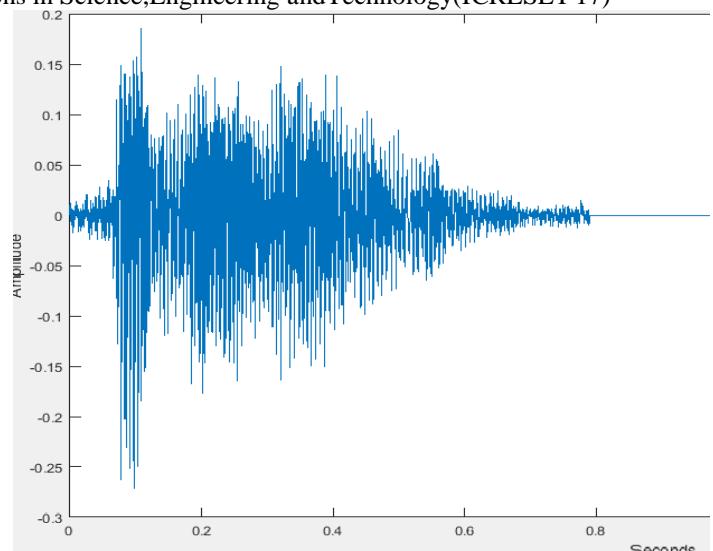
IV. RESULTS

[5]Once a network has been designed for a specific application, that network is prepared to be trained. To initiate this particular process the initial weights are chosen arbitrarily. Then, the training or the process of learning begins. The neural network was trained on various samples namely "how" "are" "you" and "okay" from a number of speakers. The target file was created after training the set. There are four sets of words and were assigned a distinct category. Thus, the first set of frames to category one and the second set of category to another one and the like.

(iii). REASON FOR OPTING ANN CLASSIFIER

When compared to conventional computers, Artificial Neural Network or ANN is a self pre-programmed approach that can do uncertain actions. It is widely used in pattern recognition to conclude the unexpected inputs. ANN consists of several nodes that replicates the biological neurons of human brain. The main advantage in which we choose ANN is that it takes the information samples rather than the entire data for obtaining the necessary outputs. As the data are split into several samples, a complete study of a particular speech sample can be abstracted that saves both time and money. We can infer the unpredicted results from the observations of the particular incoming inputs during ANN processing stage. It has the ability to recognise the unsynchronised relationship between the decision making inputs and the pre-trained inputs. In this paper, Deep Feed Forward learning algorithm technique is used (DNN) which is an artificial neural network that has multiple hidden layers between input and output layers.

After training the network, the following results have been obtained and have been tabulated as follows. The data are from various speakers from both the gender to identify the type and severity level of stammering. The classification includes word repetition, syllable repetition, prolongation and pause/stop gaps. The table and the corresponding time domain graph were also plotted. The table is formed and tabulated with the help of voice samples of two men and two women. Severity levels were categorized according to the stuttering percentages.



The %SS denotes "syllable stuttered" which is

speaker has spoken. However, when the severity

Voice Sample	Syllable Repetition	Word Repetition	Prolongation	Interjection	Total Disfluency	Total Words	%SS	Severity Level
M_0132_12y_1m_1	12	11	6	5	34	120	28.3	MILD
M_0991_08y4m_1	8	8	30	10	56	76	73.6	SEVERE
M1017_11y8m_1	10	10	20	1	41	96	42.7	MODERATE
M1017_12y_5m_1	16	25	10	3	54	174	31.1	MILD

total dis-fluency divided upon total words spoken. Mild, moderate and severe are the three severity levels observed. There were four classifications which were studied upon; namely syllable repetition, word repetition, prolongation and interjection. Mild level can be ignored while moderate severity level can be minimized using frequent feedback of the repeated words that the

level is critical or severe it is extremely difficult to eradicate but over time it can be reduced or minimized. The results produced were satisfactory and were able to classify the level of severity in one's stuttered speech.

V. DISCUSSIONS

The results were satisfactory and the training of Neural Network has provided us to further improvise our project. Here are the outputs and

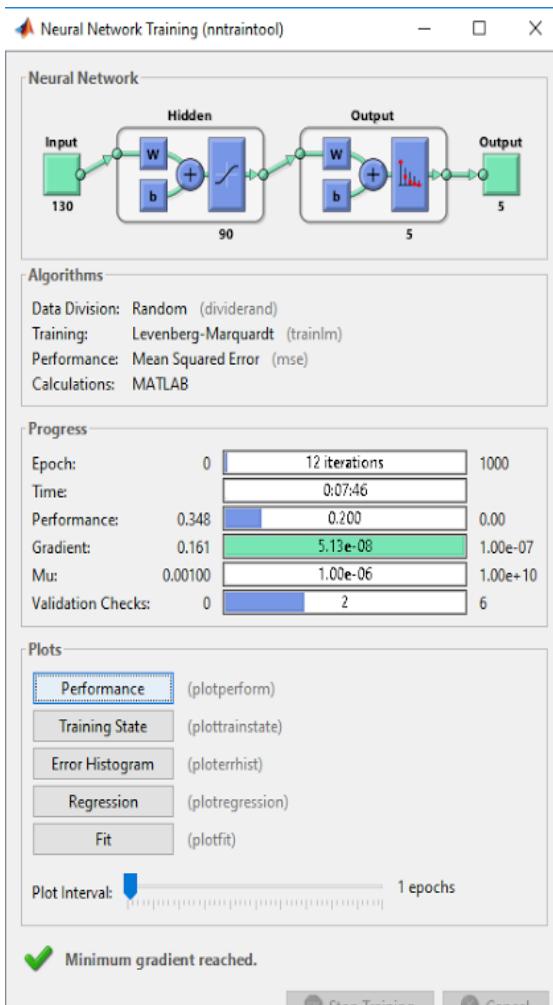


Fig.(1)

The snap shots of the word(s) trained
The text input is "THE WORD IS ZERO"

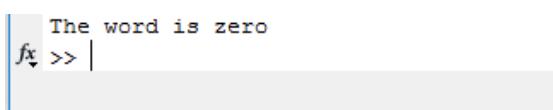


Fig.(2)

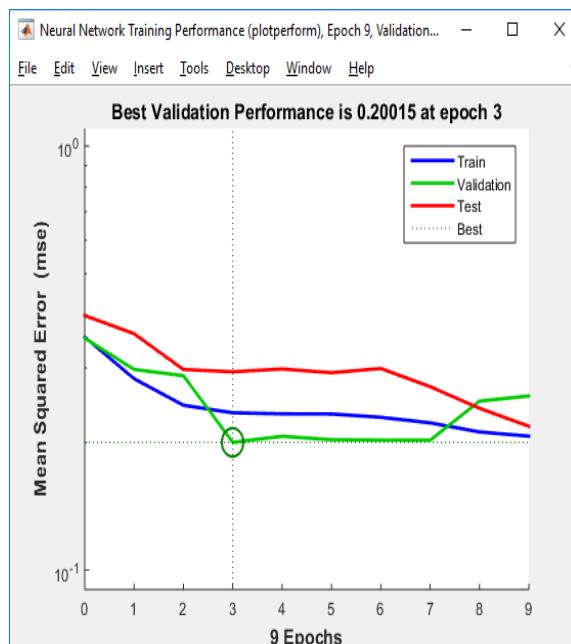
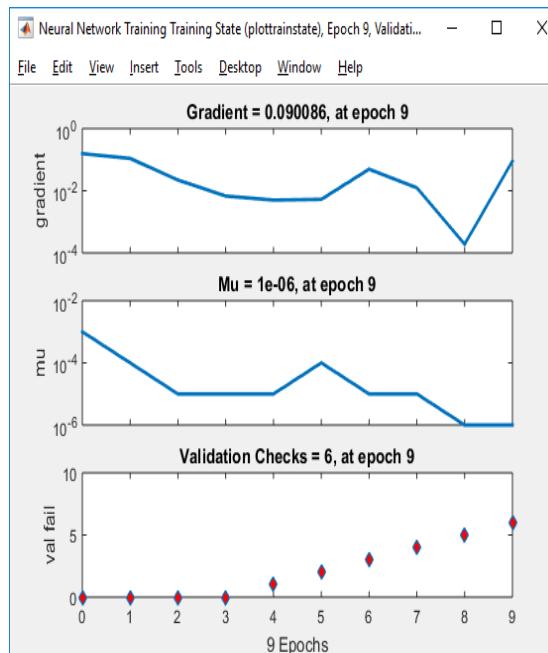


Fig.(3)

Here is the plotting of training of neural network. The various parameters on which the graph plotted were gradient, mu and validation check Fig.(4)



VI. CONCLUSION

Stuttering or stammering is a disorder of speech. In the last few decades, many researchers and pathologists have contributed to the research on stuttered speech recognition. There are three classifiers namely HMM, SVM and ANN.

Each classifier has its own odds and evens. Out of all the three, ANN provides maximum accuracy of about 94.9%.

ACKNOWLEDGEMENT

We would like to thank our Assistant professor and guide Mrs. SHEENA CHRISTABEL PRAVIN on her guidance and assistance throughout our project and in publishing this paper.

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SMART TROLLEY FOR MEDICATION AND HEALTH CARE

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Abstract— The proposed model is designed to provide a better service for patients, kids and aged people. It consists of a trolley provided with DC Geared Motors which is controlled through an Android Application. This makes the aged person or the needy partially independent. The model is built with Arduino Uno Controller, Bluetooth module (BCM92073X_LE_KIT) and a suitable Android Application. The heart of the proposed work is Arduino Uno Controller which controls the geared DC motors through L298D driver. The trolley is designed with a buzzer which beeps, once the destination is reached. In case of any obstacle on the path or an individual, again there's a beep and continues to move towards the destination after the individual is passed. The trolley will return back in the travelled path after a fixed time of service. The metal mounted on the ground decides the path for the trolley to travel. The operation provided being a simple one, a child can also operate this module, initiating a better quality tech based service. This design can also be used in hospitals that make the people independent to get the needs of patient time to time.

Keywords—arduino; trolley; automation; proximity inductive sensor;

various option provided by SMART TROLLEY FOR MEDICATION AND HEALTH CARE. Sometimes it becomes difficult for the care takes who is one of the family member mostly to provide service in their work busy or they tend to forget to provide medicines, in such cases this automated mobility system helps the care take to the needy. This SMART TROLLEY FOR MEDICATION AND HEALTH CARE is very easy to access providing options like operation through arw keys, buttons, accelerometers and voice control. It is provided with

I. INTRODUCTION

The main objective of the project is to serve rebidded people who are completely dependent on their care-taker. Now a days there are many home care centers where nurses or some care take are sent to the needy by hiring them. Usually these home care centers are not afforded by all the people as it becomes a little costlier. This "SMART TROLLEY FOR MEDICATION AND HEALTH CARE" provides an opportunity for the person

who in need of medication, food and other supplies time to time on the daily basis making them partially independent by reducing the work load of the care take. As it comes to a daily basis system the person knows well about the time of the medication and other required supplies for him and accesses the device for himself by using an open source application where one can easily make use of the device. The SMART TROLLEY FOR MEDICATION AND HEALTH CARE consists of a trolley which is the main equipment used for serving the rebidded people or the needy. It can also be used to serve old people having difficulties. The device is operated through an app which is connected to the equipment through Bluetooth. The trolley has three wheels where the rear wheels are operated using motor and the front wheel is ancestor. The trolley is sent from one place to another which is a predefined path metal mounted. On reaching the destination alerts the care take for the supply. There is enough time provided at the destination to place the supplements on the trolley and the trolley comes back the original place that is to the patient or to the needy. The time taken to travel and the halt time are predefined. There can be as many different paths to travel say room-1, room-2 and so on. The trolley is also provided with shelf where the frequent requirements are kept. Being easy to operate by all age people with various option provided it is adapted easily and bought into use.

II .OBJECTIVE

The proposed project is designed to provide better service for the patients, kids and aged people. It consists of a trolley provided with DC Geared Motors which is controlled through Android App or Voice Command. The trolley is sent and received where it is utilized by providing the needy by medicine, food and other supplies. This makes the aged one or the needy partially independent, still there must be a person to place the supplies on the trolley.

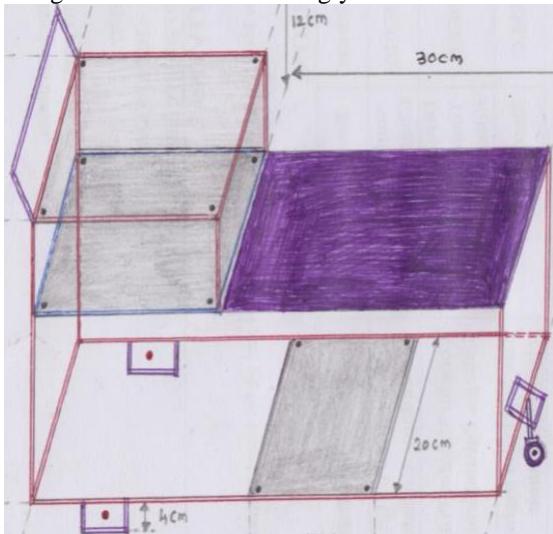
III. PROJECT METHODOLOGY

The idea used in the project is to port from one place to other place. In automobile industry and other industries,

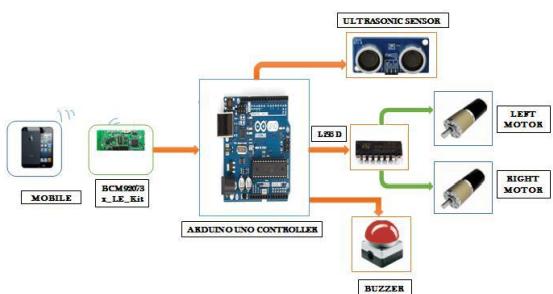
instrumentation to serve patients and needy, smart trolley for medication and health care is developed. the trolley uses metal to trace its path for transporting medicines. the places where medicines are to be served, metal are mounted on the ground i.e. the metal mounted on the ground will lead the trolley from source to destination point. as the trolley consists a pair of controlled motors and caster wheel, it operates smoothly on a flat surface. in case of any steps or other disuniformity will cause trolley to stop or rather it will not function as expected.

IV. WORK PLAN

- The program is loaded into the arduino Uno and it is interfaced with smart phone using Bluetooth module (HC-05)
- The electronic hardware such as L298 Driver, HC-05 Bluetooth module, Ultrasonic sensor, Buzzer, DC Motor, Inductive proximity sensor are interfaced with arduino
- The input is given through open source application and the trolley operates accordingly
- The trolley comes to the original position after carrying necessities
- The trolley is operated for different cases and required changes can be done accordingly



VI. BLOCK DIAGRAM



DESCRIPTION

The block diagram consists of Arduino Uno, HC-05 Bluetooth module, Ultrasonic sensor, Buzzer, L298D Driver and Motor. The entire circuit is interfaced with

mobile phone using HC-05 Bluetooth module. The input is given through mobile phone and is processed by arduino Uno. The L298D driver drives the motor according to the input given to the processor. The buzzer is provided for two purpose, one on reaching the destination and another on case of any obstacle in the path. The ultrasonic sensor detects the obstacle and the path is detected by proximity inductive sensor.

VII. HARDWARE REQUIREMENT

HARDWAR E	COMPONE NT S.NO	QUANTITY
REQUIREM ENT S.NO		
1	ARDUINO UNO	1
2	L298D	1
3	HC-05	1
4	BLUETOOTH MODULE	1
5	ULTRASONIC SENSOR	1
6	BUZZER	1
7	DC MOTOR	2
8	INDUCTIVE PROXIMIT Y SENSOR	2
9	DESIGNED TROLLEY	1
	12V BATTERY	1

ARDUINO UNO

The Arduino UNO R3 is a microcontroller board based on the ATmega328. It has 14 digital input/output pins (of which 6 can be used as PWM outputs), 6 analog inputs, a 16 MHz crystal oscillator, a USB connection, a power jack, an ICSP header, and a reset button. It contains everything needed to support the microcontroller; simply connect it to a computer with a USB cable (not included) or power it with a AC-to-DC adapter or battery to get started.

L298 DRIVER

L298D is a typical Motor driver or Motor Driver IC which allows DC motor to drive on either direction. L298D is a 16-pin IC which can control a set of two DC motors simultaneously in any direction. It means that you can control two DC motor with a single L298D IC.

HC-05 BLUETOOTH MODULE

HC-05 module is an easy to use Bluetooth SPP (Serial Port Protocol) module, designed for transparent wireless serial connection setup. Serial port Bluetooth module is fully qualified Bluetooth V2.0+EDR (Enhanced Data Rate) 3Mbps Modulation with complete 2.4GHz radio transceiver and baseband. It uses CSR Bluecore 04-External single chip Bluetooth system with CMOS technology and with AFH(Adaptive Frequency Hopping Feature). It has the footprint as small as 12.7mmx27mm.

ULTRASONIC SENSOR

Ultrasonic sensor provides an easy method of distance measurement. This sensor is perfect for any number of applications that require you to perform measurements between moving or stationary objects. Interfacing to a microcontroller is a snap. A single I/O pin is used to trigger an ultrasonic burst (well above human hearing) and then "listen" for the echo return pulse. The sensor measures the time required for the echo return, and returns this value to the microcontroller as a variable-width pulse via the same I/O pin.

BUZZER

Buzzers are very widespread in usage and are found on an incredible number of different devices. Buzzers are frequently employed to give a user or operator an audio indication of the stage of a mechanical device. Buzzers are used on computers, most often to indicate error conditions. These buzzers may go off if there is a faulty component on the device. Computers usually use beepers for this purpose, as well. These are usually piezoelectric buzzers.

DC MOTOR

100RPM Centre Shaft Economy Series DC Motor is high quality low cost DC geared motor. It has steel gears and pinions to ensure longer life and better wear and tear properties. The gears are fixed on hardened steel spindles polished to a mirror finish. The output shaft rotates in a plastic bushing. The whole assembly is covered with a plastic ring. Gearbox is sealed and lubricated with lithium grease and require no maintenance. The motor is screwed to the gear box from inside. Although motor gives 100 RPM at 12V but motor runs smoothly from 4V to 12V and gives wide range of RPM, and torque. Tables below gives fairly good idea of the motor's performance in terms of RPM and no load current as a function of voltage and stall torque, stall current as a function of voltage.

INDUCTIVE PROXIMITY SENSOR

Inductive proximity sensors are used for non-contact detection of metallic objects. Their operating principle is based on a coil and oscillator that creates an electromagnetic field in the close surroundings of the sensing surface. The presence of a metallic object (actuator) in the operating area causes a dampening of the oscillation amplitude. The rise or fall of such oscillation is identified by a threshold circuit that changes the output of the sensor. The operating distance of the sensor depends on the actuator's shape and size and is strictly linked to the nature of the material.

12V BATTERY

This is the efficiency of battery charging based solely on how many electrons you push in. If you compare watts in to watts out you have to take into account that the battery charging voltage is higher than the battery discharging voltage. The charging efficiency of flooded lead acid batteries is typically 70%, meaning that you must put 142 amp hours into the battery for every 100 amp hours you

get out. This varies somewhat depending on the temperature, speed of charge, and battery type.

VIII. SOFTWARE REQUIREMENT

ARDUINO SOFTWARE

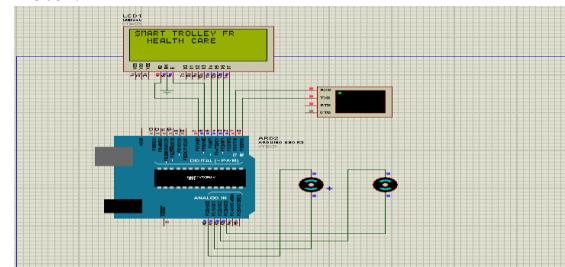
OPEN SOURCE APPLICATION

IX. SIMULATION RESULTS

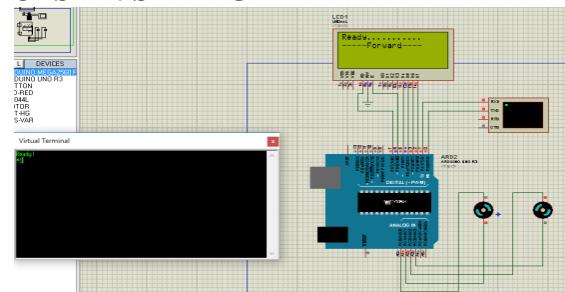
The software used for simulation is PROTEUS 7.8. the input is given by the virtual terminal. The display used here is 16*2 and the switches are used instead of proximity sensor

HARDWARE CIRCUIT SIMULATION

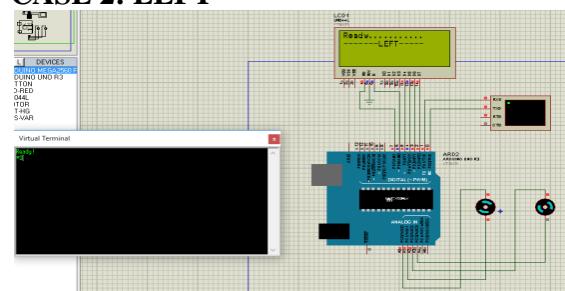
The below circuit diagram consist of micro controller where the input is given by the virtual terminal. When the input signal is received the micro controller allows the motor to rotate in its directions which is preprogrammed. The led display is placed to display the movement of the motor.



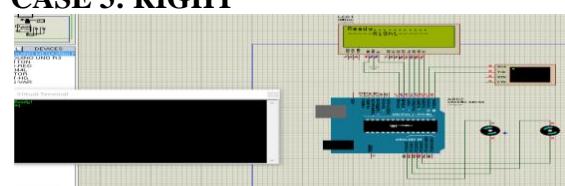
CASE 1: STRAIGHT



CASE 2: LEFT



CASE 3: RIGHT



CASE 1: ROOM 1

When the operator instructs the device to travel to the room 1, the Bluetooth module receives the command and

is send to arduino for the further processing. Now the device i.e. trolley is ready to go to room 1. The metal mounted for the respective room is traced and the inductive proximity sensor detects the metal and the processing are done. Now the trolley travels to room 1.

CASE 2: ROOM 2

When the operator instructs the device to travel to the room 2 , the Bluetooth module receives the command and is send to arduino for the further processing. Now the device i.e. trolley is ready to go to room 2. The metal mounted for the respective room is traced and the inductive proximity sensor detects the metal and the processing are done. Now the trolley travels to room 2.

CASE 3: ROOM 3

When the operator instructs the device to travel to the room 3, the Bluetooth module receives the command and is send to arduino for the further processing. Now the device i.e. trolley is ready to go to room 3. The metal mounted for the respective room is traced and the inductive proximity sensor detects the metal and the processing are done. Now the trolley travels to room 3.

ADVANTAGES

- It uses simple technology and is used for medication purposes.
- The technology used is easily available.
- It is economic.
- It can be re-programmed and purpose can be set as per requirement.

CONCLUSION:

Using simple components available in the market, it is possible to invent new technologies. Here developed is a “SMART TROLLEY FOR MEDICATION AND HEALTH CARE” serving the need in both economic and efficient way for needy. It is similar to one serving the needy. Here developed a trolley travelling over all places of the house carrying supplies say food, medicines and other requirement from one place to another place. Keeping in mind to serve the needy in user friendly manner, an simple android application is used. Using the application one can make use of trolley

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DESIGN AND FABRICATION OF AUTOMATIC SYSTEM OVERHEAD TANK CLEANING

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ABSTRACT

In this modern world, cleaning of overhead tanks manually is a tedious job. To overcome this we have aimed at tackling the disadvantages of cleaning overhead tanks, so an automatic system overhead tank cleaning is designed to provide high safety, high efficiency, less time for cleaning and to avoid environmental pollution problems. Purpose of this project is to clean domestic cylindrical water tank with the help of mechatronics system. The mechatronics system consists of a grooved gear rod attached to two arms with brushes at ends. The two arms are connected to the gear rod by nut. By rotating the gear rod, the up and down motion of the two arms is achieved. The gear rod is rotated with the help of a D.C gear motor. The main grooved shaft is powered by an A.C motor. The motor and the shaft are connected by a rubber belt. The clockwise rotation of the main shaft will make the arms move and vice versa. The whole operation is controlled by a circuit consisting of relay switches, buttons, and PIC microcontroller. The number of times for the operation to repeat can be fed into the circuit. The achievement of this project is reduction of cost and manual labour because there will be harmful diseases for the person who will go inside and it will affect the health as well as the other human being who consumes water from the tank.

1. INTRODUCTION

In recent studies it has been found that no automation based machine used in cleaning of overhead tank. This is because of the irregular shape and various heights of the tank locations. With previous survey made an attempt to make a machine by automation process for cleaning tank. An alternate solution has made a plan to solve this problem.

In India, the usage of sintex tanks by the people is approximately 71%

After studies made the information that have faced a lot of difficulties like continuous work in the dirty places, irregular payment and other various reasons. Continuous work and irregular payment may also be the major reason for this attempt. So came to a conclusion that cleaning the overhead tank using automation process can be useful to solve all these problems. In this case, machine has the capability to clean the tank easily and quickly. Designing of our machine is based on the survey report conducted.

2. MATERIALS AND METHODS

In this chapter a detailed discussions had made about the selection of materials and methods that have been handled.

2.1 Selection of Materials

The machine setup is considered. The rows and columns of the machine are of mild steel material. The DC Motor are used to move the shaft from starting to end position of the brushes and the brushes rotates continuously based on the input power which it receives from the AC Motor to clean the overhead tank.

The two types of rotary brushes are used to clean the overhead tank in horizontal and vertical positions. A shaft is used to hold the brushes in side view and bottom positions in which the adjustable springs with tension are used in between the brushes to adjust the size of the side view brushes as per the tank's space requirement.

The 0.25 horse power electrical type single phase Ac motor is used to run the machine. The up and down motion of the shaft can be controlled with help of the microcontroller. The Microcontroller is used to set the total number of rotary motion of the shaft which is used rotate the brushes at the two ends of the machine. It is operated in a supply voltage range of (0-12) V ac. The vertical shaft is about length of 3.5 feet and the horizontal shaft is about length of 3 feet which is eight in number. The setup stand is made up of mild steel such that all the components are easily made to fix upon it. A series of brushes are placed in shaft of the rotor in which the pulley gives the required speed, such that the distance between each brush from centre is exactly 40cm.

2.2 Selection of Motor

Two motors are used in the machine. The 0.25 horse power electrical type single phase Ac motor is used to run the rotatory brushes. Another 12V horse power DC motor is connected to the shaft to run the brushes and it is connected to the connecting rod to transfer the rotary motion into linear motion by means of reciprocating motion is achieved. This is used for up and down motion of the shaft which is the last step carried in the machine. The mechanism used is spring compression mechanism.

2.3 Selection of springs

A spring is an elastic object used to store mechanical energy. Springs are usually made out of spring

steel. There are a large number of spring designs; in everyday usage the term often refers to coil springs.

Small springs can be wound from pre-hardened stock, while larger ones are made from annealed steel and hardened after fabrication. Some non-ferrous metals are also used including phosphor bronze and titanium for parts requiring corrosion resistance and beryllium copper for springs carrying electrical current (because of its low electrical resistance).

When a coil spring is compressed or stretched slightly from rest, the force it exerts is approximately proportional to its change in length (this approximation breaks down for larger deflections). The rate or spring constant of a spring is the change in the force it exerts, divided by the change in deflection of the spring. That is, it is the gradient of the force versus deflection curve. An extension or compression spring has units of force divided by distance, for example lbf/in or N/m. Torsion springs have units of torque divided by angle, such as N·m/rad or ft·lbf/degree.

The inverse of spring rate is compliance, that is: if a spring has a rate of 10 N/mm, it has a compliance of 0.1 mm/N. The stiffness (or rate) of springs in parallel is additive, as is the compliance of springs in series. A spring is an elastic object used to store mechanical energy. Springs are usually made out of spring steel. There are a large number of spring designs; in everyday usage the term often refers to coil springs.

2.4 Selection of Screw

A screw is a mechanism that converts rotational motion to linear motion, and a torque (rotational force) to a linear force. It is one of the six classical simple machines. The most common form consists of cylindrical shaft with helical grooves or ridges called threads around the outside. The screw passes through a hole in another object or medium, with threads on the inside of the hole that mesh with the screw's threads.

When the shaft of the screw is rotated relative to the stationary threads, the screw moves along its axis relative to the medium surrounding it; for example rotating a wood screw forces it into wood. In screw mechanisms, either the screw shaft can rotate through a threaded hole in a stationary object, or a threaded collar such as a nut can rotate stationary screw shaft. Geometrically, a screw can be viewed as a narrow inclined plane wrapped around a cylinder.

2.5 Selection of Nut

A nut is a type of fastener with a threaded hole. Nuts are almost always used in conjunction with a mating bolt to fasten two or more parts together. The two partners are kept together by a combination of their threads' friction, a slight stretching of the bolt, and compression of the parts to be held together.

The most common shape is hexagonal, for similar reasons as the bolt head - 6 sides give a good granularity of angles for a tool to approach from (good in tight spots), but more (and smaller) corners would be vulnerable to being rounded off. It takes only 1/6th of a rotation to obtain the next side of the hexagon and grip is optimal. However polygons with more than 6 sides do not give the requisite grip and polygons with fewer than 6 sides take more time to be given a complete rotation. Other specialized shapes exist for certain needs, such as wingnuts for finger adjustment and captive nuts (e.g. cage nuts) for inaccessible areas.

A wide variety of nuts exists, from household hardware versions to specialized industry-specific designs that are engineered to meet various technical standards. Fasteners used in automotive, engineering, and industrial applications usually need to be tightened to a specific torque setting, using a torque wrench. Nuts are graded with strength ratings compatible with their respective bolts.

3. FABRICATION AND TESTING MODEL

In this chapter a detailed discussions had made about the selection of materials and methods that have been handled.

3.1 Software View

An animated design of the prototype has been made with the Solid works and Creo 2.1.0 version software's.

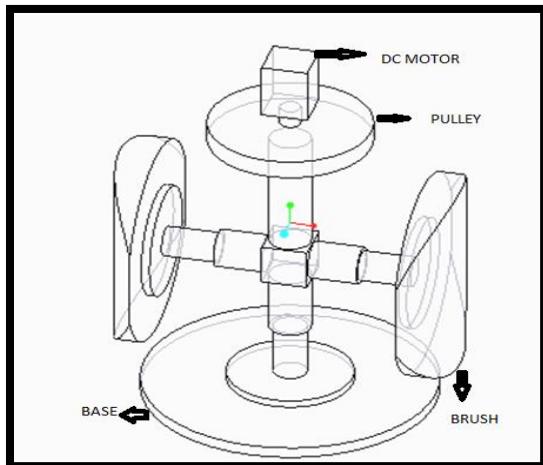


Fig 3.1 Design of the Prototype

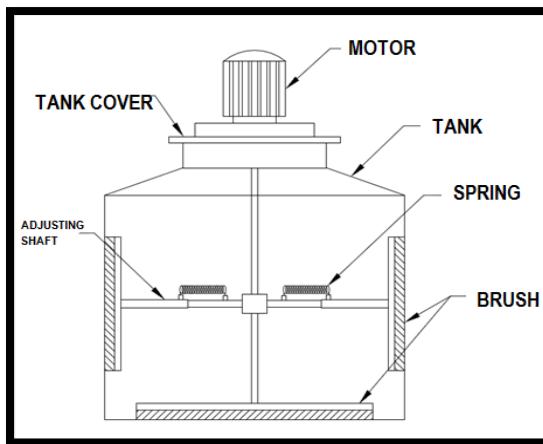


Fig 3.2 Assembled design of Prototype Model

An automated tank cleaning machine is a machine used to clean the overhead tanks such those found to store the water. Tanks must be cleaned from time to time for various reasons. The main reason is to clean the tank is allow to gets fungus. Thus the tank is to be inspected or maintenance to be performed regularly.

3.2 Fabrication and Testing

Automated tank cleaning machines work in a manner similar to a wall cleaner. A D.C motor of about 12V which runs at 60rpm is used in this project to move the side shafts up and down continuously. A AC motor of about 0.25HP which runs at 1440rpm is used for rotating the shaft at the fixed speed. The shaft is mounted on the motor in the T-shape rod. The machine is attached at the top of the tank. Then the brushes are mounted at the three end of the shaft through a surface of the tank. A PIC Microcontroller and LCD display Timer is used to set the number of rotation times of brushes and movement of shaft. After the complete setup, the motor rotates and the brushes rotate at the surface of the tank. A spring compression is mechanism is attached between the brush and shaft. Finally the water gets drain by the outlet of the tank. Portable water washing systems are widely used, but tanks that are cleaned frequently may have a fixed system installed.

4. CONCLUSION

Advanced model for tank cleaning system is cleaning the tanks thus making the operation user friendly. The working prototype is promising both in terms of imparting cleanliness and avoiding excess manpower. The future scope of the project is to extend it with auto feeding mechanism by which the manpower involved in feeding gets removed. Through the help of the auto feed mechanism it is easy to clean the tanks without excess man power. The project can be even extended to increase the cleanliness of the tank by insulating the frame and other components using stainless steel.

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PROTOTYPE MODEL FOR DROWSINESS DETECTION AND ACCIDENT PREVENTION

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Abstract—Vehicular ad hoc networks (VANETs) have emerged as an application of mobile ad hoc networks (MANETs), which use dedicated short-range communication (DSRC) to allow vehicles in close proximity to communicate with each other or to communicate with roadside equipment. Applying wireless access technology in vehicular environments has led to the improvement of road safety and a reduction in the number of fatalities caused by road accidents through development of road safety applications and facilitation of information sharing between moving vehicles regarding the road. This paper focuses on developing a novel and nonintrusive driver behavior detection system using a context-aware system in VANETs to detect abnormal behaviors exhibited by drivers and to warn other vehicles on the road to prevent accidents from happening. A five-layer context-aware architecture is proposed, which is able to collect contextual information about the driving environment, to perform reasoning about certain and uncertain contextual information, and to react upon that information. A probabilistic model based on dynamic Bayesian networks (DBNs) in real time, inferring four types of driving behavior (normal, drunk, reckless, and fatigue) by combining contextual information about the driver, the vehicle, and the environment, is presented. The dynamic behavior model can capture the static and the temporal aspects related to the behavior of the driver, thus leading to robust and accurate behavior detection. The evaluation of behavior detection using synthetic data proves the validity of our model and the importance of including contextual information about the driver, the vehicle, and the environment.

Index Terms—Context-aware system, driver behavior, dynamic Bayesian networks (DBNs), safety application, vehicular ad hoc networks (VANETs).

I. INTRODUCTION

At the present time, cars and other private vehicles are being used daily by large numbers of people. The biggest problem regarding the increased use of private transport is the rising number of fatalities that is occurring as a consequence of accidents on the roads; the associated expense and related dangers have been recognized as a serious problem that is being confronted by modern society. According to the U.K. Department of Transport's report for road casualties in Great Britain for the first quarter of 2011, there were 24 770 people killed or seriously injured due to road accidents. This number represents a small decrease of 5%, as compared with the previous 12 mo period [1]. Driver errors due to being affected by fatigue, being drunk, or being reckless are the main factors responsible for most road accidents.

Wireless communications and mobile computing have led to the enhancement of and improvement in the intelligent

trans-portation systems (ITS) that focus on road safety applications [2], [3]. As a core component of ITS, vehicular ad hoc networks (VANETs) have emerged as an application of mobile ad hoc networks (MANETs), which uses dedicated short-range com-munication (DSRC) to allow nearby vehicles to communicate either with each other or with roadside equipment. These forms of communication offer a wide range of safety applications to improve road safety and traffic efficiency and to provide a clean environment. VANET safety applications are consid-ered to represent a vital step toward enhancing road safety and improving traffic efficiency by preventing accidents from occurring, e.g., intersection collision avoidance, warning about violating traffic signal, approaching emergency vehicle warn-ing, etc. [4]. Many researchers have been working in the area of driver monitoring and detection over recent decades; therefore, multiple systems have been proposed to monitor and detect the status of drivers. Some researchers have tried to monitor the behavior of the vehicle or the driver in isolation, whereas others have focused on monitoring a combination of the driver, the vehicle, and the environment, to detect the status of the driver in an attempt to prevent road accidents. However, there is still no comprehensive system that can effectively monitor the behavior of a driver, the vehicle's state, and environmental changes to perform effective reasoning regarding uncertain con-textual information (driver's behavior) to alert other vehicles on the road by disseminating warning messages in time to the relevant vehicles in the vicinity, including implementing practical corrective actions to avoid accidents.

In this paper, we propose a five-layer context-aware archi-tecture for a driver behavior detection system in VANETs that can detect four types of driving behavior in real-time driving: normal, fatigued, drunk, and reckless driving. It will then alert the driver and other vehicles on the road by operating in vehicle alarms and sending corrective action, respectively. The functionality of the architecture is divided into three phases, which are the sensing, reasoning, and acting phases. In the sensing phase, the system collects information about the driver, the vehicle's state, and environmental changes. The reasoning phase is responsible for performing reasoning about uncertain contextual information to deduce the behavior of the driver. The behavior of the driver is considered as an uncertain context (high-level contextual information);

of driving; therefore, we have designed a dynamic Bayesian network (DBN) model to perform a probabilistic reasoning to infer the behavior of the driver. Our model combines information from different kinds of sensors to capture the static and temporal aspects of behavior and to perform probabilistic inference to deduce the driver's current driving style. The acting phase is responsible for operating in vehicle alarms and sending corrective actions to other vehicles, via wireless technology provided by VANETs.

II. RELATED WORK

Several researchers have examined the development of driver monitoring and detection systems using range of methods. Some have attempted to measure the driver's state or the vehicle's behavior to detect fatigued and drunk drivers. Meanwhile, other researchers have tried to monitor the driver, the vehicle, and the environment to detect the state of the driver. The main studies are summarized in the following.

In [5], the focus of the paper was on building a context-aware smart car by developing a hierarchical model that is able to collect, to reason about, and to react to contextual information about the driver, the vehicle, and the environment, providing a safe and comfortable driving environment. However, this system is restricted to warning the driver and controlling the vehicle and does not warn other vehicles on road by sending warning messages. In [6], a context-aware system is proposed that is used to collect and analyze contextual information about the driver, the vehicle, and the environment in real-time driving. It also collects information from questionnaires completed by the

[11], a drunk and drowsy driver detection system combining breath and alcohol sensors in a single device is developed. This device is able to measure the degree of alertness of the driver to detect charged water clusters in the driver's breath to detect the presence of alcohol using breath and alcohol sensors.

In [12], a system for drowsy driver detection in real-time driving by collecting information about the driver's behavior, such as the speed of the vehicle, the vehicle's lateral position, the yawing angle, the steering wheel angle, and the vehicle's lane position is proposed. Their system uses artificial neural networks to combine different indications of drowsiness and to predict whether a driver is drowsy and to issue a warning if required. In [13], a noncontact system to prevent driver drowsiness by detecting the eyes of the driver and checking whether they are opened or closed using a charged-coupled device (CCD) camera has been developed. The system is based on capturing the face of the driver and on using image processing techniques to check if the eyes are closed for long intervals. If the eyes are closed, the driver is drowsy, and the system will issue a warning to the driver.

Several definitions of driver behavior have been proposed in the literature. In [14], normal driving behavior is defined as the majority of behavior

The remainder of this paper is organized as follows. Section II introduces the work that has been done in the field of driver behavior detection. Our definition to the normal and abnormal driving behaviors is given in Section III. The proposed context-aware architecture for driver behavior detection is explained in Section IV. Section V proposes the reasoning mechanism based on the DBN to collect and analyze the behavior of the driver. System validation is shown in Section VI, and the conclusion is given in Section VII.

drivers to create driving situations. The Bayesian network is used to reason about this contextual information, which is relatively uncertain information, by using a learning process to observe and predict the future behavior of the driver. The system was able to predict the future behavior of the driver and cannot detect the current state of the driver and warn other vehicles on the road.

In [7]–[9], the detection of the fatigue level of the driver using a video camera to extract different cues such as eye state, eyelid movement, gaze movement, head movement, and facial expression is attempted to measure the fatigue level and warn the driver via in-vehicle alarms.

In [10], a program that works on a mobile phone and that contains an accelerometer and orientation sensors placed in the vehicle to detect a drunk driver in real time is developed. The program compares current accelerations with typical drunk driving patterns. When the program indicates that the driver is influenced by alcohol, warning messages are generated to alert the driver, and a message is sent to inform police. In

The driver behavior detection systems described earlier focus on the detection of driver's status (drunk, affected by fatigue, drowsy) by monitoring the driver or the vehicle and by issuing warning messages to the driver to prevent road accidents. While these systems have achieved good results in terms of improving road safety, they are limited to alerting the driver or controlling the vehicle itself. Moreover, they have not considered the behavior of the driver as a high-level context (uncertain context). This paper attempts to construct a comprehensive system that is able to detect normal and abnormal driving behavior using a context-aware system to collect and analyze contextual information about the driver, the vehicle's state, and environmental changes and to perform reasoning about certain and uncertain contexts. The driver and other vehicles are then alerted by operating an in-vehicle alarm and by sending warning messages containing corrective actions via wireless technology provided by VANETs, thus providing a flexible yet more accurate proactive driver behavior detection system.

III. OVERVIEW OF DRIVER BEHAVIOR

exhibited by each driver during their daily driving, whereas it defined abnormal driving behavior as

behavior of a driver while influenced by mental or physical factors. In [15]–[17], the authors referred to

interaction between the driver, the vehicle, and the environment (surrounding road information and traffic). In [18], aggressive driving is defined as when the driver commits a combination of moving traffic offenses that may cause a danger to other drivers or property. Aggressive drivers are those who exceed the speed limit, who follow the front vehicle too closely, who perform unsafe lane change, and who fail to obey traffic control rules, e.g., traffic signals. In [19], normal behavior is defined as a situation in which driver is concentrating on driving.

In [20], driver behavior is defined as a sequence of actions, each of which is associated with the specific state of the driver, the vehicle, and the environment, which can be characterized by a set of contextual information. In [21], driver behavior is referred to as a sequence of internal states of the driver, each of which may be observed by capturing associated observable features (contextual information). In [22], it is stated that the driver has a large number of internal mental states and that a transition from one state to another occurs during driving.

In this paper, the behavior of the driver is defined from the perspective of context awareness as follows. Driver behavior is a complex and dynamic interaction between three entities: the driver, the vehicle, and the environment. It is described as a transition between a sequence of states (e.g., normal, affected by fatigue, drunk, or reckless); over the course of driving, a driver will be in a particular state, which he or she may remain in for a period of time and then potentially changing to a different state. Each state can be characterized by capturing a large amount of contextual information of relevance to the interacting entities. The behavior of the driver is considered to be normal (safe) if his or her actions associated with the current state will not lead to an accident; it is otherwise considered to be unsafe (abnormal).

The behavior of the driver can be represented as follows:

$$B = \{S_{t=1}, S_{t=2}, \dots, S_{t=n}\}$$

where B is the behavior of the driver, S is the state, and t is the time. The states of the driver were classified into four classes: normal driving S_n , drunk driving S_d , fatigued driving S_f , and reckless driving S_r . As defined, each state may be characterized by capturing observable context C . The state may be referred to as:

$$(S_{t=i}) = \{C_1, C_2, C_3, \dots, C_k\}.$$

In conclusion, the behavior of the driver is considered as the current unobservable state $S_{t=i}$ that can be characterized by capturing a set of observable context

the task of driving as a complex dynamic environment and defined driving as the

C_j , where $S_{t=i}$ is the state at time = i , and C_j is the context that need to be captured to characterize the state.

Based on the previous definitions [15]–[23] of the driving behavior, we have defined four categories of driving behavior.

1) Normal behavior: Behavior is considered to be normal when driver concentrates on the driving task. This can be characterized by controlling the speed of the vehicle, avoiding sudden acceleration, driving without alcohol intoxication, maintaining a proper position between lane markers, and the driver having his or her eyes open while driving. When the driver matches the aforementioned criteria, behavior is considered normal.

2) Drunk behavior: This refers to driving while intoxicated by alcohol and is characterized by a set of observable actions such as sudden acceleration, driving without maintaining the proper lane position, driving without controlling the speed, and usually having closed eyes for more than 80% for a period of time.

3) Fatigue Behavior: In [24], fatigue is defined as an evolving process that increase during driving and is associated with a loss of effectiveness in driving. In [24]–[26], it is stated that a driver driving after a period of 17 h with no sleep behaves exactly as a driver who has 0.05% intoxication of alcohol. A driver driving after a period of 24 h with no sleep behaves exactly as one who has 0.1% intoxication of alcohol. Based on this argument, fatigue driving was defined as driving that exhibits the same characteristics as drunk driving but without alcohol intoxication in the driver's blood.

4) Reckless behavior: In [27], the reckless driver is defined as a driver who drives at high speed and a high degree of acceleration and puts other traffic participants at risk. The driver is classified as driving in this category when there is no alcohol intoxication and the driver's eyes are opened, but the following behaviors are exhibited: driving with sudden acceleration, not maintaining the proper lane position, and not controlling the vehicle's speed.

Context-aware systems are those systems that are capable of adapting their operations to the current context without user interaction and are thus aimed at augmenting usability and effectiveness by taking into account the environment's contextual information [28]. Context-aware systems incorporate the following three main subsystems [29].

- Sensing subsystem: the phase for gathering contextual information by sensors;
- Reasoning (thinking) subsystem: the phase for employing reasoning techniques to contextual data to obtain high-level contextual information (e.g., user situation);
- Acting subsystem: Depending on the current situation, the systems that provide services to users.

IV. CONTEXT-AWARE-BASED ON-BOARD UNIT ARCHITECTURE

Our architecture, as shown in Fig. 1, is divided into three main phases, i.e., a sensing phase, a reasoning phase, and an application phase, which represent the three main subsystems of a context-aware system, i.e., the sensing, reasoning, and acting subsystems, respectively. Sending corrective actions or operating the in-vehicle alarms in the third layer depends on the result of the second layer, which in turn depends on receiving the information of the first layer.

A. Sensing Phase

The sensing phase is responsible for gathering contextual information about the driver, the vehicle, and the environment and for transferring the collected information into a machine-executable form to be processed in the next phase. It is divided into two layers as follows.

- Sensors Layer: This layer is responsible for acquiring the context data. It consists of a set of different sensors integrated into the driving environment in which the system operates. Different types of sensors provide

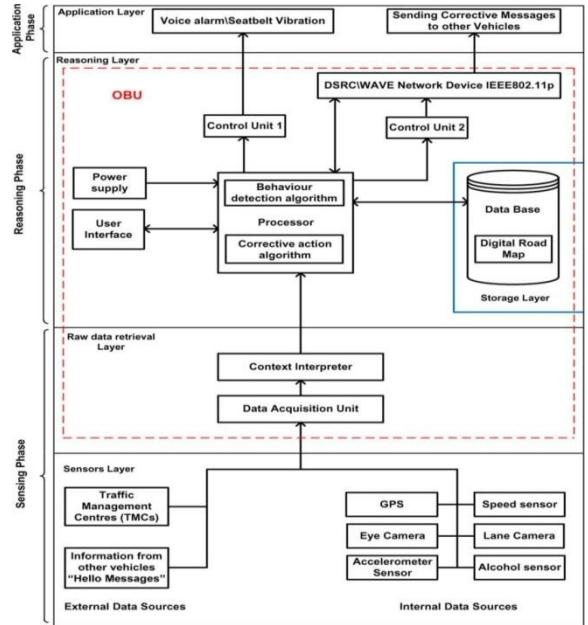
Fig. 1. Driver behavior detection system architecture.

internal data sources (physical sensors) refer to the set of sensors within the vehicle, such as cameras, speed sensor, GPS, alcohol, and the accelerometer sensor, which provide information about the vehicle's speed, acceleration information, the direction of driver's eyes, the position in lane, and the level of alcohol in the driver's blood.

It also incorporates information from external data sources (virtual sensors), including traffic management centers (TMCs), which provide information relating to traffic, weather, and road conditions, based on the website, dynamic message signs, and highway auditory radio data [2]. External data sources also include information about other vehicles (i.e., speed, current position, and direction) collected through received hello messages.

- Raw data retrieval layer: The purpose of applying this layer is to separate low-level sensing details from the sensors for the upper layer of the system and the abstract contextual information received from the sensor layer. This layer contains the following two components.
 - Data acquisition unit: responsible for controlling and coordinating all the sensors in the sensor layer;
 - Context interpreter: modeling process that is done in this component in terms of transferring the data

different types of information according to the system requirements. Two types of data sources (sensors) gather context data. The



received from the data acquisition unit into a machine-executable form. Several types of modeling algorithms can be used to abstract the received sensory data (e.g., ontology modeling). The received data may come from different types of sensors, such as cameras, GPS, and speed sensors. This component transfers the data into a form that can be processed by the reasoner.

B. Reasoning Phase

This phase is responsible for extracting the situation of the driver and calculating corrective actions for other vehicles on the road. There are two types of contextual information: certain information, which is obtained from a single sensor, and uncertain contextual information, which cannot be acquired by a single sensor and may be incomplete or inexact. The behavior of the driver is categorized as uncertain contextual information (high-level contextual information). In this phase, the behavior detection algorithm performs reasoning about uncertainty (driver behavior) by combining data acquired from different sensors to detect the state of the driver during real-time driving. The corrective action algorithm is responsible for calculating the appropriate corrective action to other vehicles on

the road. The reasoning phase consists of two layers as follows.

- Reasoning Layer: This layer is responsible for extracting the current state of the driver (e.g., •

– Processor: The onboard unit (OBU) processor is responsible for managing all the components of the OBU and controlling all the

• Behavior detection algorithm: This algorithm is designed to reason about uncertain contextual information to detect the current behavior of the driver using a DBN algorithm to combine the data collected from a sensing layer and to detect the type of behavior. If the behavior of the driver is normal, no action is needed. In the case of abnormal driving behavior (e.g., drunk, fatigued, or reckless), the processor performs the corrective action algorithm. In this paper, we will focus on the driver behavior detection algorithm.

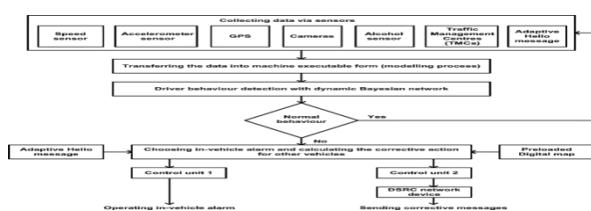
• Corrective action algorithm: The aim of performing this algorithm is to choose the appropriate in-vehicle alarm and to calculate the proactive corrective action for other vehicles on the road according to their positions, velocities, and directions with the use of predefined digital road maps and the information collected from the adaptive hello messages. The corrective action algorithm will be out of the scope of this paper.

– Control unit 1: This unit is responsible for controlling in-vehicle alarms such as seat vibration and audio alarm to attract the driver's attention. This unit receives the signal from the processor in the case of abnormal driving behavior.

– Control unit 2: After receiving the signal from the processor indicating abnormal driving behavior, this unit sends signals to the DSRC/wireless access in vehicular environment (WAVE) device to transmit corrective

messages to other vehicles on the road or to the roadside unit.

Fig. 2. Driver behavior detection system mechanism.



The OBU processor performs the DBN algorithm to perform reasoning about an uncertain context (driver behavior) by combining data received from the interpreter using the probabilistic inference. If the output of the inference is a normal driving

normal, fatigued, drunk, or reckless), and it generates corrective

• actions for other vehicles to avoid road accidents. This layer comprises the following components.

tasks and activities it performs. The processor performs the following two algorithms.

– DSRC/WAVE network device: The OBU contains a DSRC/WAVE network device based on IEEE 802.11p [30]. It is responsible for connecting the vehicle to other vehicle's OBUs or with the roadside unit through the wireless radio frequency based on IEEE 802.11p. The OBU can send or receive messages via this network device.

– Power supply: The power supply is responsible for providing power to the OBU. It is rechargeable and provides power to the OBU without any constraints.

– User interface: This contains the audio and video interface that allows the user to interact with the services provided by the OBU.

• Storage Layer: In this layer, the database stores predefined digital maps of the road and the historical data (past driving situations).

Fig. 2 shows the mechanism of detecting the behavior of the driver and calculating corrective action for other vehicles on the road. The vehicle sense contextual information about the vehicle, the driver, and the environment from sensors that include both physical and logical sensors, such as speed, accelerometer, TMC, adaptive hello message, camera, GPS, and alcohol sensors, which are connected to the OBU. After collecting this information from the sensors, the interpreter transfer the different kinds of data to a form that can be processed by the processor by applying one of the modeling techniques, such as ontology modeling [31]. This will be out of the scope of this paper.

C. Application Phase

This phase represents the acting subsystem in a context-aware system. It is responsible for disseminating warning messages that includes corrective actions for other vehicles on the road. It also operates in-vehicle alarms to warn the driver to prevent the occurrence of accidents and to decrease the number of potential fatalities.

behavior that satisfies all normal driving criteria, no action will be taken by the processor, and the vehicle will sense new information. If the output of the inference is an abnormal driving behavior, such

as being drunk, fatigued, or reckless, the processor

calculating the corrective action for other vehicles on the road and choosing the appropriate in-vehicle alarm according to the position of other vehicles and their velocity and direction. After calculating corrective actions for other vehicles and choosing the in-vehicle alarm, the processor will send a signal to control units 1 and 2 to operate an in-vehicle alarm and to send the corrective message to other vehicles through the DSRC network device. This process is based on a context-aware system and is a self-organizing process in which information V.

DYNAMIC BAYESIAN NETWORK DRIVER BEHAVIOR DETECTION MODELAs stated previously in the definition driver behavior, this refers to a transition between a set of states during the course of driving. For example, the alcohol level in the driver's blood may be low at the beginning of the driving but will become higher if the driver is drinking while driving; the level of fatigue may also increase during driving [24]. This fact indicates that, in addition to the observable context at the current time slice, the driver's state at the previous time slice is also considered an indicator for the state at the current time slice. Moreover, the driver may exhibit different behaviors at different times. It is therefore very important to capture the temporal aspect of behavior and to integrate the evidences over time. As a result, the accurate and effective detection of different types of behavior requires different types of context to be combined. This information may be incomplete or inaccurate due to the inaccurate reading of some sensors and the fact that different variables need to be combined. Several information fusion methods have been proposed such as fuzzy logic, the Dempster–DBN can be defined as a pair of (S, \overrightarrow{S}) , where S is a static Bayesian network that defines the prior $P(Z_1)$, and \overrightarrow{S} defines $P(Z_t|Z_{t-1})$, which is a two-slice temporal Bayesian network, as shown in the following [42]:

$$\begin{aligned} & N \\ & P(Z_t|Z_{t-1}) = \prod_{i=1}^N P(Z_t^i | \text{Pa}(Z_t^i)) \end{aligned}$$

where N is the number of nodes in the network, Z_t^i is the i th node at time slice t , and $\text{Pa}(Z_t^i)$ are the parents of Z_t^i .

The first step in designing a DBN is to identify the hypothesis variables and group them into mutually exclusive events. The second step is to identify the information variables that denote something about the hypothesis. After defining the hypothesis variable and information variables, the next step is to create the directed links between the variables in the networks, which reflect the conditional independence between variables to construct the static Bayesian network at time $t = 1$. Finally, the conditional probability table (CPT) for each node in the network and the conditional probability over time have to be created given its parent [43]. In this system, the DBN is

performs the algorithm of Shaper theory, neural networks, and the Kalman filter. These methods do not provide efficient expressive capabilities to capture incomplete data, uncertainties, dependence between the variables, and the temporal aspect exhibited by the behavior. This system uses DBNs to combine data from different types of sensors to deduce driver behavior due to the following reasons. First, they are considered to be the most reliable method for dealing with inaccurate data and unobservable physical values. Second, they are able to model time-series data. Third, they are efficient at combining uncertain contextual information from a wide range of sensors to deduce high-level contextual information (reason about uncertain context) and are able to combine prior data with current data [32]–[39]. A DBN is a directed acyclic graph that represents the conditional independence between a set of random variables and deals with uncertain information and probabilistic inference upon receiving evidences. It consists of a set of nodes that represent the random variables and a set of arcs representing the conditional independence between variables. It is considered as a set of static Bayesian networks interconnected by sequential time slices. The relationship between two neighboring time slices can be modeled using the first-order hidden Markov model, which means that the random variables at time slice t are affected by the variables at time slice t and by the variables at time slice $(t - 1)$ only [35], [37], [40], [41]. A

→

treated as a singly connected static Bayesian networks in which the hypothesis node at time slice t depends on the observations at time slice t and the hypothesis node at time slice $t - 1$ only.

A. Defining Network Variables (Nodes)

The hypothesis node in this network is the state node, which includes four mutually exclusive states: fatigue, normal, drunk, and reckless. This reflects the state of the driver at the current time. The information variables were divided into two groups: the first group representing variables that may affect the behavior and the second group representing the information that results from a specific behavior type. The two groups are defined as follows.

- Group 1 is composed of information variables that affect the behavior, including the circadian rhythm and the driving environment.

– Circadian rhythm: This refers to the human sleep–awake cycle, which is considered a cause of driver fatigue. There are two periods during the day (3:00–5:00 P.M. and 3:00–5:00 A.M.) during which human reach their peak level of fatigue

[24], [32], [35]. The circadian rhythm was considered as one of the causes that affect the hypothesis nodes. The circadian rhythm node is

- Driving environment: Noise and temperature are considered to have a high influence on the driving environment, which can in turn cause fatigue. Fatigue is more likely to occur when noise and high temperature occur inside or outside the vehicle [32], [35]. The driving environment node was selected as one of the effects that cause the hypothesis nodes.
- Group 2 is composed of information variables that result from specific behavior, including vehicle-related information (vehicle speed, position between lane markers, and acceleration) and driver-related information (the state of the driver's eyes and the level of alcohol in the driver's blood).
 - Controlling the speed: Drunk and fatigued drivers struggle to control their speed due to the mental state of the affected driver. According to the definition of the reckless driver use in this paper, the driver may violate the speed limit [10].
 - Position in the lane: In [10], it is stated that the drunk driver has a problem in maintaining the lane position (vehicle position between lane markers).

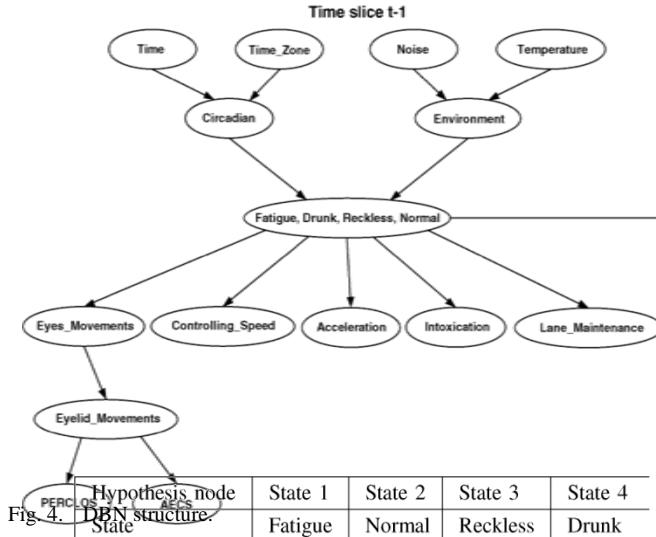


TABLE I
HYPOTHESIS NODE STATES

Node name	State 1	State 2
Time	Fatigue	Active
Time_zone	Change	No change
Circadian	Fatigue	Awake
Noise	High	Normal
Temperature	High	Normal
Environment	Good	Bad
Lane_maintenance	Good	Bad
Acceleration	Sudden	Moderate
Controlling_speed	Good	Bad
Intoxication	Less_than_limit	More_than_limit
Eyes_movements	Normal	Abnormal
Eyelid_movements	Normal	Abnormal
PERCLOS	Normal	Abnormal
AECS	Slow	Normal

affected by two nodes, i.e., time and time zone nodes

- Acceleration: The driver is considered to use normal behavior while driving with normal acceleration and considered to exhibit abnormal behavior, such as being drunk, fatigued, or reckless while driving with sudden acceleration [10].
- State of the driver's eyes: The eyes of the fatigued driver are usually measured by PERCLOS, which is considered to be the most accurate measure of driver fatigue. PERCLOS is the measure of eyes that are 80% covered by the eyelid for a period of time [8], [9], [32], [44], [45]. Eye movements affect eyelid movements, which can be measured via PERCLOS and AECS.
- Intoxication: This refers to the amount of alcohol in the driver's blood. This node has two states (less than 0.05% and more than 0.05%). The driver is considered to be a drunk driver if there is alcohol intoxication of more than 0.05% [11], [46].

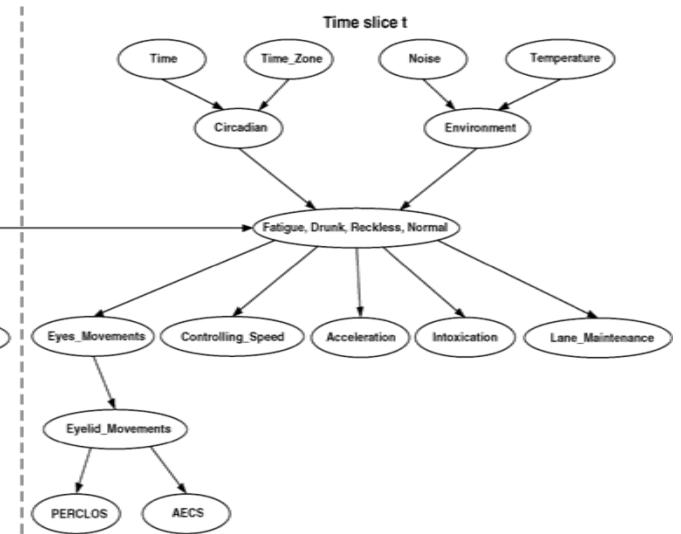


TABLE II
NETWORK VARIABLES AND THEIR STATES

B. Network Graph

After deciding the variables included in the network, the next step is to decide the conditional independence between them (drawing the directed acyclic graph). Fig. 3 shows the static Bayesian network structure at time ($t = 1$) and the conditional

independence between the variables. The DBN is shown in Fig. 4, where the hypothesis node at time slice t is affected by the information variables at

C. Parameterizing the Network

Parameterizing the network (choosing the values of CPT) is the step that the prior probability of the root nodes and the conditional probabilities of the links in the network are determined. First, all the nodes in the network and their possible states must be specified before the value (probability) for each state is chosen. Tables I and II show the state space for each node.

- Deciding the value for each node is important for the network to be useful. Defining the probability of each node in the network refers to the probability of node X being in state A when the evidence is received. The

CONDITIONAL PROBABILITIES FOR THE CONTROLLING SPEED NODE GIVEN ITS PARENT

Time_zone	Probability
Change	0.17
No change	0.83

time slice t and the hypothesis node at time slice $t - 1$ only.

following two methods may be used to obtain the probabilities of the states for each node in the network. The values can be obtained by performing statistical analysis of a huge amount of training data. Training data are obtained by performing several tests in a test bed specifically designed for the system and by collecting the output for each test.

TABLE XI

Controlling_speed / States	Fatigue	Normal	Reckless	Drunk
Good	0.46	0.975	0.48	0.46
Bad	0.54	0.025	0.52	0.54

TABLE V
PRIOR PROBABILITY FOR THE NOISE NODE

Noise	Probability
High	0.15
Normal	0.85

TABLE VI
PRIOR PROBABILITY FOR THE TEMPERATURE NODE

Temperature	Probability
High	0.15
Normal	0.85

TABLE VII
CONDITIONAL PROBABILITIES FOR THE CIRCADIAN NODE GIVEN ITS PARENTS

Time / States	Time_zone	Circadian	Probability
Fatigue	Change	Awake	0.1
	No change	Awake	0.4
	Change	Fatigue	0.9
	No change	Fatigue	0.6
Active	Change	Awake	0.3
	No change	Awake	0.95
	Change	Fatigue	0.7
	No change	Fatigue	0.05

TABLE VIII
CONDITIONAL PROBABILITIES FOR THE ENVIRONMENT NODE GIVEN ITS PARENTS

Noise / States	Temperature	Environment	Probability
High	High	Good	0.06
	Normal	Good	0.2
	High	Bad	0.94
	Normal	Bad	0.8
Normal	High	Good	0.27
	Normal	Bad	0.85

TABLE XII
CONDITIONAL PROBABILITIES FOR THE INTOXICATION NODE GIVEN ITS PARENT

Intoxication / States	Fatigue	Normal	Reckless	Drunk
Less_than_limit	0.99	1	0.975	0.1
More_than_limit	0.01	0	0.025	0.9

TABLE XIII
CONDITIONAL PROBABILITIES FOR THE EYE MOVEMENT NODE GIVEN ITS PARENT

Eyes_movements / States	Fatigue	Normal	Reckless	Drunk
Normal	0.05	0.99	0.99	0.05
Abnormal	0.95	0.01	0.01	0.95

TABLE XIV
CONDITIONAL PROBABILITIES FOR THE EYELID MOVEMENT NODE GIVEN ITS PARENT

Eyelid_movements / Eyes_movements	Normal	Abnormal
Normal	0.95	0.01
Abnormal	0.05	0.99

TABLE XV
CONDITIONAL PROBABILITIES FOR THE AECS NODE GIVEN ITS PARENT

AECS / Eyelid_movements	Normal	Abnormal
Slow	0.05	0.97
Normal	0.95	0.03

TABLE IX
CONDITIONAL PROBABILITIES FOR THE LANE
MAINTENANCE NODE GIVEN ITS PARENT

Lane_maintenance / States	Fatigue	Normal	Reckless	Drunk
Good	0.49	0.975	0.41	0.49
Bad	0.51	0.025	0.59	0.51

TABLE X
CONDITIONAL PROBABILITIES FOR THE ACCELERATION
NODE GIVEN ITS PARENT

Acceleration / States	Fatigue	Normal	Reckless	Drunk
Moderate	0.3	0.925	0.374	0.3
Sudden VI. EVALUATION	0.075	0.626	0.7	

Here, we evaluate the performance of the proposed driver behavior detection system using synthetic data. Given the parameterized DBN, the driver

nodes, we will treat the circadian and the environment nodes as evidence nodes during this evaluation. The eye movement node is treated as an evidence node as it affects the eyelid movement node, which affects the PERCLOS and AECS nodes. After considering the circadian, the environment and the eye movement as evidence nodes, the total number of all possible combinations attained is 2^7 , which is equal to 128 possible inputs.

Here, we have instantiated all the possible combinations of inputs, and the system has been able to detect the state of the driver (fatigue, drunk, reckless, and normal) over time accurately, applying all possible combinations. It is impossible to detail all the possible combinations here; only samples of the combinations of evidence are shown in Table XIX. This shows the states of the evidence nodes, the inference results (hypothesis node's state), and the degree of belief. (Eye_movements = EM, Controlling_speed = CS, Acceleration = A, Intoxication = I, Lane_maintenance = LM, Circadian = C, and Environment = E).

It is shown in Table XIX that the system is able to detect four driving behaviors, which are fatigue, nodes), each of which has two possible states. The total number of all the possible combinations of evidences is 2^{10} . As, the circadian node is affected by the time and time zone nodes and the environment node is affected by the noise and temperature.

TABLE XVIII
CONDITIONAL PROBABILITIES FOR THE
PERCLOS NODE GIVEN ITS PARENT

PERCLOS / Eyelid_movements	Normal	Abnormal
Normal	0.95	0.02
Abnormal	0.05	0.98

the next stage involves performing the inference process to calculate the conditional probability for the hypothesis node over time after receiving a set of evidences via sensors to detect the behavior of the driver. Inference is the process of combining the low-level data collected by different sensors and of deducing high-level contextual information (e.g., driver behavior). The proposed model combines data about the driver, the vehicle, and the environment to deduce the driver behavior. The behavior of the driver depends on the sensory data, with different sensor readings leading to different driving behaviors.

behavior inference process starts upon reception of evidences via sensors. As shown in Fig. 4, the network consists of ten evidence nodes (root nodes and leaves

drunkenness, recklessness, and normal driving behavior. The system is able to detect normal driving behavior in all possible states for the circadian and environment nodes (see 1–4 in Table XIX). The detection of drunken driving is more accurate when the eyes of the driver are closed as this provide a combination of intoxication and other evidences (see 5–12 in Table XIX), as compared with the case where the eyes are opened, combined with intoxication and other evidences (see 13–20 in Table XIX). When we instantiated a single evidence regarding eye movement, the fatigue level of the driver (see 28 in Table XIX) was found to be less accurate than when we instantiated more than one evidence in combination with eye movement evidence (see 27 in Table XIX). In the same situation with the case of reckless driving behavior, when we instantiated a single evidence such as sudden acceleration (see 35 in Table XIX), the detection accuracy was less than when we instantiated more than one evidence (see 29–34 in Table XIX).

TABLE XVI
CONDITIONAL PROBABILITIES FOR THE STATE
NODE AT TIME $t - 1$ GIVEN ITS PARENT

Circadian	Environment	State	Probability
Awake	Good	Fatigue	0.05
		Normal	0.31
		Reckless	0.31
		Drunk	0.33
Awake	Bad	Fatigue	0.27
		Normal	0.25
		Reckless	0.25
		Drunk	0.23
Fatigue	Good	Fatigue	0.27
		Normal	0.25
		Reckless	0.25
		Drunk	0.23
Fatigue	Bad	Fatigue	0.51
		Normal	0.16
		Reckless	0.16
		Drunk	0.17

TABLE XVII
CONDITIONAL PROBABILITIES FOR THE STATE
NODE AT TIME T GIVEN ITS PAREN

Circadian	Environment	State (t-1)	Fatigue	Normal	Reckless	Drunk
Awake	Good	Fatigue	0.7	0.1	0.1	0.1
		Normal	0.1	0.7	0.1	0.1
		Reckless	0.1	0.1	0.7	0.1
		Drunk	0.1	0.1	0.1	0.7
Awake	Bad	Fatigue	0.8	0.1	0.05	0.05
		Normal	0.4	0.4	0.1	0.1
		Reckless	0.3	0.1	0.5	0.1
		Drunk	0.2	0.1	0.1	0.6
Fatigue	Good	Fatigue	0.7	0.1	0.1	0.1
		Normal	0.5	0.4	0.05	0.05
		Reckless	0.4	0.1	0.4	0.1
		Drunk	0.4	0.05	0.05	0.5
Fatigue	Bad	Fatigue	0.8	0.1	0.05	0.05
		Normal	0.6	0.3	0.05	0.05
		Reckless	0.4	0.1	0.4	0.1
		Drunk	0.3	0.05	0.05	0.6

Fig. 5 shows a comparison between all the possible combinations of evidences, which lead to assessment of fatigue behavior. As shown in the figure, four curves represent the level of fatigue in all possible states of circadian and environment nodes. The level of driver fatigue in the case of Circadian = awake and environment = good is the lowest level in the chart, whereas in the case of Circadian = fatigue and environment = bad, the fatigue reaches its highest level. This demonstrates the effects of the environment and the circadian rhythm on the driver's level of fatigue. This further validates our driver behavior detection system model.

Fig. 6 shows a comparison between all the possible combinations of evidence, which lead to assessment of reckless behavior. Four curves in the figure characterize the belief of reckless behavior in all possible states for the circadian and environment nodes.

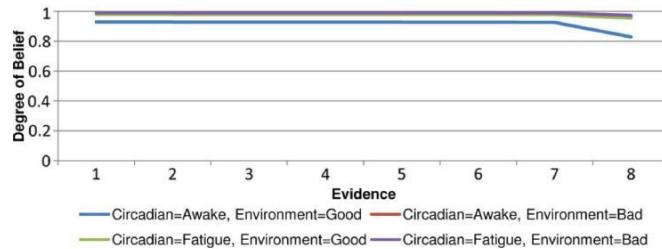


Fig. 5. Comparison between all possible evidence of fatigue behavior.

Reckless behavior is more highly present when the environment = good and circadian = awake, which again validates our driver behavior detection model.

Fig. 7 shows a comparison between all the possible combinations of evidences, which lead to an assessment of drunk behavior. As shown in the figure, there are four curves demonstrating the drunk behavior in all possible states of circadian and environment nodes. The belief of drunk behavior is approximately the same in all cases. It reaches its highest degree when circadian = fatigue and the environment = bad.

The aforementioned inference results reveal the fact that the presence of more than one evidence guarantees the occurrence of a specific behavior, and explain the importance of combining different types of contextual information to deduce the behavior of a driver. These results show the utility of the proposed driver behavior detecting system.

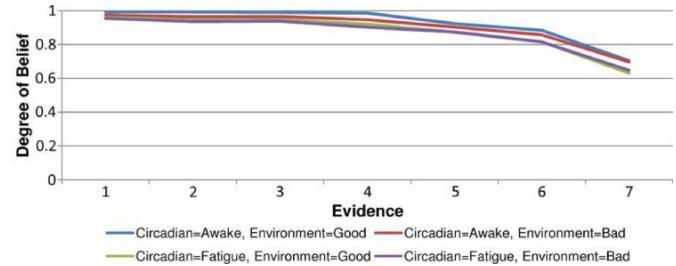


Fig. 6. Comparison between all possible evidences of reckless behavior.

TABLE XIX
SAMPLES OF THE COMBINATIONS OF EVIDENCES

No.	EM	CS	A	I	LM	C	E	State	Belief
1	Normal	Good	Moderate	Lessthanlimit	Good	Awake	Good	Normal	0.9816
2	Normal	Good	Moderate	Lessthanlimit	Good	Fatigue	Bad	Normal	0.9709
3	Normal	Good	Moderate	Lessthanlimit	Good	Awake	Bad	Normal	0.9687
4	Normal	Good	Moderate	Lessthanlimit	Good	Fatigue	Good	Normal	0.9787
5	Abnormal	Bad	Sudden	Morethanlimit	Good	Awake	Good	Drunk	0.9984
6	Abnormal	Good	Sudden	Morethanlimit	Good	Awake	Good	Drunk	0.9984
7	Abnormal	Bad	Sudden	Morethanlimit	Bad	Awake	Good	Drunk	0.9984
8	Abnormal	Bad	Moderate	Morethanlimit	Good	Awake	Good	Drunk	0.9984
9	Abnormal	Good	Sudden	Morethanlimit	Bad	Awake	Good	Drunk	0.9984
10	Abnormal	Good	Moderate	Morethanlimit	Good	Awake	Good	Drunk	0.9984
11	Abnormal	Bad	Moderate	Morethanlimit	Bad	Awake	Good	Drunk	0.9983
12	Abnormal	Good	Moderate	Morethanlimit	Bad	Awake	Good	Drunk	0.9983
13	Normal	Bad	Sudden	Morethanlimit	Good	Awake	Good	Drunk	0.8361
14	Normal	Good	Sudden	Morethanlimit	Good	Awake	Good	Drunk	0.8170
15	Normal	Bad	Sudden	Morethanlimit	Bad	Awake	Good	Drunk	0.7474
16	Normal	Bad	Moderate	Morethanlimit	Good	Awake	Good	Drunk	0.7448
17	Normal	Good	Sudden	Morethanlimit	Bad	Awake	Good	Drunk	0.7206
18	Normal	Good	Moderate	Morethanlimit	Good	Awake	Good	Drunk	0.7178
19	Normal	Bad	Moderate	Morethanlimit	Bad	Awake	Good	Drunk	0.6255
20	Normal	Good	Moderate	Morethanlimit	Bad	Awake	Good	Drunk	0.5923
21	Abnormal	Bad	Sudden	Lessthanlimit	Good	Awake	Good	Fatigue	0.9287
22	Abnormal	Bad	Sudden	Lessthanlimit	Bad	Awake	Good	Fatigue	0.9279
23	Abnormal	Good	Sudden	Lessthanlimit	Bad	Awake	Good	Fatigue	0.9276
24	Abnormal	Good	Sudden	Lessthanlimit	Good	Awake	Good	Fatigue	0.9274
25	Abnormal	Bad	Moderate	Lessthanlimit	Good	Awake	Good	Fatigue	0.9272
26	Abnormal	Bad	Moderate	Lessthanlimit	Bad	Awake	Good	Fatigue	0.9266
27	Abnormal	Good	Moderate	Lessthanlimit	Bad	Awake	Good	Fatigue	0.9254
28	Abnormal	Good	Moderate	Lessthanlimit	Good	Awake	Good	Fatigue	0.8292
29	Normal	Bad	Moderate	Lessthanlimit	Bad	Awake	Good	Reckless	0.9932
30	Normal	Bad	Sudden	Lessthanlimit	Bad	Awake	Good	Reckless	0.9915
31	Normal	Good	Sudden	Lessthanlimit	Bad	Awake	Good	Reckless	0.9905
32	Normal	Bad	Sudden	Lessthanlimit	Good	Awake	Good	Reckless	0.9857
33	Normal	Good	Moderate	Lessthanlimit	Bad	Awake	Good	Reckless	0.9232
34	Normal	Bad	Moderate	Lessthanlimit	Good	Awake	Good	Reckless	0.8840
35	Normal	Good	Sudden	Lessthanlimit	Good	Awake	Good	Reckless	0.7046

All data used in the evaluation of our system are synthetic data since there was no test bed equipped with all sensors required for collecting the data for the proposed model. If a test bed or real vehicle equipped with required sensors were available, the CPTs for the network could be reparameterized based on the real data. Using one of the available learning algorithms, such as expectation–maximization algorithm, can

lead to parameterize the network with real data to represent real-time cases.

VII. CONCLUSION

Because it is a promising area of VANETs, safety applications are attracting increasingly more consideration

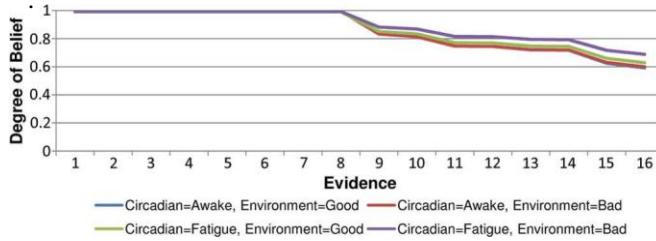


Fig. 7. Comparison between all possible evidences of drunk behavior.

Monitoring and detecting the behavior of drivers is vital to ensuring road safety by alerting the driver and other vehicles on the road in cases of abnormal driving behavior. Driver behavior is affected by many factors that are related to the driver, the vehicle, and the environment, and over the course of driving, a driver will be found to be in a particular state; the driver can then stay in this state for a period of time or shift to another state. Hence, it is important to capture the static and dynamic aspects of behavior and take into account the contextual information that relates to driver behavior. In this paper, we have presented a driver behavior detection system in VANETs from the viewpoint of context awareness. Our contributions are threefold: 1) A five-layer context-aware architecture, which can detect the behavior of the driver, is presented by capturing information about the driver, the vehicle, and the environment; 2) a DBN algorithm for inferring driver behavior from different kind of sensors under uncertainty has been formulated to capture the static and dynamic aspects of the behavior; and 3) definitions for normal and abnormal driving behaviors are given. The evaluation result has demonstrated the detection accuracy of the proposed model under uncertainty and the importance of including a great amount of contextual information within the inference process. Our future work comprises designing a corrective action algorithm to calculate the appropriate corrective actions for other vehicles on the road. Modeling techniques for transferring the data collected from sensors into a machine-processable format will also be developed.

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MULTI-OBJECTIVE GREY WOLF OPTIMIZATION FOR FEATURE REDUCTION

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Abstract

Feature sets are always dependent, redundant and noisy in almost all application domains. These problems in The data always declined the performance of any given classifier as it make it difficult for the training phase to converge effectively and it affect also the running time for classification at operation and training time. In this work a system for feature selection based on multiobjective gray wolf optimization is proposed. The existing methods for feature selection either depend on the data description; filter-based methods, or depend on the classifier used; wrapper approaches. These two main approaches lack of good performance and data description in the same system. In this work gray wolf optimization; a swarm-based optimization method, was employed to search the space of features to find optimal feature subset that both achieve data description with minor redundancy and keeps classification performance. At the early stages of optimization gray wolf uses filter-based principles to find a set of solutions with minor redundancy described by mutual information. At later stages of optimization wrapper approach is employed guided by classifier performance to further enhance the obtained solutions towards better classification performance. The proposed method is assessed against different common searching methods such as particle swarm optimization and genetic algorithm and also was assessed against different single objective systems. The proposed system achieves an advance over other searching methods and over the other single objective methods by testing over di-

ferent UCI data sets and achieve much robustness and stability.

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Keywords: Gray-Wolf, Multi-Objective, Attribute Reduction

1. Introduction

Classification problems one of the essential task in data mining and machine learning, which target classify every object in data set into various collections based on the information depicted by its attributes. It is complicated to separate the attributes which are beneficial, without previous knowledge. Sometimes the dataset containing relevant, irrelevant, or redundant attributes¹. The redundant and irrelevant attributes are slow down the classifier performance and they might even minimize the classification accuracy because the search space become huge^{2,3}. Attribute reduction could handle this problem by choosing only relevant attribute for classification. The reduct set will improving the classifier performance and providing a faster and more cost effective classification, which leads to obtain comparable or even best classification accuracy from using all attributes³. Attribute reduction is a complicated mission because there exist complex interaction between attributes. A single redundant (relevant) attribute might become relevant (redundant) when working with other attribute¹. So that, the optimal attribute collection (subset) will be a collection of integrated attributes that span over the diverse properties of the classes to properly discriminate them. The attribute reduction mission is challenging because of the huge search space. In search space the size is exceeds exponentially with respect to the number of attributes in the data set². So, in practice the exhaustive search is impossible in almost cases.

search based on sequential forward selection (SFS)⁴ and sequential backward selection (SBS)⁵. However, these attribute reduction approaches still suffer from several of issues, such as stagnation in local

optima and increasing in the cost of computation¹¹. So as to improve the attribute reduction issues, an efficient global search algorithm is needed⁶. Evolutionary computation (EC) algorithms are well-known for their global search capability. Gray wolf optimization (GWO)⁷ is a comparatively recent EC algorithm, that is computationally less expensive than some other EC techniques. Generally, attribute reduction is a multi-objective issue. It has two main objectives, which are to minimize the size of attributes and to maximize the classification accuracy. Usually, these two objectives are contradictory and the optimal solution needs to be made in the presence of a trade-off between them. Treating attribute reduction as a multiobjective issue can obtain a set of non-dominated attribute subsets to meet different requirements in real-world applications. Although GWO, multi-objective optimization, and attribute reduction have been individually investigated frequently, there are very few studies on multi-objective attribute reduction. Meanwhile, existing attribute reduction algorithms suffer from the issues of high computational cost, and GWO is argued computationally less expensive than other EC techniques. In addition, the utilizing of GWO for multi-objective attribute reduction has not been investigated¹. This paper represents the first time that GWO has been applied to multi-objective attribute reduction. This will require novel methods to be introduced as there is no longer a single basis global solution but a set of solutions to meet different requirements. The overall goal of this paper is to develop a GWO-based multi-objective attribute reduction approach to classification which include a small number of attributes and achieve a lower

Relief does not transact with redundant attributes because it tries to obtain all relevant attributes regardless of the redundancy among them.

EC algorithms have been used to attribute reduction issues, such as genetic algorithm (GA), genetic programming (GP), ant colony optimization (ACO),

classification error rate than using all available attributes. This goal is achieved by using the new gray-wolf inspired algorithm that exploits mutual information index as a fitness function to find solutions with minor redundancy that are passed to a second phase of optimization with different objective which is the classification performance and initialized with the past obtained solutions. The remainder of this paper is organized as follows. Section II provides background information. Section III describes the GWO-based multi-objective attribute reduction algorithms. Section IV presents the experimental results with discussions. Section V provides the conclusion and future work.

2. Related Work

Greedy search based on sequential backward selection (SBS)⁵ and sequential forward selection (SFS)⁴ are two model wrapper techniques. SBS (SFS) starts with all attributes (no attributes), then candidate attributes are consecutively removed to (added from) the sub-set till the further removal (addition) does not rise the classification accuracy. But, these two techniques suffer from the issue of so-called nesting effect, that means once an attribute is eliminated (chosen) it could not be chosen (eliminated) later. This issue could be resolved by merging both SFS and SBS into one technique.

Thus, Stearns⁸ proposes a plus-l-take away-k technique, which performs l times forward selection followed by k times backward elimination. However, it is hard to detect the best magnitudes of (l, k). FOCUS⁹ is a filter attribute reduction technique, which exhaustively examines all potential attribute subsets and then chooses the minimal attribute subset. But, the FOCUS technique was not computationally efficient due to the exhaustive search. Relief¹⁰, also a filter technique specifies a weight to every attribute to indicate the relevance of the attribute to the aim concept. But,

and particle swarm optimization (PSO). Zhu¹¹ propose an attribute reduction technique using a mimetic technique which is a component of local search and GA. In this technique, individual attributes are firstly ranked according to a filter measure. GA utilizes the accuracy of classification

as the fitness function and eliminates or adds an attribute according to the ranking information. The experiments prove that this technique out-performs GA individually and another techniques.

3. Preliminaries

3.1. Gray Wolf Optimization

Gray wolf optimization is presented in the following subsections based on the work in ⁷.

Inspiration

Gray wolves are species with very strict social dominant hierarchy of leadership. The leaders are a male and a female, called alphas. The alpha is mostly responsible for making decisions about hunting, sleeping place, time to wake, and so on. The alphas decisions are dictated to the pack. The second level in the hierarchy of grey wolves is beta. The betas are subordinate wolves that help the alpha in decision-making or other pack activities. The beta wolf is the best candidate to be the alpha in case one of the alphas passes away or becomes very old to lead. The lowest ranking grey wolf is omega. The omega plays the role of scapegoat. Omega wolves always have to submit to all the other dominant wolves. They are the last wolves that are allowed

to eat. The fourth class is called subordinate (or delta in some references). Delta wolves have to submit to alphas and betas, but they dominate the omega. Scouts, sentinels, elders, hunters, and caretakers belong to the delta category and each has its own defined responsibilities.

Mathematical Modelling

The GWO the fittest solution is called the alpha () while the second and third best solutions are named beta () and delta () respectively. The rest of the candidate solutions are assumed to be omega (). The hunting is guided by , , and and the follow these three candidates. In order for the pack to hunt a prey them first encircling it. In order to mathematically model encircling behavior the following equations are used ¹.

$$\tilde{X}(t+1) = \tilde{X}_p(t) + \tilde{A}\tilde{D} \quad (1)$$

Where D is as defined in 2 and t is the number of iteration, A , C , are coefficient vectors, X p is the prey position and X is the gray wolf position.

$$\tilde{D} = C:\tilde{X}_p(t) \quad (2)$$

The \tilde{A} and \tilde{C} vectors are calculated as in equations 3 and 4

$$\tilde{A} = 2Ar - a \quad (3)$$

$$\tilde{C} = 2r_2 \quad (4)$$

Where components of \tilde{a} are linearly decreased from 2 to 0 over the course of iterations and r_1, r_2 are random vectors in [0; 1]. The hunt is usually guided by the

alpha. The beta and delta might also participate in hunting occasionally. In order to mathematically simulate the hunting behavior of grey wolves, the alpha (best candidate solution) beta, and delta are assumed to have better knowledge about the potential location of prey. The first three best solutions obtained so far and oblige the other search agents (including the omegas) to update their positions according to the position of the best search agents. So the updating for the wolves positions is as in equations 5, 6 and 7.

$$\begin{aligned} & \tilde{\sim} \quad \tilde{\sim} \quad \tilde{\sim} \quad \sim \quad \sim \quad \sim \quad \sim \\ & \tilde{\sim} \quad \tilde{\sim} \quad \sim \quad \sim \quad \sim \quad \sim \quad \sim \\ X_1 &= \tilde{\sim} \quad \tilde{\sim} \quad \tilde{\sim} \quad \sim \quad \sim \quad \sim \quad \sim \\ X &= A_3 D \quad (6) \end{aligned}$$

$$X(t+1) = \tilde{\sim} \quad \tilde{\sim} \quad \sim \quad \sim \quad \sim \quad \sim \quad \sim \quad (7)$$

A final note about the GWO is the updating of the parameter $\sim a$ that controls the tradeoff between exploitation and exploration. The parameter $\sim a$ is linearly updated in each iteration to range from 2 to 0 according to the equation 8.

$$\sim a = 2 - \frac{2}{\text{Max}_{\text{iter}}} t \quad (8)$$

Where t is the iteration number and Max_{iter} is the total number of iteration allowed for the optimization. Input: N number of wolves (agents) used N_{Iter} number of iterations for optimization.

Output: Optimal wolf position Initialize a population of N wolves positions at random While Stopping criteria not met do Evaluate individual wolves positions using the given fitness function.

Find the best wolf position; called solution.

Find the best wolf position excluding solutions; Called solution.

Calculate the $\sim a$ parameter given the current iteration and the maximum number of iterations using equation 8

Foreach Wolf_i do

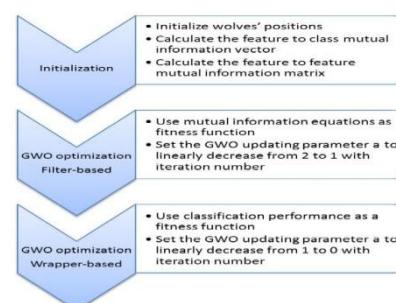
Update the Wolf_i position given the , and solutions, $\sim a$, and the Wolf_i position as in equation 7
End

Alg 1: GWO Search Algorithm

• The Proposed Multi- Objective GWO Feature Selection Algorithm (MO-GWO)

Attribute reduction in general can be categorized into filter and wrapper methods. Filters perform attribute reduction based on the characteristics of data itself. Filters and it is performed independently of the learning algorithm by estimating the usefulness of attributes. Attributes that are not expected to provide valuable information for classification are filtered out of the dataset before training starts. In the wrapper approach, the attribute space is explored to find an attribute (feature) subset guided by classification performance of individual attribute subsets. Hence intelligent exploration of search space is always a challenge as the single evaluation of fitness function is always time consuming. This approach may be slow since the classifier must be re-trained on all candidate subsets of the attribute set and its performance must also be measured. Filter methods always have poor performance in attribute reduction as it depends only on measuring the importance of attributes based on the characteristics of data regardless of the

Figure 1: The proposed Feature Selection Algorithm



classifier used. On the other hand wrapper approach searches a very large space of attribute combinations which may be inefficient but it is much classifier guided and hence; if efficiently used, can have better performance. The proposed algorithm is a wrapper attribute reduction that is guided by filter-based principles so that it exploits the classification performance of wrapper-based methods and the efficiency of the filter-based ones. A two-stage.

gray wolf optimization is used to find attribute combination that both exploit filter-methods principles and wrapper-based methods principles; see Fig 1. Initially GWO is used to search for a attribute combination that maximizes the following fitness function based on mutual information index:

$$= V - P \quad (9)$$

Where V is the average mutual information between the selected attributes and the class labels and P is the average mutual information among the selected attributes. V and P are calculated as:

The used fitness function represents the predictability of attributes from each other and the predictability between individual features. Hence the goodness of a attribute combination is estimated as how much the

selected attributes can correctly predict the output class labels and how much are they dependent. The convergence speed for GWO is ensured for it efficient searching capability and for the simplicity of the used fitness function that mainly depend on precalculated attribute to class mutual information vector and the precalculated feature to feature mutual information. This step of optimization is stopped at a predetermined number of iterations. The range for the parameter that controls the tradeoff between exploitation and exploration is limited to the range from 2 to 1 rather than from 2 to 0

to keep solution diversity and to tolerate stagnation¹². This The obtained population by the end of the first stage is a set of solutions that maximizes the mutual information equation in⁹. The obtained population is used as initial solutions for the second level optimization that used GWO to maximize classification performance as follows:

$$\text{Fitness} = \text{CCR}(D) \quad (14)$$

Where $\text{CCR}(D)$ is the correct classification ratio at feature set D . The optimization in this second phase is much guided towards enhancing the classification accuracy given a preselected classifier; K-nearest neighbor in the current case, but the individual evaluation is much time consuming than the one used in the first stage. So, the first stage is used to motivate the search agents to regions with expected promising regions in the attribute space while the second level optimization uses exploitation to intensively find the solution with best classification performance¹³.

A note worth mentioning is that the parameter used by the GWO to control the diversification and intensification is set in this second level of optimization to the range from 1 to 0 to enhance the intensification of the solutions.

Table 1: Description of The Data sets Used in Experiments

Dataset	No. of Features	No. of Samples
Breast cancer	9	699
Exactly	13	1000
Exactly	13	1000
Lymphography	18	148
M-of-N	13	1000
Tic-tac-toe	9	958
Vote	16	300
Zoo	16	101

Table 2: My caption

Parameter	value(s)
No of wolves	5
No of iterations	100
Problem dimension	same as number of features in any given database
Search domain	18

This parameter choice allows for less deviation from the initial solutions to this second stage of optimization and allows also for fine tuning to find classification-performance guided solutions¹⁴.

5 Experimental Results

5.1. Datasets and Parameters Used

Table 1 summarizes the 8 used data set for further experiments. The data set are drawn from the UCI data repository¹⁵. The data is divided into 3 equal parts one for training, the second part is for validation and the third part is

for testing. GWO algorithm is compared with the particle swarm optimization (PSO)¹⁶ and genetic algorithms (GA)¹⁷ which are common for space searching. The parameter set for the GWO algorithm is

Table 3: Experiments Results of Different Runs for GA, PSO and GWO of Fitness Function.

Dataset		Breast Cancer								
		KNN		MI		MI and KNN				
		GA	PSO	GWO	GA	PSO	GWO	GA	PSO	GWO
Mean fitness	0.024034	0.030043	0.025751	-0.37176	0.91588	-0.41202	0.024034	0.028326	0.027468	
Std fitness	0.006509	0.009104	0.00607	0.06582	0.129056	0.031957	0.006509	0.008366	0.006509	
Best fitness	0.017167	0.021459	0.021459	-0.42633	-0.42633	-0.42633	0.017167	0.021459	0.021459	
Worst fitness	0.034335	0.042918	0.034335	-0.27369	-0.12947	-0.35466	0.034335	0.042918	0.038627	
Dataset				Exactly						
		KNN		MI		MI and KNN				
		GA	PSO	GWO	GA	PSO	GWO	GA	PSO	GWO
Mean fitness	0.269461	0.297006	0.188024	0.003356	0.003414	0.003416	0.291617	0.308982	0.101198	
Std fitness	0.051118	0.017381	0.141883	0.00013	0.000366	0.000314	0.0105	0.019905	0.120123	
Best fitness	0.179641	0.278443	0.017964	0.003231	0.003049	0.003049	0.275449	0.290419	0.01497	
Worst fitness	0.034335	0.042918	0.034335	-0.27369	-0.12987	-0.354866	0.034335	0.042918	0.038627	
Dataset				Exactly2						
		KNN		MI		MI and KNN				
		GA	PSO	GWO	GA	PSO	GWO	GA	PSO	GWO
Mean fitness	0.232934	0.245509	0.234731	0.0033	0.003578	0.003244	0.24012	0.241317	0.232934	
Std fitness	0.012235	0.009468	0.010285	0.000208	0.000356	0.00012	0.014729	0.012453	0.012235	
Best fitness	0.218563	0.236527	0.224551	0.003157	0.003157	0.003157	0.227545	0.233533	0.218563	
Worst fitness	0.248503	0.260479	0.248503	0.003613	0.004108	0.003375	0.263473	0.263473	0.248503	
Dataset				Lymphography						
		KNN		MI		MI and KNN				
		GA	PSO	GWO	GA	PSO	GWO	GA	PSO	GWO
Mean fitness	0.167347	0.151616	0.127041	-0.1005	-0.09185	-0.194105	0.147534	0.179592	0.131633	
Std fitness	0.039256	0.033997	0.050777	0.006798	0.008537	0	0.071252	0.033534	0.02286	
Best fitness	0.122449	0.102041	0.061224	-0.11134	-0.10271	-0.194105	0.061224	0.142857	0.10204	
Worst fitness	0.22449	0.183673	0.204082	-0.09255	-0.08419	-0.194105	0.244898	0.22449	0.163265	
Dataset				M-of-N						
		KNN		MI		MI and KNN				
		GA	PSO	GWO	GA	PSO	GWO	GA	PSO	GWO
Mean fitness	0.097006	0.12515	0.073653	-0.04805	-0.04906	-0.053143	0.108982	0.584615	0.028144	
Std fitness	0.041302	0.036815	0.064305	0.005811	0.00546	0.000101	0.03767	0.08503	0.010712	
Best fitness	0.035928	0.086826	0.017964	-0.05318	-0.05318	-0.053189	0.065868	0.029533	0.017964	
Worst fitness	0.149701	0.176647	0.146707	-0.04133	-0.03997	-0.052962	0.164671	0.035928	0.041916	

Table 4: Experiments Results of Different Runs for GA, PSO and GWO of Fitness Function

Dataset		KNN				MI		MI and KNN	
		GA	PSO	GWO	GA	PSO	GWO	GA	PSO
Breast cancer	0.644444	0.644444	0.511111	0.111111	0.177778	0.111111	0.577778	0.666667	0.622222
Exactly	0.615385	0.6	0.492308	0.892308	0.892308	0.892308	0.784615	0.507692	0.507692
Exactly2	0.292308	0.523077	0.234731	0.953846	0.892308	0.969231	0.353846	0.523077	0.261538
Lymphography	0.488889	0.377778	0.127041	0.266667	0.233333	0.055556	0.488889	0.488889	0.366667
M-of-N	0.630769	0.569231	0.461538	0.323077	0.369231	0.292308	0.692308	0.584615	0.461538
Tic-tac-toe	0.6	0.6	0.488889	0.111111	0.222222	0.111111	0.55555	0.622222	0.533333
Vote	0.375	0.525	0.4125	0.175	0.2125	0.0625	0.4625	0.3625	0.35
Zoo	0.5875	0.5625	0.5625	0.2625	0.225	0.0625	0.5875	0.5625	0.45

Dataset		Zoo							
		KNN				MI		MI and KNN	
Mean fitness	0.22625	0.25	0.235625	-0.01815	-0.01076	-0.01815	0.245	0.241875	0.22125
Std fitness	0.021264	0.013258	0.029365	0	0.004195	0	0.019838	0.027828	0.017315
Best fitness	0.203125	0.23125	0.203125	-0.01815	-0.01815	-0.018158	0.21875	0.203125	0.203125
Worst fitness	0.253125	0.26875	0.265625	-0.01815	-0.00833	-0.018158	0.26875	0.271875	0.240625

Dataset		Zoo							
		KNN				MI		MI and KNN	
Mean fitness	0.054 -	0.056	0.054	-0.20943	-0.19771	-0.444235	0.06	0.056	0.058
Std fitness	0.011402	0.008944	0.020736	0.136339	0.143631	0	0.023452	0.019494	0.019235
Best fitness	0.04	0.04	0.03	-0.44423	-0.44423	-0.444235	0.04	0.04	0.04
Worst fitness	0.07	0.06	0.08	-0.1025	0.093762	0.444235	0.1	0.09	0.09
Dataset				Zoo					
		KNN			MI			MI and KNN	
		GA	PSO	GWO	GA	PSO	GWO	GA	PSO
Std fitness	0.049215	0.049215	0.053429	0.14243	0.024575	0.077866	0.023973	0.051896	0.043355
Best fitness	0	0	0	-0.56358	-0.3075	-0.563585	0.060606	0.03125	0.030303
Worst fitness	0.117647	0.117647	0.147059	-0.22423	-0.24388	-0.389472	-0.117647	0.176471	0.147059

Table 5: Experiments Results of Mean Attribute Reduction.

Dataset	KNN				MI				MI and KNN	
	GA	PSO	GWO	GA	PSO	GWO	GA	PSO	GWO	
Breast cancer	0.644444	0.644444	0.511111	0.111111	0.177778	0.111111	0.577778	0.666667	0.622222	
Exactly	0.615385	0.6	0.492308	0.892308	0.892308	0.892308	0.784615	0.507692	0.507692	
Exactly2	0.292308	0.523077	0.234731	0.953846	0.892308	0.969231	0.353846	0.523077	0.261538	
Lymphography	0.488889	0.377778	0.127041	0.266667	0.233333	0.055556	0.488889	0.488889	0.366667	
M-of-N	0.630769	0.569231	0.461538	0.323077	0.369231	0.292308	0.692308	0.584615	0.461538	
Tic-tac-toe	0.6	0.6	0.488889	0.111111	0.222222	0.111111	0.555555	0.622222	0.533333	
Vote	0.375	0.525	0.4125	0.175	0.2125	0.0625	0.4625	0.3625	0.35	
Zoo	0.5875	0.5625	0.5625	0.2625	0.225	0.0625	0.5875	0.5625	0.45	

outlined in table 2. Same number of agents and same number of iterations are used for GA and PSO.

5.2. Results and Discussion

Table 3 and 4 summarizes the result of running the different optimization algorithms for 10 different runs. Mean fitness function obtained by the GWO achieves remarkable advance over PSO and GA using the different fitness functions over the different data sets used which ensures the searching capability of GWO. By, remarking fitness functions over the different data sets. We can see that the proposed multi-objective function outputs solutions with minor feature size in comparison to the other single objective fitness functions thanks to the exploitation of mutual information in feature selection process. Also, we can see that GWO is still performing better for feature reduction.

Table 6 summarizes the average testing performance of the different optimizers over the different data set.

standard deviation of the solution obtained on the different runs of individual algorithms we can see that GWO has comparable or minimum variance value which proves the capability of convergence to global optima regardless of the initial solutions which proves the stability of the algorithm. Also, on the level of best and worst solutions obtained at the different runs we can see advance on the fitness value obtained by GWO over PSO and GA over almost all the test data sets.

Table 5 describes the average selected feature size by the different optimizers using different

We can see that the performance of GWO is better than GA and PSO for all the used fitness functions over the test data sets. By comparing the

performance of different fitness functions used; namely mutual information, classification performance and the multi-objective fitness functions, we can see the advance of the proposed multi-objective function on performance. This advance can be interpreted by the good description of data with minimal redundancy and classifier guidance by the second objective of the fitness function.

Table 6 summarizes the average testing performance of the different optimizers over the different data set. We can see that the performance of GWO is better than GA and PSO for all the used fitness functions over the test data sets. By comparing the performance of different fitness functions used; namely mutual information, classification performance and the multi-objective fitness functions, we can see the advance of the proposed multi-objective function on performance. This advance can be interpreted by the good description of data with minimal redundancy and classifier guidance by the second objective of the fitness function.

In this work a system for attribute reduction was proposed based on multi-objective gray wolf optimization. The proposed method tolerates the problems that are common on both wrapper-based feature selection as well as filter-based ones. The proposed fitness function exploits the capabilities of mutual information index as measure to ensure data dependence and classification performance as a second objective to guarantee classification performance. The graywolf optimization in comparison to PSO and GA proves good performance in reaching global minima and robustness against different initial starting solutions. In future we will try use three initialization methods depend on the forward and backward

6. Conclusions and Future Work

Table 6: Experiments Results of Mean Classification Accuracy.

Dataset	KNN				MI				MI and KNN	
	GA	PSO	GWO	GA	PSO	GWO	GA	PSO	GWO	
Breast cancer	0.95279	0.958798	0.946781	0.886695	0.91588	0.924464	0.949356	0.959657	0.959657	
Exactly	0.725526	0.673273	0.804805	0.664264	0.670871	0.675676	0.684685	0.669069	0.90991	
Exactly2	0.747748	0.733333	0.748949	0.732733	0.727327	0.73093118	0.738739	0.724324	0.754955	
Lymphography	0.74702	0.726776	0.776	0.754939	0.74135	0.6007699	0.770939	0.688	0.776	
M-of-N	0.868468	0.836036	0.914114	0.806006	0.837237	0.81801816	0.855255	0.921321	0.972372	
Tic-tac-toe	0.731661	0.712853	0.723511	0.673354	0.673354	0.673354	0.736677	0.748589	0.736	
Vote	0.916	0.93	0.912	0.93	0.952	0.966	0.94	0.924	0.932	
Zoo	0.854545	0.842424	0.872727	0.654545	0.727273	0.6	0.884848	0.848485	0.854545	

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Channel selection for simultaneous move game in cognitive radio ad hoc networks

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Abstract In cognitive radio ad hoc networks, the nodes exhibit autonomous behavior and selfishly search for the available channels to make spectrum selection decisions. A natural competition among cognitive users arises that may result in chaos and serious degradation in spectrum utilization. In this competitive and hostile environment, game theoretic model can ease this rivalry and autonomously assist in creating a subdued environment. We introduce a repeated game to alleviate the spectrum allocation problem and facilitate the cognitive radio users to make spectrum selection decision simultaneously or asynchronously. In contrast to sequential games, the proposed simultaneous move multi-stage game model is appropriate for practical applications where paucity of central spectrum management resources is common. In order to avoid the conflicts arising from coinciding concurrent decisions, we incorporate learning via history statistics to attain a stable and efficient equilibrium point. Every player computes the feasibility of playing a strategy from the action of the opponents in the previous iterations by incorporating the proposed learning rule. This learning process assists in decision making for the next iteration and the Nash equilibrium is achieved.

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finite probability that a player does not make a move in any iteration. This work also employs a learning algorithm to assign weights to suitable strategies for a simultaneous setup. The learning mechanism is used to alter these probabilities according to the history in order to encourage players to opt for high probability strategies. This elim-

Keywords Cognitive radio _ Game theory _ Convergence _ Spectrum allocation _ Learning _ Simultaneous move game

1 Introduction

Cognitive radios have recently become a widespread research area due their ability to efficiently use the scarce and under-utilized licensed bandwidth in a frequency spectrum. While cognition seems to be a lucrative option, it comes with a complexity of its own, especially in ad hoc networks where no governing authority exists for the regulation of frequency allocation. These cases demand a self-evolving mechanism to ensure smooth distribution and utilization of resources. The main concern regarding the resource allocation is to acquire a stable solution, called Nash equilibrium in game theory.

Almost all cognitive games discussed in literature involve a sequential playing mode where CRs or secondary users (SUs) take turns in opting for channels [1]. This leads to added delay in the network to stabilize [2], which is correlated with the number of participating players. In [3], the authors discuss CR game as a simultaneous moves game but the problem is simplified by assuming that at a certain time, only one player makes a decision with a fixed and equal probability, and the problem is solved assuming sequential moves. Similarly, other works also assign equal probabilities for making a move and the game reduces to a sequential play [4].

In [5], the authors model the spectrum access game as a purely sequential Stackelberg potential game, with license holder or primary user (PU) as the leader. On the other hand, [6] assumes that the players only choose to make moves with a fixed probability. Hence there is always a

inates the need for a sequential potential game. However, due to practical implications of information exchange, the players, nevertheless, make moves based on a weighted probability to avoid collisions. Another one-shot simultaneous moves game is discussed in [7], but the problem is not competitive as more channels are available for a couple of users and address a completely different scenario.

A preferred solution would be if the players can make decisions simultaneously without having to wait for their turn according to some probability. The main concern in simultaneous decisions is to avoid conflicts due to being uninformed of other player's strategy [8]. The simultaneous moves game structure eliminates the need to be informed about other players' strategies and instead only requires a player to consider its own strategy from previous plays. This process of attaining information is called learning, which serves to minimize regret, where regret is the difference in payoffs from opting certain strategies and not opting the others in previous iterations. If the regret for a certain game increases, the utility or payoff for that game decreases. The simultaneous moves inherently cannot be incorporated in potential game scenarios. To the best of our knowledge, learning and potential games are treated independently in literature [6]. Learning allows to discuss heterogeneous players, but the cognitive system mostly involves players with shared objectives.

In this work, we aim to combine the learning with simultaneous decisions setup, where players only have knowledge of history and are ignorant of currently opted strategies of opponents. This allows us to reap the benefits of learning, allowing simultaneous moves by providing improved network performance and reduced delay.

We explore the problem of cognition for a simultaneous moves game. The lack of information created due to switching from sequential to simultaneous moves is compensated in a way so as to feed the information by other means. This source of information is generated through history. The information gained from previous moves is utilized as a learning tool for players during decision making. We present a different learning algorithm, which computes the actions of opponents by a forecast rule. This creates some additional overhead for the players but improves the convergence time. This faster convergence will reduce the processing time to establish stability and hence the processing overhead is eventually reduced.

The next section presents the related works in literature. Section 3 explains the system model for the simultaneous

moves repeated game for CR spectrum allocation. Then the simulations and numerical results are explained in Sect. 4 and in Sect. 5 we conclude this paper.

2 Related work

Many researchers have employed learning in game theory to reduce information exchange and incorporate decentralized approaches [9–13]. Most of these works are based on hedge algorithms proposed by Freund and Schapire [14]. This work presents a learning based simultaneous moves game, where players take actions by computing a weight function to minimize regret. The Freund and Schapire Informed (FSI) algorithm, however, takes a much longer time to converge, though with a reduced overhead. The FSI or hedge algorithm reduces the loss by playing a safe strategy, i.e., the strategy with the highest probability of providing a better gain.

In [9], the authors present a comparison of existing game theoretic solutions for channel selection. This work describes the various challenges related to spectrum sensing and access. It is suggested that in order to address various challenges faced by the CR system, a hybrid approach incorporating multiple game theoretic solutions must be employed.

[10] discuss distributed uncoupled learning partially overlapping channels with interference mitigation, which provides improved spectrum utilization. Heterogeneous game models are explored that provide faster convergence. Binary interference model is considered for interference, which lacks the incorporation of distance and considers only the interference among neighboring nodes.

[11] propose a potential game for minimizing interference that achieves Nash Equilibrium. Two uncoupled learning solutions are provided, where the first learning scheme requires a common control channel to achieve optimal solution. The second learning algorithm does not depend on the control channel, but provides only suboptimal solutions.

In [12], the CR users compute the probability for choosing an action based on the proposed learning algorithm. The proposed scheme employs time slotting to allow a single player to transmit in one slot. This limits the CR implementation to a sequential set up. SUs select channel according to the probability computed based on the payoff obtained for all users and time slots.

The proposed scheme in [13] requires information exchange among SUs. The network is modeled as a Markovian process. The spatial adaptive play (SAP) algorithm presented allows only one player to change its action at

any time. This discrepancy is removed in concurrent-SAP by allowing only random non-neighboring nodes to choose

their action. This restricts the system and requires knowledge of neighboring nodes. The work also fails to incorporate time varying networks. Moreover, the processing overhead is also large.

Besides the few selected works explained above, there are various researchers who employed learning in CR networks [15– 20]. These previous works employ learning to determine a suitable channel based on highest probability. However, this still retains the sequential setup and does not allow the freedom to choose anytime by all players. Moreover, these works do not discuss transmission power and lack the consideration of impact of transmission power on other network users. We propose a solution to improve the resource consumption in terms of reduced interference and efficient spectrum utilization.

In the proposed scheme, the users decide their actions simultaneously, and examine their previous actions to observe their best strategy so far. These strategies depend on the channel cost that is determined from the amount of interference for that channel and the probability of channel utilization in the recent history. This also ensures convergence through a careful design of the utility function.

3 System model

The network consists of K PUs, each with their own channel and N cognitive players. The number of SUs is assumed larger than the number of available channels to depict a competitive environment. Since the main concern in the problem is the allocation of spectrum bands to the cognitive users, the game is played among the N SUs for the K available channels as possible choices. $a_i \in A$, is the action set for player i according to its strategy $s_i \in S$, where $i \in 1; \dots; N$. These action sets comprise of the available channel choices, i.e., $a_i \in \{1; K\}$.

There are two different types of competitions in this cognitive game. One form of competition exists in PUs for efficient utilization of available channels. The other kind of competition exists among SUs who have the objective to gain access to the available channels. These two competitions conflict with each other in their objectives. PU strives to gain a better revenue by charging a price that is high enough to benefit but should not be too high to discourage CRs from opting it. Similarly, the SUs must opt for channels offering lower price but avoid the higher level of interference due to the presence of large number of users present on a cheaper channel. Hence, the proposed cost function is designed to balance these two scenarios.

The objective of learning is to devise one's strategy by constantly updating its belief about the strategy of the opponent. This allows a more informed and calculated action, which may be used to provide a better performance

over time. The PU is a silent player in this game and is assumed to be not transmitting for the duration of the game, leaving the game to be played among SUs only. If, however, a PU chooses to transmit or reclaims its channel, the game is simply played for the remaining available channels.

In this work, we assume that the transmit power levels p_{ik} , for user i over channel k are fixed for every user, though they may vary from user to user. The link gain between nodes i and j is given by h_{ij} and is assumed to be inversely proportional to the squared distance between transmitting and receiving nodes. The cost function C_{ik} for i th player over channel k depends on the amount of interference created; greater cost is charged from a player that creates higher interference over a channel. Similarly, the interference suffered by a user on a channel makes that channel less attractive, thus lowering the cost of that channel. The cost also lowers depending on the number of available channels; higher number of available channels increases the competition for attracting users, lowering the cost of channels. We incorporate the cost based on the fact that all players are attracted to an empty channel. This fact, however, is also known to the players in the game and every player knows that its opponent can opt for same and the seemingly vacant channel may become over occupied; leading to conflicts. These conflicts can be avoided by keeping a cost function that every user must pay for channel access. The channels, which are vacant, provide the best utility but at a higher cost than the channels that are pre-occupied by a few users. This eventually lowers the higher utility of a vacant channel. Hence the cost function employed is given by:

$$C_{ik} = \frac{I_{ik}^0 \delta t}{\delta p^{1/4} a_k \delta} + \frac{I_{ik} \delta t p}{K I_{ik} \delta t} + \frac{I_{ik} \delta t - 1}{1 - p} + \frac{I_{ik} \delta t - 1}{1 - p - I_{si} \delta t - 1}$$

where, $I_{ik}^0 \delta t = \frac{P_N}{\prod_{j \neq i} p_j h_{ij} f_j}$ is the amount of interference a user i suffers on channel k , and $I_{ik} \delta t = \frac{P_N}{\prod_{j \neq i} p_j h_{ij} f_j}$ is the amount of interference a user i creates over a channel k . This term behaves as a cooperative parameter, as it allows the players to behave considerably towards other network users. $I_{si} \delta t = \sum_{k=1}^K \frac{I_{ik}^0 \delta t}{p_k}$ is the sum of interference in all previous iterations. $\frac{1}{1 - p} = \frac{1}{1 - \frac{\prod_{j \neq i} p_j h_{ij} f_j}{\prod_{j \neq i} p_j h_{ij} f_j}}$ is the probability of channel usage in the previous iteration for channel k . This factor increases or decreases the channel cost according to

its suitability. The game learns by evaluating the probability of channel access from previous iteration and utilizes this probability to scale the price for next iteration. Hence, the first term scales the cost of channel according to the probability of channel access and the ratio of

interference created to the interference suffered. The second term adds to the channel cost according to the interference it provides in the current iteration as compared to the interference observed in the history. The third term reduces the channel cost by determining the wisdom of player in recent history. If a player is successful in achieving an improved solution in the previous iteration, it is rewarded by a lower price in the next iteration.

The function $f_{ij} \delta t$ is the binary indicator for the presence of users on the same channel at time t and is given by:

$$f_{ij} \delta t = 1; \text{ if } s_i = s_j \text{ at } t; i \neq j$$

$$f_{ij} \delta t = 0; \text{ if } s_i \delta t \neq s_j \delta t$$

The utility function for i th node with strategy s_i over a channel k , when s_{-i} is the strategy of its opponents, is given by:

$$U_{ik}(s_i; s_{-i}) = \frac{p}{1 - \frac{I_{ik} \delta t p}{\prod_{j \neq i} p_j h_{ij} f_j} - C_{ik} \delta t p}$$

The proposed utility function is concave in nature, hence we can utilize the following theorem to establish its convergence.

Theorem 1 The Nash equilibrium of a game with con-cave utility function, is achieved at the maximum value of the utility function.

Proof A point $s_{-i}; s_{-j}$ is a Nash equilibrium, if it satisfies:

$$U_i(s_{-i}; s_{-j}) \geq U_i(s_i; s_{-j})$$

and

$$U_i(s_{-i}; s_{-j}) \geq U_i(s_i; s_j)$$

If the utility function U_i is concave, it has a maxima at point $U_i(s_{imax}; s_j)$, such that:

$$U_i(s_{imax}; s_j) \geq U_i(s_i; s_j)$$

Similarly, for player j with concave utility U_j , the maxima $U_j(s_i; s_{jmax})$ satisfies the condition:

$$U_j(s_i; s_{jmax}) \geq U_j(s_i; s_j)$$

Hence, $s_{imax}; s_{jmax}$ is a Nash equilibrium solution.

Lemma 1 For the function U_{ik}^t to be concave, the second derivative of utility should be negative, i.e.,:

$$\frac{\partial^2 U_{ik}^t}{\partial p_{ik}^2} \neq 0$$

Proof The utiltiy function is given by the expression:

$$U_{ik}^t = \frac{1}{N_0} \ln \left(1 - \frac{p_{ik}}{I_{ik}^0 + \sum_{j \neq i} I_{jk}^0} \right)$$

$$= \frac{1}{N_0} \ln \left(1 - \frac{p_{ik}}{\frac{K I_{ik}^0}{I_{ik}^0} + \sum_{j \neq i} \frac{I_{jk}^0}{I_{jk}^0}} \right)$$

$$= \frac{1}{N_0} \ln \left(1 - \frac{p_{ik}}{1 + \sum_{j \neq i} \frac{I_{jk}^0}{I_{jk}^0}} \right)$$

The first partial derivative of utility with respect to power p_{ik} , can be written as:

$$\frac{\partial U_{ik}^t}{\partial p_{ik}} = \frac{1}{N_0} \cdot \frac{1}{1 + \sum_{j \neq i} \frac{I_{jk}^0}{I_{jk}^0}} \cdot \frac{-1}{\sum_{j \neq i} \frac{I_{jk}^0}{I_{jk}^0}}$$

The remaining three terms of the utility vanish after derivative as they are functions of previous time or of the power of other users p_{jk} . This simplifies the second derivative as:

$$\frac{\partial^2 U_{ik}^t}{\partial p_{ik}^2} = \frac{1}{N_0} \cdot \frac{1}{1 + \sum_{j \neq i} \frac{I_{jk}^0}{I_{jk}^0}} \cdot \frac{-1}{\sum_{j \neq i} \frac{I_{jk}^0}{I_{jk}^0}} \cdot \frac{\partial}{\partial p_{ik}}$$

Hence,

$$\frac{\partial^2 U_{ik}^t}{\partial p_{ik}^2} \neq 0$$

Thus the proposed utility function is concave with respect to the transmission power of CRs.

This work is based on determining a stable strategy set for a simultaneous moves CR game. Usually when all players make their decisions simultaneously, they tend to go for the best choice at the moment. Since all players are doing the same, the best choice no longer remains the best due to conflicts leading to higher interference levels. This problem can be solved by making the players patient. Instead of jumping off for the apparently best choice, the players are encouraged to analyze their situation and ‘guess’ the behavior and likely action of other players. Since the players are cooperative, they are ready to accommodate other network users, instead of greedily searching for an even better payoff. Based on history, players are made to be contended with their choices if the previous choice provides a better interference than the currently available choices. Hence, players do not feel the need to change their choices unnecessarily.

Due to simultaneous decisions of players, the best response utility function formulations incorporates the previous performance to reduce regret. The best iterative utility function provides the facility of computing the value of utility with each move of players, and decides in favor of the best strategy set among all moves by comparing the

favor of strategy set providing the maximum value of utility function among all previous iterations. Thus the decision function for this game can be written as:

$$W_t \leftarrow \max_{\delta} \left(\sum_{i=1}^N \sum_{k=1}^K U_i(s_i) ; s_i \in \Delta_i \right) \quad 3$$

where, $s_i \in \{0; 1; \dots; t\}$. The basic idea is to make all channels comparable so that players do not get biased towards one particular channel. Higher number of users lead to better performance due to simultaneous nature of decision making process. Instead of waiting for all users to one-by-one choose their strategies, our algorithm empower users to make their decisions at the same time as their opponents by analyzing the historical data.

When assigning power according to the water-filling algorithm, the strategy set involves jointly opting for channel and transmission power. From [6], the k th channel users have the power vector given by:

$$P_k \leq \delta I - H_k^{-1} c_k \quad 34$$

where, I is the identity matrix and $c_i \leq \frac{c_{th}}{h_i}$. The channel vector H_k is given by:

$$H_k \leq \delta h_{ij} P_j; s_i \leq s_j \leq k$$

These power levels are assigned to the cognitive users based on their respective channel choices.

Algorithm 1: Iterative algorithm for the convergence of strategies

```

Randomly choose initial actions (channel and transmission power);
Define T as number of iterations, K available channels and N
number of CRs; for i=1:N do
    if two CRs choose the same channel then
        | Compute interference and utilities based on initial
        actions; end
end
for t=1:T do
    Players decide their strategies simultaneously;
    Players make moves and compute interference and utilities for all
    channels K;
    Choose the channel with the maximum utility value; Compute
    the best utility of all players till the current iteration;
    if previous iteration yields higher utility than the current utilities
        | then move to the channel with higher utility;
    end
    Choose the action set corresponding to the weight function
    W(t) for the next iteration;
    Repeat for all iterations or till players no longer change their
    strategies and convergence is achieved;
end
```

The basic algorithm for the proposed scheme is given in Algorithm 1. The algorithm explains the iterative procedure of channel choice by the CRs. Each player observes the interference over a channel and computes its suitability

according to the payoff obtained from the channel. The

players make their moves only after determining the highest payoff channel. However, this payoff is determined based on the knowledge of previous iterations and may actually lead to a lower value due to the moves made by the opponents. Thus, an apparently suitable channel may not remain so after the completion of simultaneous game and convergence becomes hard to achieve. This algorithm allows players to utilize the knowledge of previously played games and use it as the initialization of next game. Since all players perform this operation, a weight function $W_{t,p}$ can be formulated which is employed as the decision function, achieving network convergence.

4 Numerical results and simulations

The simulation setup consists of $N \leq 20$ SUs, which are competing for $K \leq 4$ available channels. The network topology is two-dimensional that has uniformly distributed nodes in a square region of 200 m^2 . The game is played repeatedly for some time to observe convergence. Each iteration serves as a source of learning for the next iterations. Based on each iteration, the users evaluate the probability of each channel according to the number of players opting for it in the previous iteration and utilize this probability to increase or reduce the price of that channel in the next iteration. The final decision is made by the SU based on the best utility provided by a channel among all possibilities. The results are shown in Fig. 1, which demonstrates the steady state solution for simultaneous game. The strategies or the selected channel choices for users are shown for each iteration. It can be seen from the figure that the convergence time for the game is less than or

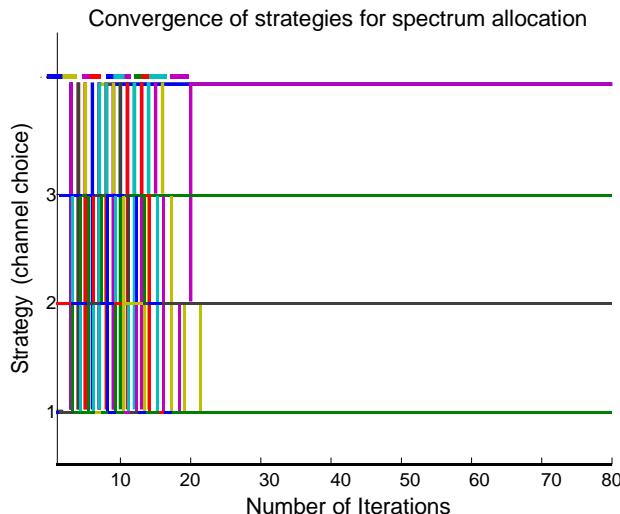


Fig. 1 Convergence of strategies for spectrum allocation

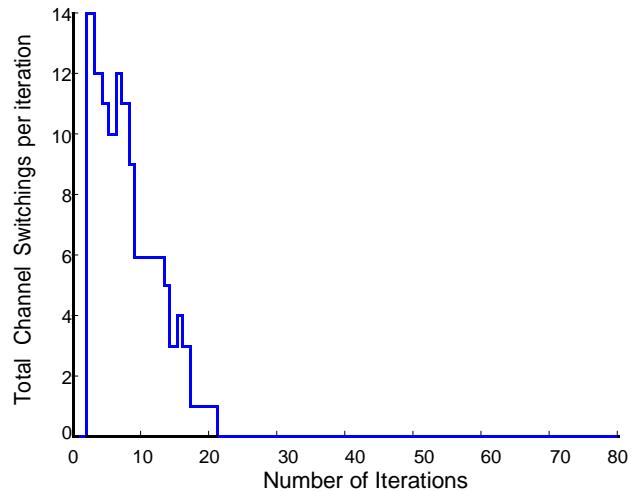


Fig. 2 Channel switching leading to convergence

equal to N and the players are able to establish their strategies according to the network size.

Figure 2 is a demonstration of aggregate channel switching observed over time. We can see that initially almost all users change their strategies. As time passes, the players get more informed through learning and fewer users need to change their strategies. This leads to convergence, observed as zero switching, and is shown in the figure.

Figure 3 provides a comparison of average network capacity obtained by employing learning schemes. The figure elaborates the learning schemes when a fixed transmission power is assigned to SUs. It is seen that the network performance is considerably improved when learning is employed in combination with the water-filling power allocation. The third curve shown as dotted line in Fig. 3 represents the no-learning scenario and performs better than fixed power learning scheme. However, it should be noted that the no-learning game is a sequential moves game and provides better performance at the cost of additional delay. This is depicted in Fig. 4, which demonstrates the increase in convergence time with increasing number of SUs. This figure is plotted in log scale for convenience and it shows the average time required to achieve convergence as the number of CRs is increased. The curve shown in bold circles represents the sequential move scenario. As previously discussed, the simultaneous move game requires much less time to achieve convergence as compared to sequential game.

5 Conclusions

This work presents a potential game framework for spectrum

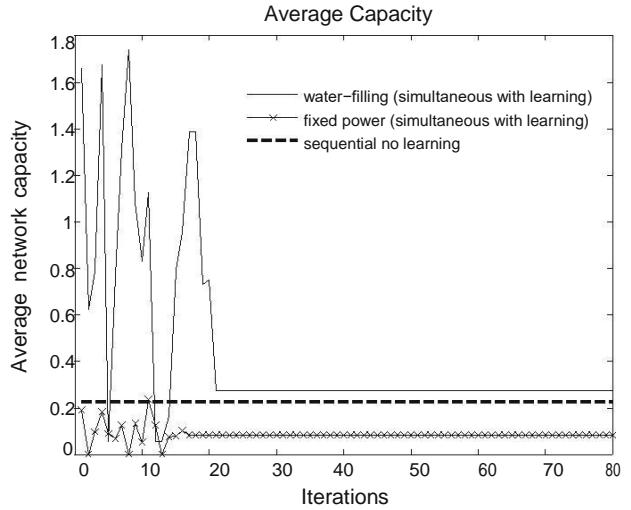


Fig. 3 Comparison of average capacity for different schemes

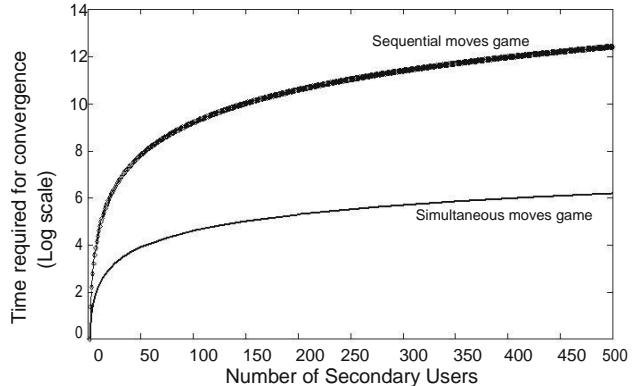


Fig. 4 Comparison of convergence for sequential and simultaneous moves games

simultaneously choosing their strategies. The cooperation is enforced among selfish players by devising a pricing scheme based on the level of interference for each channel. In order to achieve a stable and meaningful solution to the spectrum allocation problem, learning technique is employed along with the pricing mechanism. The proposed learning algorithm, which is based on the weighted knowledge of historical data, assists in avoiding conflicting and imprudent choices. To achieve a stable solution for an otherwise un-steady simultaneous moves system, we employ the concepts of learning to compensate the lack of information. This assists in achieving convergence by determining a stable solution. The time taken by the players to establish their strategies is directly proportional to the number of SUs involved in the game, which is a considerable improvement as players do not have to wait for making a decision. In sequential games, the convergence time for each user is proportional to the square of network size $O(N^2)$ due to the delays in decision making.

Topic Modeling: Study of Public Issues Using Social Media

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Abstract--In recent trends we use social media to share post and tweets and to interact with friends through messages; nowadays it has gone a long way by raising our voice about the issues that we are facing in our day to day life and we often give voice to support others anywhere in the globe. The prime focus is on “topic modeling” of how the tweets are been retrieved and analyse the impact that is been reflected to the issue in that particular period of time and the policy changes done due to these post and tweets by using LDA(Latent Dirichlet Allocation) and Gibbs Method and the impact brought to the very society.

to identify our own character about what is our role in the drama and find the perfect character that we

Keywords: Social media, LDA, Gibbs sampling, topic modelling

I.INTRODUCTION

In order to share our pictures and current mood as post and tweets we use social media such as “facebook” and “twitter” and more often we interact with our friends through messages in these media. Nowadays social media has gone a long way like education, shopping and find our life partner too. The initial reason to create a platform for such social media is to improve communication and get us connected to people who are not near us. Many of us always depend on these social media to gather information, learn stuff that we often don’t find in the books and know the culture and taboo of various places around the globe.

Bringing the media accessible in our devices such as our smart phones make us more attached to these devices; instead of spending our time with the real time people who is around us. There is also complaint that students are not spending enough time in studying or performing practical work rather they spend more time in social media and the devices related to it. There are couples who developed relationship and were able to identify their life partners through social media; at the same time there are fake accounts to distract youngster who are not matured enough, misguiding them to get themselves trapped as a victim.

Other than all the criteria given above social media is basically to connect people, and the sites are created in a user friendly way to break our personal fence(privacy) and fly high to see others in the world beyond the sky. More time we are able

want our self to perform the way we want and not the way others expect us to do. Before two decades an individual was not able to raise voice for his own rights, he was not identified, he was not heard, he had no means to convey his necessity and he was hidden from the individuals around him. Nevertheless now raising our voice for our rights, for social problem, and to have our cultural heritage and even to save our environment the social media is helpful. These reverberations are not only to be heard by the government and its official instead it is now carefully attended by each and every individual in the social media.

With such voices there had been protest that is been organized for some sort of problems without a strong basement and got success with the help of social media. Such as the cases in “Iran ‘09”, “Egypt ‘11” and”2017 pro-jallikattu protests”. Those who have accounts in any of the social medias are having all rights to create, share and comment any article into the media spreading them around the world. Often government is using social media to spread awareness about the endangering species and many others send facts that is useful for daily life or facts that is been forgotten in our daily life. Even though there is a fun side in sharing all these stuff there is also the other side where the false facts is being published and again creating confused story behind us. It is mandatory for us to identify the truth behind the scene about the article that is been shared, and to find the loyalty and the truth about it.

There are streams that are been reviewed and judged with the help of social media, as there are always positive and negative views for a particular object. The movie review, political parties with more supports, organizes social activities and so on. When it comes to review there is always two faces, sometimes more than that; let us not worry the number of faces instead concentrate on positive and negative faces. In order to find such cases we must run an assessment to analysis and get an output on how the people has shared their views about the subject that we are going to analyse. In this paper with the help of an open source programming language ‘R’, the post and tweets are extracted from facebook and twitter respectively, analysing and representing them in graphical form and obtain an conclusion. There are number of tweets/post been extracted using R in a

several period of time and find the mentality of the public in that time, plotting in graphical structure.

In order to identify the related topics that are been analysed using social media and R we use a statistical method called “Topic Modeling”. It is used to group the topics and phrases that is been mainly used by the public and draw a conclusion from the response of the user and plot them as a graph. The tweets that are being extracted are completely analysed and broken into separate words and categorize them into different set, by the maximum number of usage of these words. The most used words are formed into word cloud with all the topic related to the subject that we are analysing. To complete this statistical method we use some techniques such as LDA (Latent Dirichlet Allocation) and Gibbs method.

Since we look forward to a point that has clear definition of the subject that we are going to analyse, but we extract number of tweets and post which are collected randomly in the period of time. These post and tweets are identified with the help of “metadata tag” which is commonly known as “hash tag (#)”; post are often uses this symbol and type the subject that are being posted or tweeted to categorize and to make sure that they are referring to the particular subject in the posts. So when collect all these post we get a lot of posts referred to the subject and we use topic modelling in order find related and most used topics about that subject; here is where we use LDA to study these post and find how many percentage of this post is referred to the subject that we are searching about. Many times we share many subject into single post which may complicate the analyse by introducing foreign words into our subject, which may affect our topic modelling to avoid such issues we follow LDA method into topic modelling to make it simpler and easier.

II.Existing Approach

In a journal titled as “Social media and its effects on individual and social system” completely gives the idea of how the global communication is been improved and make sure that even the civilians in the deserted area are able to express their views and get it exposed to the world. It mainly consider between virtual interaction of global communication and individual communication which has improved our connection with others by making a strong bonding with those who are away from us.^[1]

Social media has gone a long way from individual communication to global communication by expressing their views of good and bad of the public cry or an activity performed in the society. The role of each individual they act through social media has their impact to the society like usually the users are mainly fond in streaming news feed

and the profile pictures and so on, some focus on blogs and forum to develop their knowledge. Whereas now the number of individuals taking part in activism through social media has increased ^[2], in order to have a strong movement in the field of political science and social movements the effect will always depend upon the communication between the individuals and the decision maker.

There are number of studies focusing on how a social media can be a tool in shaping social movements for both offline and online at a global level^[3]. Social media such as facebook, Twitter, YouTube and the various online blogs have given their voices of support for many individuals otherwise they would have never been heard. The first biggest revolution started with the help of social media is known as ‘Arab Spring’ which is commonly known as ‘Egyptian Revolution’,

‘Facebook revolution’ and Twitter revolution’, why does this movement has its name after facebook and twitter, it is only because of the role of social media in this movement. There has been study on the movement of how a social media has played a major role and the changer it has bought to the society. ^[4] There were blogs written and published in the internet against the Mubarak regime, Egyptian government failed to block or privacy the internet user which lead to share instant message through facebook and the information to form a group in the Tahrir Square to protest against the government. Ultimately in the end they had succeeded their victory.

Social media is not only used for an activism but also to highlight the issues and the problems faced in the society, whereas most of the problems can be rectified instead they can be overcome or find a way to get an aid. Japan is an Earthquake prone area, there is no chance that they could avoid this natural calamity but it can be overcome by investigating the real time interaction of the event using twitter. According to the journal that deals about earthquake and an application is created in order to report the monitor event occurring whereas the Meteorological Agency cannot detect more than three events at a time but we can overcome this issue with the help of social sensors otherwise known as social media.

Previously to get public opinion during election was to walk on the road holding a microphone and recording the opinion of the public in which the high class who move fast in cars and those who are in a hurry to catch a bus are skipped in the opinion poll. There was survey taken to predict the US primary election with the help of twitter. ^[5] In a particular interval of time the tweets are been extracted to perform the sentiment analysis of the most popularly subject and predict the result, with the predicted result the original outcome is to be compared and find the final output is obtained, this is predicted by the people opinion

on each and every candidate and tweets about them. At the end of this journal has not got the result as they expected for they have contradiction between the tweets and the election result and believe that posting tweets will never make any changes to the election result but they can help to capture the public trend in the real world through social media.

A survey in data mining technique is a survey that deals with the different type of mining techniques done in social media for the past years and up to date.^[6] With the help of this survey we can understand the techniques that are been followed in the data mining done in social media, it has a significance of how the data is being used in order to share our view critic an event or an individual. According to the graph theory the major components are nodes and links that is to get the followers and get the link through them. There may be different data mining techniques used in social network analysis which totally depends on the supervision that is been conducted on by retrieving information and contents of the data generated.

How analysis in social media works, is answered by the survey that have been done through some techniques and algorithms. As the journal “Approximate Frequency Counts over Data Streams”^[7] deals with an algorithm for finding and calculating the frequently used word count, where the count is declared by the user. It was to give a document full of statements regarding a single subject. The frequently used topic differ for each and every document as their matter of subject is different so make an analyst with a single set of words cannot be used for all the subject, for which a word cloud is being used in order to identify and create a word cloud with which we can run the assessment. Which are clearly states that the frequency count is more than the count given by the user leads to the data stream because the count is being marked approximately which works only for a small document and small memory.

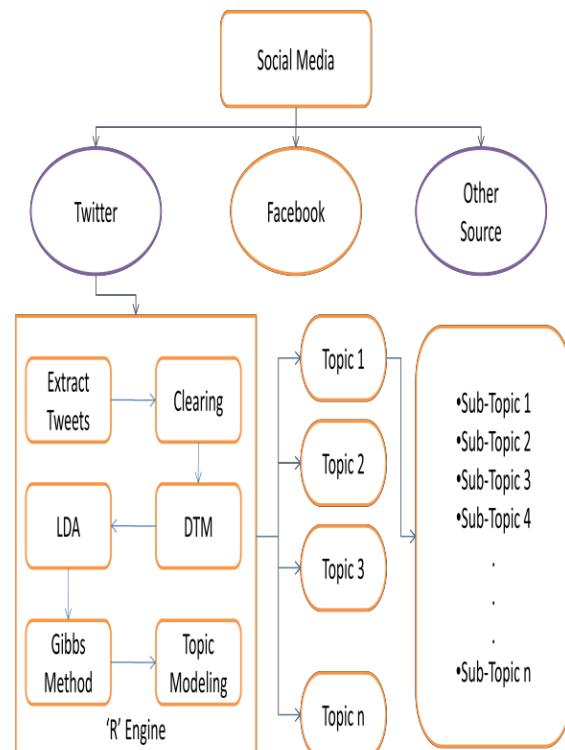
There is another journal that deals with the summarizing data streams using count-min sketch method, “An improved Data Stream Summary: The Count-Min Sketch and its Applications” this journal is fully constructed with the help of mathematical equation and formulae. The survey here is dealing with the large scale document, which has overcome the previously used algorithm for small memory and small document, the time linear has been increased for the update of the data by increasing the speed of the data stream and the sketches are constructed by hash function with strong independence guarantees which may be critical for evaluating in the hardware. With the help of this count-min sketch technique it is now able to sole any sophisticated problems such as big documents or data streams by estimating the fundamental queries.

The algorithm or a statistical method that is been used in the topic modeling is LDA (Latent Dirichlet Allocation) it is a generative statistical model that allows set of observation that is been defined by the group of unobserved and find the similarity between them. The major role is to find the set of description that are collected from the large collection of a document.^[8] LDA is fully constructed with the mathematical equation and statistic method, initially LDA was a graphical method for topic discovery that the major topics discussed are found and plotted in a graph. LDA is a collection of discrete data by a flexible generative probabilistic model. It is an easy method for identify the topics that are mainly discussed in a large scale.

III. Proposed Work

Our current focus is on ‘Topic modeling’ on the current issue based on ‘Hydro-Carbon Project’ in Neduvvasal, Pudukkottai Dt., Tamil Nadu, India. The tweets are been extracted for several interval period of time for my analysis. The high frequently used topics that are been discussed about the Hydro-Carbon Project are been collected in different period are identified and are been compared. The frequency is been set by the user using the DTM(Document Term Matrix) where the topics are tabulated in a matrix form where rows represent topics and columns represent the number of term.

IV. System Flow



The social media is a group of social sites like twitter, facebook and other such sources. Initially my survey is done in twitter, the tweets related #HydroCarbonProject are been extracted and the unwanted characters, punctuations and links are cleared from the extracted tweets. Then the DTM (Document Term Matrix) is done where the frequently used words are been identified with predefined count by the user.

With the use of LDA and Gibbs sampling the topic modelling is carried out by identifying the most used topics in the extracted tweets in different sets and then the each sets are compared with each other and the results are obtained.

V.Methodology

In order to do topic modeling LDA and Gibbs sampling is been used and it is a statistical method that create a set of observed topics from a large document. In natural language processing LDA is a generative statistical model that allows sets of observation to be explained by unobserved groups that explain why some parts of the data are similar. LDA is constructed with substantial amount of mathematics, but it is important to understand the work of this model and how it is gathering the topics. Given that the mathematical equation to perform LDA is

$$P(\vec{x}) = \frac{(\sum_{k=1}^K a_k)}{\prod_{k=1}^K a_k} \cdot \prod_{k=1}^K r_k^{a_k}$$

Where,

K is the count of the occurrence of the each topic

P is the probability of the occurrence that may occur

\vec{x} is the vector with K component

a_k is a multinomial distribution

\vec{a} is component which contains K parameters

In the right hand side in the equation, the fraction is a normalized constant which is proportional to the Dirichlet parameters. These are expressed as gamma function; the factorial function is generalized as,

$$(\vec{a}) = \int_0^\infty r^{a_1-1} \cdots r^{a_K-1} \lambda^{K-1} \lambda^K$$

The value of \vec{a} is changed periodically and the changes that are made in the final graph are plotted sequently and their behaviour is being compared.

Gibbs sampling method is used after LDA to get a clear understanding between the topics that are been obtained through LDA method, by comparing the each set of topic with the rest of the sets the final output is obtained. With Gibbs sampling method the topics that are probably

expected to predict the relation with all the topics that are been observed using LDA method previously. It is a randomized algorithm that predicts randomly which can be fixed by an approximate count.

VI.Experimental Results

Topic modeling is used to group the topics and phrases that is been mainly used in the tweets that is been extracted using #HydroCarbonProject and draw a conclusion from the response of the user. The tweets that are being extracted are completely analysed and broken into separate words and categorize them into different sets, by the maximum number of usage of these words. The result obtained is

Topic 1	"hydrocarbonproject, stop, saveneduvas, rt, tamilnadu, farmer, neduvias"
Topic 2	"hydrocarbonproject, i, hydrocarbon, methan, rt, neduvias, i"
Topic 3	"hydrocarbonproject, rt, project, methan, neduvias, ban, dont"
Topic 4	"save, hydrocarbonproject, pleas, rt, share, awar, creat"
Topic 5	"hydrocarbonproject, savefarm, rt, tamilnadu, support, among, fire"
Topic 6	"hydrocarbonproject, rt, neduvias, let, stand, gvprakash, skycinema"
Topic 7	"hydrocarbonproject, rt, get, readi, youngster, avadhaar, central"
Topic 8	"hydrocarbonproject, need, rt, neduvias, profession, protest, pmoindia"

VII.Conclusion & Further Work

In the end of my survey there are eight sets of topics that are mainly discussed in a large scale, the featured topics are ‘farmer’, ‘savefarm’, ‘support’, ‘tamilnadu’ and ‘student protest’. By analysing these topics we can come to a conclusion that ‘Hydro Carbon Project’ must be reconsidered by the government for the welfare of the farming land and the sentiment of farmers, according to the tweets from twitter it is against the ‘Hydro Carbon Project’ in Neduvasal. So with my survey result the government should reconsider the project that is been initiated in Neduvasal and make necessary changes in the policy for the welfare of the farmers and farming land in Tamil Nadu.

The tweets are extracted in the initial stage of the protest during the month of February,2017, so the tweets in several interval of time must be extracted to find the changes in the topics that are been discussed largely, and find the topic changes by comparing with all the extraction and analysement.

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HARDWARE SOFTWARE CO-DESIGN FOR A CLOSED LOOP CONTROL SYSTEM

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ABSTRACT

The implementation of a hardware software co-design in the field of control systems is explained in this paper. The architecture of such systems is a key aspect in the design process. The system is designed based on the ATmega

328P microcontroller. The functionality of such a system is shown using a case study – Speed control of a DC motor under loaded and unloaded condition. Usage of minimal hardware and maximal software ensures reduction in hardware and lessens expenditure of the system and the dependency of the control system on the hardware is reduced. This makes the system design simplified and compacted. Purpose of speed control is to reduce the error and drive the motor at a set speed under loaded or unloaded condition to a certain extent. The speed control of DC motor is crucial in applications where precision is of essence.

INTRODUCTION

With growing technology pertaining to industrial automation, the demand for control systems have increased. Systems in which the output quantity has no effect upon the input to the control process is called an open-loop control system. The goal of any control system is to measure, monitor, and control a process. We can accurately control the process by monitoring its output and feeding some of it back, to compare the actual output with the desired output so as to reduce the error and bring the output of the system back to the desired response. The quantity of the output being measured is called the feedback signal, and the type of control system which uses feedback signals to both control and adjust itself is called a closed-loop system. Generally, systems modelled for these applications are

mostly mechanical and require large size hardware. Some important applications are rolling mills, paper mills, printing presses, textile mills, excavators, cranes, mine winders, hoists, machine tools, traction. In embedded systems the software and hardware must be designed together to make sure that the implementation not only functions properly but also meets the performance, cost and reliability goals. This paper uses a software based PID control system which reduces the hardware requirement and thereby reducing the overall cost of the system. PID (Proportional, Integral, and Derivative) control is a widely-used method to achieve and maintain a process set point. The process itself can vary widely, ranging from temperature control to speed control in miniature electric motors to position control of an inkjet printer head. While the applications vary widely, the approach in each case remains quite similar.

PROBLEM STATEMENT

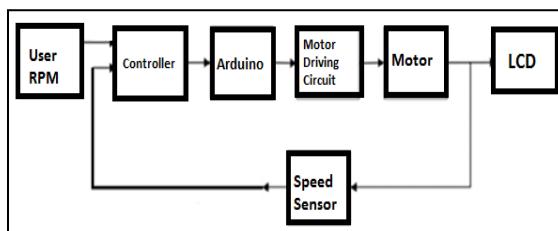
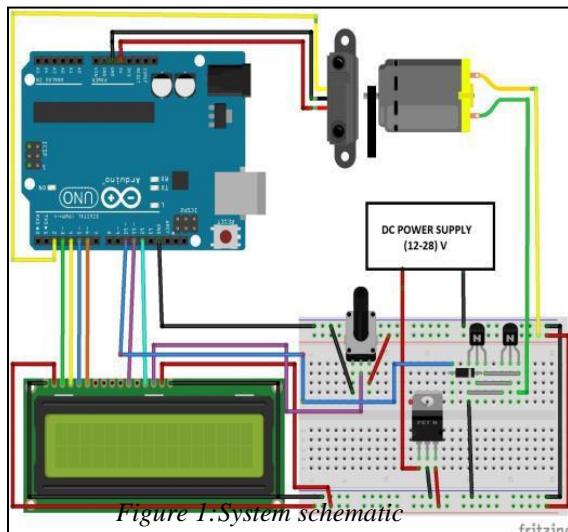
Today, control system applications are mostly mechanical and requires large size hardware. Mass scale production of these systems becomes expensive. Usage of minimal hardware and maximal software ensures reduction in hardware and as a positive outcome, cost and component size are reduced. This approach leads to increase in robustness and flexibility of the system. Conventionally used method is to implement PID hardware suitable for a specific application. This restricts the usage of the same hardware for various other applications. Thus the need for a more flexible system has led to the software based approach for the PID controller. The emergence of hardware software co-design in the field of control systems has led to increase in customization and ever declining cost. A commonly used hardware in control system, a

DC motor, is taken as a case study to elaborate this design approach of a low cost closed loop control system.

METHODOLOGY

(I) System design

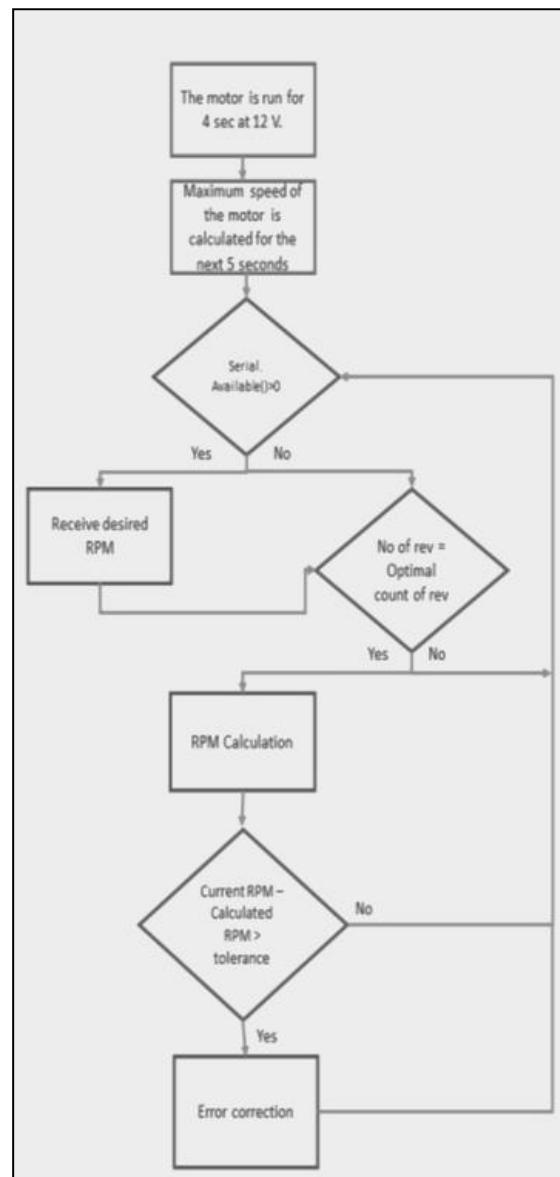
The system design comprises of an ATmega 328P microcontroller, 12V DC Supply, Voltage Regulator LM7812, Transistor n-p-n 2N2222, Diode, 12V DC Motor, IR Sensor, Potentiometer, 16x2 Liquid Crystal Display (LCD).



(II) System Operation:

A 12V DC motor, for which the actual point is to be controlled based on the set point and load. Voltage regulator is used to maintain a steady voltage level in a circuit despite the fluctuations in the input. The output from the regulator is used to power the motor and the LCD. An LCD display is used to display the required input and

output data for the system. An IR proximity sensor works by applying a voltage to IR light emitting diode which emit infrared light. This light hits the chopper of the motor and it is reflected back towards the sensor. The transistor is used as a switch that uses just a little current from the Arduino digital output to control the much bigger current of the motor. The diode connected across the connections of the motor only allows electricity to flow in one direction. When the power is turned off the circuit gets a negative spike of voltage that can damage your Arduino or the transistor. The diode protects against this by shorting out any such reverse current from the motor.



The speed of the motor is calculated by noting the time taken by the motor to complete a certain optimal count of revolutions and computing with the equation: $RPM = 60000 * \text{optimal count of revolution} / \text{time taken}$. The difference between the actual point and the set point gives the error. This error is diminished by the PID technique, where a certain amount of correction is being done to the original PWM signal.

(III) Feedback:

The motor response is observed to be nonlinear and the PWM mapping using the direct proportional method doesn't make the motor run at the set point. This concludes that the motor doesn't have a linear behaviour in the whole operating range.

The change in the speed of the motor when the user inputs a value is brought about by an algorithm which keeps checking the difference in the actual point and the set point and feeds a corrected PWM based on the value of the difference. This difference is calculated based on a PID control algorithm.

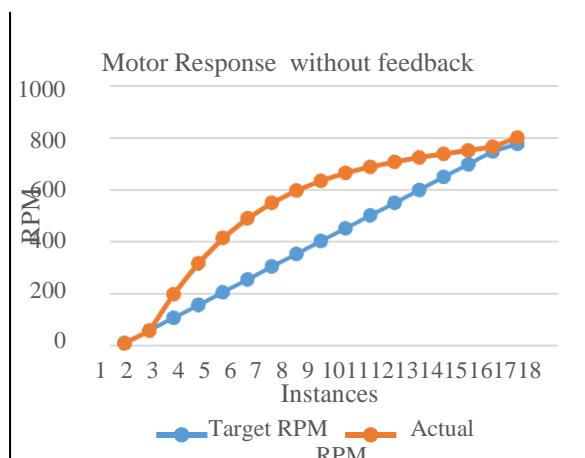


Figure 4

The Proportional–Integral–Derivative (PID) controller is a generic control loop feedback mechanism widely used in control systems. The PID control equation may be expressed as:

$$\text{Correction} = K_p * \text{Error} + K_i * \Sigma \text{ Error} + K_d * \frac{dP}{dT}$$

Where, error is the difference between the set point and the actual point; Σ error is the

summation of previous error values; and dP/dT is the time rate of change of speed.

Proportional gain (K_p): Larger proportional gain typically means faster response, larger the error, larger is the proportional term compensation. However, an excessively large proportional gain results in process instability and oscillation.

Integral gain (K_i): Larger integral gain implies steady-state errors are eliminated faster. However, the trade-off is a larger overshoot

Derivative gain (K_d): Larger derivative gain decreases overshoot but slows down transient response and may lead to instability due to signal noise amplification in the differentiation of the error.

```

PID:
Error = Set point - Actual
Integral = Integral + (Error*dt)
Derivative = (Error - Previous error)/dt
Drive = (Error*kP) + (Integral*kI) + (Derivative*kD)
Previous error = Error
wait(dt)
GOTO PID

```

Pseudo Code for PID

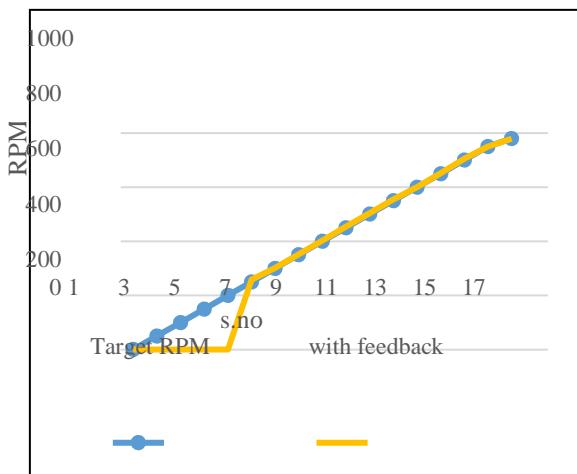
The Ziegler–Nichols tuning developed by John G. Ziegler and Nathaniel B. Nichols is performed by setting the I (integral) and D (derivative) gains to zero. The "P" (proportional) gain, K_p is increased from zero until it reaches the (ultimate gain) K_u , at which the output of the control loop has stable and consistent oscillations. K_u and T_u (the oscillation period) are used to set the P, I, and D gains depending on the type of controller used. Ziegler–Nichols tuning creates a quarter wave decay.

Ziegler–Nichols method			
Control Type	K_p	K_i	K_d
P	$0.50K_u$	-	-
PI	$0.45K_u$	$1.2K_p/T_u$	-
PID	$Ziegler-Nichols tuning$ $0.60K_u$	$2K_p/T_u$	$K_pT_u/8$

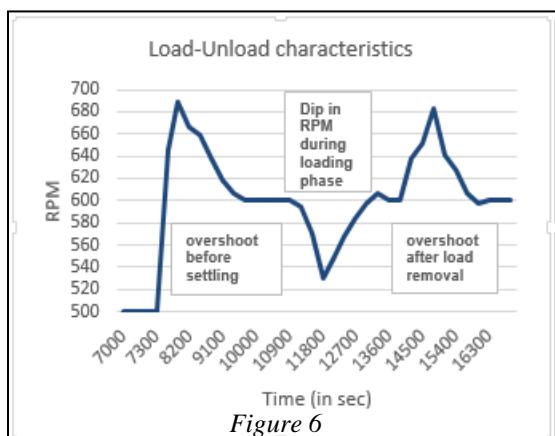
Motor Response with feedback

1	3	5	7	9	11	13	15	17
s.no								
Target RPM								with feedback

Figure 5

Motor Response with feedback**(IV) Load stabilization:**

When a constant load is applied to the motor after a given settling time, the impact of the load will reduce the revolutions per minute. The reduction in the RPM creates an error between the set and the actual point. This error results in increasing the PWM based on the algorithm to diminish the error and the set is achieved. When the load is removed the actual point shoots up to a value greater than the set point. This error is corrected by the algorithm and the motor settles at the desired speed.

**CONCLUSION**

The motor response is observed to be nonlinear and the PWM mapping using the direct proportional method doesn't make the motor run at the target RPM. This concludes that the motor doesn't have a linear behaviour in the whole operating range. The feedback system adjusts the PWM in a calculated amount with

the help of a PID controller technique. Thus the implementation of this algorithm was investigated successfully using this case study.

ACKNOWLEDGEMENT

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and guidance

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Mathematical Modeling and Genetic Algorithm based Exploration for blanking die design parameters optimization of AISI 1020 sheet material

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Keywords: Blanking, Optimization, Genetic algorithm, Multiple Regression Analysis, Mathematical modeling.

Abstract—In sheet metal blanking operation, several die design parameters affects the quality of the product and also productivity. The major input parameters includes sheet thickness and the punch and die clearance and the dependent output parameters are tool life and the burr height. The selected values should be in optimal value. The optimum value is obtained by using the genetic algorithm. The genetic algorithm is an optimization process to find the better results as an output. Then the development of mathematical modeling by using the equations derived from the multiple regression analysis and converts the linear equations into the matrix form and then solve by the mathematical process. This output is compared with the genetic algorithm results, to get the better results.

I. Introduction

Expert system is a computer-based Artificial Intelligence (AI) system with an ability to solve problems using decision making rules in the same way that someone with experience would perform. The task of developing an expert system requires standard information practiced in industries. An expert system can support the stamping industries in die design that leads to improve its quality standards. Proper selection of die design parameters involves calculations and decisions based on experience. Therefore there exists the need to develop an intelligent system that is

and the variable clearance for the non-symmetric shapes. The clearance variables at the contour of a part gives a more uniform punch stress and hence punch wear, thereby

capable of providing expert guidance to the die designers.

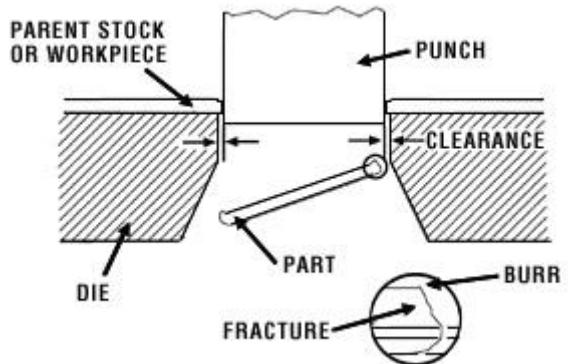


Fig.1.Blinking operation

Several studies have been conducted to understand the effect of punch and die clearance on tool life and the quantity of the part. Pankaj.G.Dhole et al [1], uses Taguchi's Grey Relational Analysis to determine the burr height using the Blanking parameters. For increasing the life of dies, the punch wear should be reduced. Chan. H.Y et al [2], discussed about the burr formation which affects the geometrical precision of the blanked parts. The authors have also compared the optimization techniques are used for the control of burr formation. As they suggest for burr free technology to improve the geometrical precision of the blanked parts. T.Z.Quazi et al [3], uses DOE approach by Taguchi method. The authors can take the experimental data's for nine values to determine the optimum results. In order to minimize the burr height, the clearance should be set at above 5% with almost no blank holder force. Soumya Subramonian et al [4], uses FEM for investigating the influence of uniform clearance

improving punch life considerably. Amol Totreet al [5], study the factors which are affects the blanking

process. As a result, clearance, thickness, and tool wear plays an important factor for determining the quality of the product. Dorian M.D'Addonaet al [6], determines the optimal cutting parameters in the turning processes. The GA is used to find out the optimal value. As the result, minimize the machining time and simulation gives the automatic selection of the machining parameters. Rahul Nishadet al [7], study the different methodologies are used for the optimization process in the blanking process. The study proves that the optimization of the blanking process with varied effectiveness.

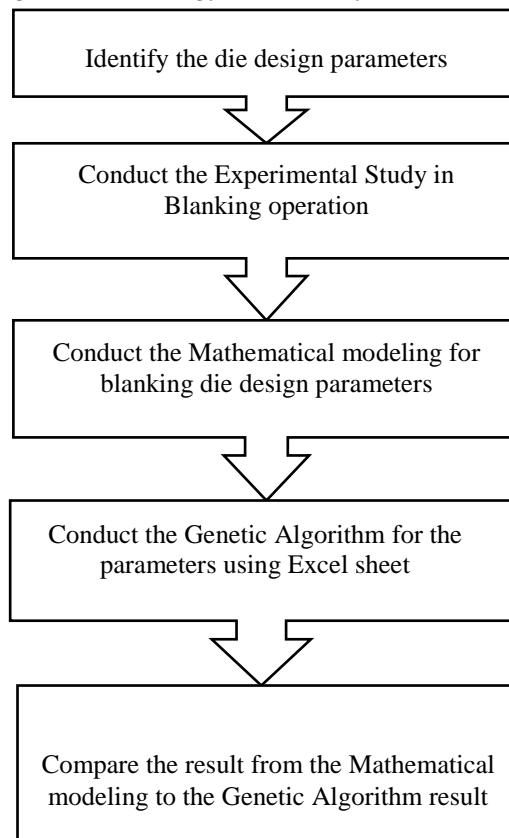
Emad-Al-Momani et al [9], uses DOE technique for investigating the effect of parameters for two different materials products. In order to minimize the burrs height, the clearance should be

set as 2% with almost no blank force. R.Hamblin [11], uses DOE technique for investigates the effect of interaction between the clearance, Tool wear, sheet thickness, blanking force and the geometry of the sheared profile. When the clearance is set at 10%, the process is slightly more robust to tool wear, as far as the blanking force response is concerned.

II. Methodology

The experimentation part involves the material AISI 1020 and the following represents the methodology in which the experimentation was carried out.

Fig.2. Methodology of the study



AT Experimental Result

TABLE: II EXPERIMENTAL RESULT

Sheet Thickness	Punch and die clearance [mm]	AISI 1020	
		Tool life	Burr

[mm]		[No. of Strokes]	Height [mm]
0.5	0.025	187200	0.06
0.5	0.10	482400	0.02
0.5	0.22	403200	0.08
1.0	0.025	129600	0.09
1.0	0.10	302400	0.05
1.0	0.22	345600	0.18
1.5	0.025	122400	0.12
1.5	0.10	201600	0.10
1.5	0.22	223200	0.20

Mathematical Modeling

Multiple regression analysis is used in the mathematical modeling. The multiple regression analysis is used in the **Microsoft Excel 2010**. Multiple regression analysis is a powerful technique used for predicting the unknown value of a variable from the known value of two or more variables. It is used when one is interested in predicting a continuous dependent variable from a number of independent variables.

The Linear system Equation can be written as:

$$\begin{aligned}
 a_{11}x_1 + a_{12}x_2 + \dots + a_{1n}x_n &= b_1 \\
 a_{21}x_1 + a_{22}x_2 + \dots + a_{2n}x_n &= b_2 \\
 \vdots &\quad \vdots \quad \vdots \quad \vdots \\
 a_{m1}x_1 + a_{m2}x_2 + \dots + a_{mn}x_n &= b_m.
 \end{aligned} \tag{1}$$

where a, b, c, d, h, and k are real constants, a pair of numbers $X = X_0$ and $Y = Y_0$ [also written as an ordered pair (X_0, Y_0)] is a solution of this system if each equation is satisfied by the pair. The set of all such ordered pairs is called the solution set for the system. To solve a system is

to find its solution set. Using matrix multiplications, we can rewrite the linear system above as the matrix equation

$$AX = B$$

(2)

The augmented matrix associated with the system is the matrix $[A|C]$, where

$$A = \begin{bmatrix} a_{11} & a_{12} & \cdots & a_{1n} \\ a_{21} & a_{22} & \cdots & a_{2n} \\ \vdots & \vdots & \ddots & \vdots \\ a_{m1} & a_{m2} & \cdots & a_{mn} \end{bmatrix}, \quad \mathbf{x} = \begin{bmatrix} x_1 \\ x_2 \\ \vdots \\ x_n \end{bmatrix}, \quad \mathbf{b} = \begin{bmatrix} b_1 \\ b_2 \\ \vdots \\ b_m \end{bmatrix}$$

(3)

III. MULTIPLE REGRESSION OUTPUTS

A. Material: For Material AISI 1020

Multiple Regression equation for the material AISI 1020, considering the tool life as a parameter is

$$Y_{TL1} = 323885 - 172333 * X_1 + 989405.7 * X_2 \tag{4}$$

where, X_1 = sheet thickness; X_2 = Punch & die clearance

TABLE: III REGRESSION OUTPUT FOR THE PARAMETER TOOL LIFE

	Coeff	Std. Error	t Stat	P-value	Lower 95%	Upper 95%

Intercept	323885	60378	5.36	0.001	176145	471625
Sheet Thickness	-172333	49161	3.50	0.012	-292626	-52041
Punch and die clearance	989405.7	249900	3.95	0.007	377923	1600889

Multiple Regression equation for the material AISI 1020 considering the burr height as a parameter is

$$Y_{BHI} = -0.01968 + 0.08 * X_1 + 0.364341 * X_2 \quad (5)$$

TABLE: IV REGRESSION OUTPUT FOR THE PARAMETER BURR HEIGHT

	Coeff	Std. Error	t Stat	P-value	Lower 95%	Upper 95%
Intercept	314428	38079.35	8.25	0.0001	221251	407604.5
Sheet Thickness	-185667	31005	-5.98	0.0009	-261533	-109800
Punch and die clearance	961498.7	157607	6.10	0.0008	575847.8	1347150

VI. Experimental Procedure

The Quality of the product is mainly depends upon the proper clearance and reduction of burr height, and productivity is mainly depends upon the tool life, often changing the tool indirectly affects productivity. The main objective of the study is to maximize the tool life and minimize the burr height. To achieve this the an add-on called SolveXL in MICROSOFT EXCEL 2010 is used to obtain the optimal value. The following selection and considerations have been made for carrying out the experimental procedure. The number of objective as Multi-objective, the population size as N=100, the Cross over Rate, CR=0.95, the Mutation Rate, MR=0.05, the Upper bound values as $X_1=1.50$, $X_2 = 0.22$, the Lower bound values as $X_1=0.50$, $X_2=0.03$ and the objective type as minimum or maximum.

VII. Genetic Algorithm Results

The experimental results shows that the material AISI 1020 have 0.5mm thickness with the 0.10 punch and die clearance gives that the improvement in tool life as 482400 strokes and reduce the burr height as 0.02 mm from the experimental study.

ERIAL: AISI 1020

Convert the equation (4) and (5) into Matrix form.

$$A = \begin{pmatrix} -172333 & 989405.7 \\ 0.08 & 0.364341 \end{pmatrix} \quad B = \begin{pmatrix} -323885 \\ 0.01968 \end{pmatrix}$$

$A \cdot X = B$ can be rewritten as $X = A^{-1} \cdot B$

Solution:

$$X = \begin{pmatrix} 2.5e-6 & 6.970 \\ 5.6e-7 & 1.214 \end{pmatrix} X \begin{pmatrix} -323885 \\ 0.01968 \end{pmatrix}$$

$$X_1 = 0.623; X_2 = 0.126$$

VIII. Mathematical Modelling Results

TABLE: VII MATHEMATICAL MODELLING RESULTS

Material	Genetic algorithm results	
	X₁	X₂
AISI1020	0.50	0.10

IX. Conclusion

In blanking, the tool life is an important factor for improve the productivity and improvent in quality, and also burr height to an optimal value is amportant to improve the quality of the product. Thus comparing the output of the genetic algorithm

with the mathematical modelling is discussed.

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A Novel Approach for Efficient Usage of Intrusion Detection System on Mobile Agents with Game Model in MANET

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Abstract — Mobile Ad-hoc Networks (MANET) are selfconfiguring, infrastructureless, dynamic wireless networks in which the nodes are resource constrained. Intrusion Detection Systems (IDS) are used in MANETs to monitor activities so as to detect any intrusion in the otherwise vulnerable network. In this paper, we introduce proficient plans for breaking down and upgrading the time span for which the interruption identification frameworks need to stay active in a mobile ad hoc network. A probabilistic model is suggested that makes utilization of collaboration between IDSs among neighbourhood hubs to lessen their individual active time. More often than not, an IDS needs to run all the time on each hub to manage the system conduct. This can end up being an exorbitant overhead for a battery-controlled Mobile phone as far as power and computational assets. Henceforth, in this work our point is to lessen the length of active time of the IDSs without trading off on their effectiveness. To approve our proposed approach, we demonstrate the connections between IDSs as a multi-player cooperative game in which the players have partially cooperative and partially conflicting goals. We theoretically analyse this game and support it with simulation results.

Index Terms — Ad hoc networks, intrusion detection, energy efficiency.

I. INTRODUCTION

A Mobile Ad-hoc Network (MANET) is a self-organized collection of mobile nodes which communicate with each other without the help of any fixed infrastructure or central coordinator. A node can be any mobile device with the ability to communicate with other devices. In a MANET, a node behaves as a host as well as a router. A node intending to communicate with another node that is not within its communication range, takes help of intermediate nodes to relay its message. The topology of the network dynamically changes over time as nodes move about, some new nodes join the network or few other nodes disengage themselves from the network. MANETs have distinct advantages over traditional networks in that they can easily be set up and dismantled, apart from providing flexibility as the nodes are not tethered.

Intrusion Detection System (IDS) is the mechanism used by the nodes of a network for detection of intrusion and has been classified into two broad categories based on the techniques adopted, viz., (a)

Signature-based intrusion detection and (b)

Anomaly-based intrusion detection. In signature-based detection, knowledge about the signatures of attacks is incorporated in the detection system. At the occurrence of an attack, the characteristics of the attack is matched with the signatures included in the IDS. If there is a match, then an attack associated to that signature is said to have occurred. In anomaly-based detection, the IDS does not attempt to find a signature match but searches for anomalous events or behaviour. For instance, it could look out for anomalous behaviour such as dropping of data packets and events such as erratic changes in the routing table. IDSs can also be categorized based on the audit data used for analysis. Host-based IDSs make use of data obtained from the host for which it checks for intrusion detection. This kind of data could be operating system or application logs on the system. On the other hand, network-based IDSs collect and analyse data from network traffic.

To this end, we propose a distributed scheme for efficient usage of IDSs in a network based on probability theory.

Cooperative game theory can be used to model situations in which players coordinate their strategies and share the payoffs between them. The output of the game (individual payoffs that players receive) must be in equilibrium so that no player has incentive to break away from the coalition. The game settings in all the earlier game-theoretic work on IDS involves two sets of opposing players, the nodes/IDSs and the attacker/defaulters. In our work, we have set a game that involves players (IDSs sitting in neighbouring nodes) cooperating to achieve a common goal (i.e., to monitor a single node). To the best of our knowledge, we have not come across any work on cooperating IDSs (to get a security versus energy tradeoff) that models such a situation using game theory. We have presented such a cooperative multi-player game to model the interactions between the IDSs in a neighbourhood and used it to validate our proposed probabilistic scheme.

The contributions of this paper are summarized as follows:

1. We present a novel technique, based on a probabilistic model, to optimize the active time duration of intrusion detection systems (IDSs) in a MANET. The scheme reduces the IDSs' active time as much as possible without compromising on its effectiveness
2. To validate our proposed approach, we also present a 1-player cooperative game that analyses the effects individual intrusion detection systems with reduced activity on the network.
3. Through simulation we show that a considerable

We attempt to solve the problem of efficient usage of IDS in two phases: First, we look at the problem from the point of view of a node being monitored by its one-hop neighbours. We present an optimization problem for the same and analyse it using game theory. Second, we view the problem from the point of view of a node which monitors its neighbours. Using the solution to the optimization problem, we arrive at an efficient distributed algorithm which every node in the network employs. Let us consider a network of wireless nodes, each

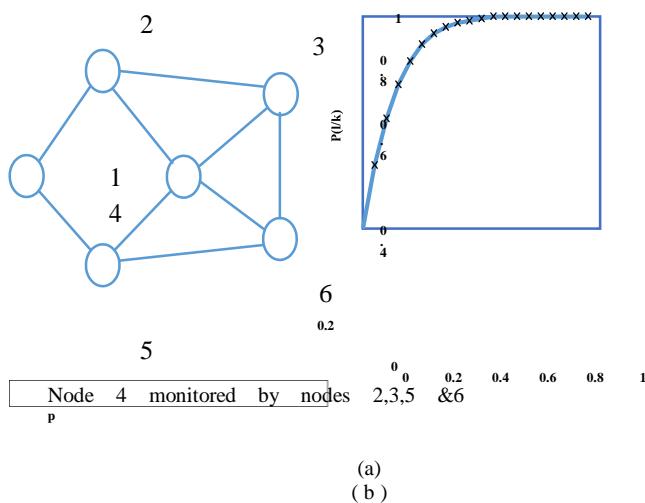


Fig. 1: (a) A MANET (edge between nodes denote they are within radio range); (b) p Vs. $P(l/k)$ using eqn. (1) [$k=7$ and $l=1$]

having an intrusion detection system (IDS) that is responsible for detecting malicious activities within its neighborhood. We assume that a mobile node is watched for malicious activities

by all its neighbors (nodes within its radio range) using these

2 0.97

To represent the condition when node a is monitored

saving in energy and computational cost is achieved using our proposed technique of optimizing the active time of the IDSs while maintaining the performance of the IDS.

4. The proposed scheme uses local information, thus making it distributed and scalable. Moreover, it works not be require both static and dynamic work for each node all the time. We attempt to reduce this redundancy, thereby saving the afore-mentioned resources. The assumptions that we make are summarized as follows:

EFFICIENT USAGE OF IDS AS AN OPTIMIZATION

1. Each node is equipped with an IDS component.

monitored by at least l of its neighbours at any instant of time.

The security level also provides a trade-off between security and energy consumption. The higher the security level, the more is the number of neighbours that monitor a node at a time, which results in higher energy consumption.

Assume that a node a has k neighbours (IDSs) at a particular instant. Each neighbour monitors independently with a probability of p . The probability that node a is monitored at security level l is:

$$P(l/k) = \sum_{i=0}^k \binom{k}{i} p^i (1-p)^{k-i}$$

$$=$$

$$0$$

We define an optimization problem as follows:

$$\begin{aligned} & \text{Min} \\ & \text{imiz} \\ & e p \\ & \text{Subject to } \sum_{i=0}^k \binom{k}{i} p^i (1-p)^{k-i} \geq T \\ & =0 \end{aligned} \quad (2)$$

where $T + \varrho = 1$ and ϱ is a very small positive number. T

denotes a threshold value, which is the minimum probability with which the desired security level (l) is maintained. The value of T can be set depending on the application scenario. Hence, given T and l , an optimal solution to the optimization problem of (2) will give the minimum value of p with which each neighbor has to monitor. Here the monitored node is watched by at least l neighbor IDSs with a probability of T .

IDSs. Hence, by neighbor, we mean 1-hop neighbor throughout

with probability 1 by at least l neighbor, the optimization

problem of (2) has to be optimized towards 1, and the solution would be p

$= 1$ irrespective of the value of k . However, we contend that if the requirement that at least l neighbors monitor always (with probability 1) is relaxed by a very small degree (the value of ϱ), we can reduce the value of p to a very large extent. Fig. 1(b) gives the *probability*(p) versus $P(l/k)$ plot using equation (1) when the security level $l = 1$ and the number of neighbors $k = 7$. We can see that the value of $P(l/k)$ increases rapidly as the value of p increases, and stabilizes at about $p = 0.60$. It means

that after a certain point, even if we make the IDSs monitor more frequently, incremental gain is minimal. Moreover, for application scenarios such as an IDS, the value of $P(l/k) =$

en $T=0.995$) respectively. Since node 5 is a neighbor of the nodes 1, 4 and 6 $p_5^{min} = \max(0.85, 0.97, 0.90) = 0.97$,

We define the *degree* of a node to be the number of its neighbors at any instant of time. Let m_i denote the minimum degree of the neighbors of node i . We assign m_i to k in the optimization problem of (2) to obtain the following optimization problem whose solution is p_i^{min} .

Minimize p

$$\begin{aligned} & \text{subject to} \sum_{j=0}^{m_i} (-)^j p^j (1-p)^{m_i-j} \geq T \\ & \quad = 0 \end{aligned} \quad (3)$$

0.9999 would effectively mean $P(l/k) = 1$.

III. A GAME THEORETIC ANALYSIS OF IDS USAGE IN A NETWORK

The solution to the optimization problem of (2) must be such that it is profitable from the point of view of a cooperating IDS. In other words, the energy saving achieved by this approach should be in equilibrium. To show that, we describe a cooperative game model to represent the interactions between the IDSs in a neighborhood.

Each player's (IDS's) objective is to monitor the nodes in its neighborhood at the desired security level in order to detect any malicious activity. Another objective is to conserve its energy. Here, we would like to consider the first objective as the primary goal and the second one as the secondary goal. If the second objective, i.e., saving battery power, were the main objective, each node would independently decide to sleep all the time resulting in a totally inactive IDS. Since the nodes are independent, they have to cooperate to achieve the above goals. According cooperative game theory analyzes these situations where the participants' objectives are partially cooperative and partially conflicting. Thus our scenario can be modeled as n-player cooperative game.

IV. THE IDS USAGE ALGORITHM

Thus far, we have looked at the problem of efficient usage of an IDS from the perspective of a node monitored by its neighbors. Next, we use the optimization problem of (2) as a building block and develop a distributed scheme for the IDSs. Every node employs this scheme to determine the ideal probability with which its IDS has to remain active so that all nodes in the network are monitored with the desired security level.

Let p_i^{\min} be the optimal (minimum) probability with which node i has to monitor so that its neighbors are monitored with the desired security level. We refer to p_i^{\min} as the minimum monitoring probability of node i . For instance, in Fig. 2, node 5 has three neighbors (1, 4, 6). Suppose, $l = 1$. Here, 4, 1 and 6 have to be monitored by their respective neighbors with a probability of 0.85, 0.97 and 0.90 (solutions of problem (2) where, $T + \varrho = 1$ and ϱ is a very small positive number. The term T , as explained earlier denotes a threshold value, which is the minimum probability with which the desired security level (l) is maintained, albeit for the whole network.

For instance in Fig. 2, $m_5 = 2$ since 2 is the least of all the degrees of node 5's neighbors, viz., 1, 4, and 6.

Consequently, $p_5^{\min} = 0.97$. Similarly, the corresponding (m_i, p_i^{\min}) pairs for other nodes are also shown in Fig. 2. The minimum monitoring probability obtained as the solution to the optimization problem of (4) ensures that every node in the network is monitored at the desired security level.

Let $p^{(m)}$ be the solution to the optimization problem of (4). Hence, $p^{(x)}$ denotes the corresponding solution when m_i is

replaced by x . Without loss of generality, let node 1 be the neighbor of node i with minimum degree among all its neighbors, i.e., m_i = degree of node 1. Since the L.H.S of the constraint of the optimization problem is the probability that at least l neighbors are monitoring out of all the x neighbors, the value of $p^{(x)}$ decreases as the value of x increases. Hence, $p^{(x)} < p^{(m)}$ since $x > m_i$. Here, m_i is the degree of node 1. Hence, $p^{(m)}$ is the minimum probability with which node 1 has to be monitored by its neighbors so that security level l is achieved (Refer optimization problem of (2)). Since $p^{(x)} < p^{(m)}$, node 1 is not monitored with security level l . This contradicts our assumption. Hence proved.

The mechanism employed by each node in the network to determine the minimum monitoring probability is best presented by the simple algorithm, called *LDK*, which stands for Least Degree for k . The *LDK* algorithm is illustrated pictorially in Fig. 3. Each node (say M) initiates this algorithm to determine the probability with which it has to monitor its neighborhood. In step 1, M broadcasts the message *SendDegree*. This message is limited to only one hop. In step 2, the neighbors of M reply back with their respective degrees. In step 3, the least of these degrees is assigned to k in the formula, and the minimum monitoring probability of M (p^{\min_M}).

In step 2 of *LDK*, a malicious neighbor may send a false degree information to M and try to disrupt the algorithm. However, *LDK* is resilient to such an attack under the following assumption. We assume that a malicious neighbor of M would

like p^{\min_M} to be as less as possible so that the chance of being detected is reduced.

Algorithm LDK.

Step 1. Each node M broadcasts a message of type *Send Degree* to its neighbors asking them to send their *degree*.

$M -> broadcast : (\text{SendDegree})$

Step 2. On receipt of the *SendDegree* message in step 1, each neighbor node, B of M replies to M a *ReplyDegree* message.

$B -> M : (\text{ReplyDegree})$

Step 3. On receipt of each *ReplyDegree* message in step 2, M does the following:

- i. For each message do
 $degree = \text{ReplyDegree}$;
- ii. $k = \text{Minimum } (degree);$

The drawback of the above mechanism is the increase in the size of the reply message. An alternative technique is to request for the IDs of the neighbors only when there is suspicion. The function (Minimum(degree)) in step 3(ii) checks for suspicion before returning the minimum degree. A suspicion is said to have been aroused if there is an outlier (at the lower end) of the received degrees (considering the degrees as a data set), or an unusual value is reported (e.g., 1). Since the neighbors share a neighborhood, it is unlikely that there will be huge differences

- iii. If $l > k$ then $p_M^{\min} = 1$. Otherwise, p_M^{\min} is assigned the minimum value of p (where l is the desired security level of the neighbor, $T + \rho = 1$ ρ is a very small positive number) such that

$$\sum_{i=1}^k p^i (1-p)^{k-i} \geq T$$

It cannot change its security level and thus to be monitored with a low monitoring probability, it can only send a high degree to M in step 2. Since the minimum degree of the neighbors is chosen by M in step 3 to determine the value of p_M^{\min} , the high degree sent by the malicious neighbor will most likely not be chosen. Even if several malicious neighbors collude and report an inflated high degree, if there is at least one honest neighbor which reports correctly, the honest neighbor's degree will be chosen as the minimum degree (in step 3) and p_M^{\min} will be correctly calculated. We contend it is safe enough to assume that at least one neighbor is honest.

However, the afore-mentioned assumption may not hold for some other kind of malicious neighbor. It may send a low degree (e.g., 1) to force M to use a high monitoring probability and consequently consume more energy. This attack can be handled in two ways. First, in step 2, a neighbor B may send the identity (e.g., IP address) of its neighbors along with its degree. In step 3, M can perform some validation check which we illustrate using an example. Suppose, in Fig. 2, node 5 is malicious. When node 4 requests for the degrees, node 3 replies with (degree:3, IDs:2,4,6), i.e., its degree is 3 and the identities of its neighbors are 2, 4 and 6. Similarly, nodes 2 and 6 reply with (degree:3, IDs:1,3,4) and (degree:3, IDs:3,4,5) respectively. However, suppose node 5 reports a false reply with (degree:1, IDs:4). On receipt of these replies, node 4 now can determine that node 5 has sent a false reply. The degree reported by node 5 has to be at least 2 since node 6 has already reported that it is a neighbor of node 5. Thus, node 4 discards the reply of node 5 and considers only the rest. However, this check will not work in the extreme case when none of the neighbors of node 4 are also neighbors of node 5.

routing protocol can be exploited. For instance, if the routing protocol is AODV, the HELLO packets which are periodically broadcast by each node can be appended with the degree of the node before broadcasting it. Hence, step 1 and step 2 of the algorithm would not be needed. Since the nodes are mobile, the degrees of the nodes may change. So this algorithm must be run at periodic intervals and the value of p_i^{\min} recalculated for each node i . This period is a configurable parameter, which has to be set judiciously. It should be noted that when the period is shorter, a more accurate state of the topology will be obtained although a higher communication cost will be incurred as each node has to obtain the degrees of its neighbors through some messages (steps 1 and 2). On the other hand, a longer period may cause the algorithm to use inaccurate information about the topology (depending on how quickly it changes), while reducing the communication cost.

B. Security Level

In *LDK*, the probability with which a node has to monitor depends on the value of the security level. It is

in their degrees. Thus, an outlier at the lower end could be used to identify a false degree of very low value. In case of a suspicion, the node M can again request for the degrees and the identities and perform the validation check as mentioned above.

A. Message Complexity of *LDK* algorithm

In step 1 of the *LDK* algorithm, a message is broadcast and in step 2 a message is received from each of its neighbors. Each node executes this algorithm using only local information. Therefore, the worst case message complexity of the algorithm is $O(d)$, where d is the highest degree of any node in the network at any instant of time. Moreover, provisions in the underlying

In a cooperative IDS, a neighbor of a node cooperate with other neighbor nodes for validation of the observed data. While the proposed probabilistic efficient IDS usage scheme limits monitoring of a node. This is because at any instant of time, all the neighbors of a node are not monitoring its behavior. Here an IDS component may observe only a portion of its neighbor's behavior. This may lead to inconsistency w.r.t. to the observed data in different IDSs. By setting the security level, one can limit the number of nodes observing a node's behavior at any instant of time. Thus, there will be no inconsistency in the observed data of at least these number of nodes. Further, if the validation requires consensus of more number of neighbors, the security level can be raised. The use of the security level for cooperatively detecting a malicious node is demonstrated using simulation experiments in the next section.

Additionally, the effect of using *Algorithm LDK* is that a node (IDS component) samples the behavior of a neighbor node instead of monitoring it all the time. It has been found that the sampling rate of an IDS affects its performance. However, in the case of a cooperative IDS, these components cooperate and share their observations to finally detect any anomalous behaviour. Even if a neighbor may not observe a portion of the node's behavior, some other neighbor(s) observe the said portion. As the number of neighbors that monitor the said portion can be tuned using the security level, no portion goes un-monitored (unobserved). Thus, the performance of the IDS (whose components are on the neighbors) will not be affected.

V. PERFORMANCE EVALUATION

In this section we present simulation results for the *Algorithm LDK* and discuss its performance. We design a cooperative IDS and deploy it in a MANET simulated using ns2.32 simulator and compare its performance under two scenarios:

1. We keep IDSs running on mobile nodes in a network throughout the simulation time.
2. We use the *Algorithm LDK* to reduce the active time of IDS in each node of the network.

The focus is not on the design of the cooperative IDS but on how integrating *LDK* in it helps reduce the active time of individual IDSs while attempting to maintain its effectiveness. The performance metrics are detection rate, false detection rate, and the saving of energy and computational resource.

VI. CONCLUSION S

In this paper we have proposed an efficient way of using intrusion detection systems (IDSs) that sits on every node of a mobile ad hoc network (MANET). We first present the minimization of the active duration of the IDSs in the nodes of a MANET as an optimization problem. We then described a cooperative game model to represent the interactions between the IDSs in a neighbourhood of nodes. The game is defined in such a way that the primary goal of the IDSs is to monitor the nodes in its neighbourhood at a desired security level so as to detect any anomalous behaviour, whereas, the secondary goal

of the IDSs is to conserve as much energy as possible. To achieve these goals, each of the nodes has to participate cooperatively in monitoring its neighbour nodes with a minimum probability. We then develop a distributed scheme to determine the ideal probability with which each node has to remain active (or switched on) so that all the nodes of the network are monitored with a desired security level. The evaluation of the proposed scheme is done by comparing the performances of the IDSs under two scenarios: (a) keeping IDSs running throughout the simulation time and (b) using our proposed scheme to reduce the IDS's active time at each node in the network. From the simulation results we observe that the effectiveness of the IDSs in the network is not compromised while using the proposed scheme, rather, there is considerable reduction of energy consumption in each of the nodes that increases the network lifetime significantly. Here we have assumed a homogeneous network in a way that all the nodes have the same capacities in terms of their computational and energy resources. In future we wish to extend our model to accommodate a heterogeneous network.

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Estimation of speed in linear induction motor drive by MRAS using neural network and sliding mode control

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Abstract: The paper proposes a speed observer for a linear induction motor drive, which uses artificial neural network model reference adaptive system (NN-MRAS) that uses sliding mode control. The basic mathematical equations of the motor governed by the voltages and currents from the equivalent circuit of the motor including the end effects are determined. The artificial neural network (ANN) model based adaptive system in MRAS for the secondary of the motor is

I. Introduction

Every strategy or methodology that needs to be studied and implemented initiates with the motor drive that is dealt with. The induction motor drives have a recent and fast development in various applications due to its gaining edge compared to the dc motor drives. Linear induction motors are a special type of induction motor that have been studied and for linear motion applications [2]. Unlike rotator induction motors (RIM), linear induction motors (LIM) do not require motion conversion form rotator to linear form. Many recent literatures related to LIM are present. Even though LIM have their advantages, there are some difficulties in analysing and modelling it due to complexity of structure. End effects are associated with the machine due to asymmetric structure. Linear encoders are used for the speed control of the motor which is costly and have low reliability. So, sensors less techniques are used for reducing the difficulty [3], [4], [7], [8]. But accurate measurement in speed of ac motor is still not possible [5], [6]. The conventional MRAS has been implemented on RIM. The NN MRAS has been tested on RIM and LIM with PI controller [11], [1], [9], [10]. The model is deduced from basic voltage and current models of LIM. MRAS that uses ANN in

developed. The sliding mode control is implemented with the NN-MRAS model. The dynamical response and speed observation is compared for the conventional MRAS using PI control and the proposed model for the induction motor drive by simulation using Matlab/Simulink.

KEY WORDS: Indirect vector control, linear induction motor, MRAS, artificial neural network, sliding mode control.

the adaptive model is developed based on the equations of the motor [1]. The sliding mode control replaces the conventional PI control and simulated. The proposed model and the conventional model are compared for the performance.

II. Equivalent circuit of LIM

The primary difference between the transformer and induction motor is related to effects of varying rotor frequency on rotor voltages and impedances. The linear induction motor generalised model and equivalent circuit is shown in the figure.

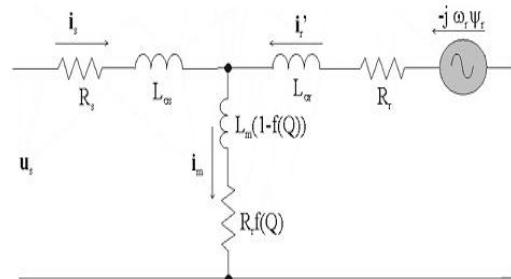


Fig. 1.Equivalent circuit of LIM

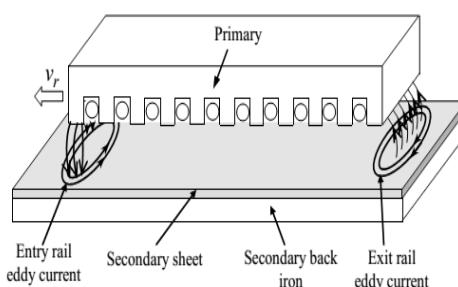


Fig.2. Generalised model of LIM

The primary is basically stationary, similar to RIM but cut opened and rolled flat. The currents produce magnetic field translational to the surface of the stator. The secondary is a piece of conductor with iron return path i.e. for the magnetic flux to pass. There are

basically two types of construction single sided and double sided.

III. Mathematical model

The mathematical model [12] is derived from basic induced voltage equations of an induction motor except The end effects are occurred during the motion between the stator (primary) and secondary. The difference in the induced currents causes the difference in the magnetic flux density at both the ends. The end effects behave differently at the entry and exit ends of the LIM. The currents induced in the secondary at the entry end decay more slowly than at the exit end, because of its larger time constant. It depends on the velocity of the secondary. The primary's length is inversely proportional to the velocity, i.e., for a zero velocity the primary's length may be considered infinite, and the end effects may be neglected. The effect is governed by the equation,

$f(Q) = (1 - e^{-Q})/Q$; and Q is given as $Q = DR_r/(L_m + L_{lr})v$, where D is length, L_{lr} is secondary leakage reactance, L_m is mutual inductance, R_r is the secondary resistance and v is the velocity of secondary.

$$V_{ds} = R_s i_{ds} + R_r f(Q) (i_{ds} + i_{dr}) + p\lambda_{ds} - \omega_e \lambda_{qs} \quad (1)$$

$$V_{qs} = R_s i_{qs} + p\lambda_{qs} - \omega_e \lambda_{ds} \quad (2)$$

$$V_{dr} = R_r i_{dr} + R_r f(Q) (i_{ds} + i_{dr}) + p\lambda_{dr} - \omega_{sl} \lambda_{qr} \quad (3)$$

$$\lambda_{qr} = R_r i_{qr} + p\lambda_{qr} - \omega_{sl} \lambda_{dr} \quad (4)$$

$$\lambda_{ds} = L_{ls} i_{ds} + L_m (1 - f(Q)) (i_{ds} + i_{dr}) \quad (5)$$

$$\lambda_{qs} = L_{ls} i_{qs} + L_m (i_{qs} + i_{qr}) \quad (6)$$

$$\lambda_{dr} = L_{lr} i_{dr} + L_m (1 - f(Q)) (i_{ds} + i_{dr}) \quad (7)$$

$$\lambda_{qr} = L_{ls} i_{qr} + L_m (i_{qr} + i_{qs}) \quad (8)$$

The flux equations can be split into two parts while modeling. The first part consists of the equation without the end effect and the second equation includes the end effects.

IV. Indirect vector oriented control for LIM

Basically there are two types of vector control, direct and indirect. The sensor less techniques that are used generally uses the latter type of control of speed [13]-[15]. The three phase flux is transformed into dq-axes which are orthogonal and the secondary currents are decoupled in the direct and quadrature axes. Here, vector oriented control is used for the secondary induced flux of the LIM. The block diagram showing the vector control is shown in the figure. The current control is done in secondary oriented reference frame. The direct and quadrature axes are controlled by a flux control loop and a speed loop respectively. The angular position that is required for the estimation of speed is provided by the NN-MRAS with sliding mode control. The conventional MRAS uses PI controllers. The pulse width modulation which uses space vector modulation is used for the motor input. The transformations from the 3-phase to dq and back are also shown in the block diagram. There exist some minor problems related to the implementation. Due to the presence of dc biases, there exists open loop integration causing integrator to saturate. There is also the inverter nonlinearity due to the presence of finite voltage drop during its on-state.

this includes the end effects in the model.

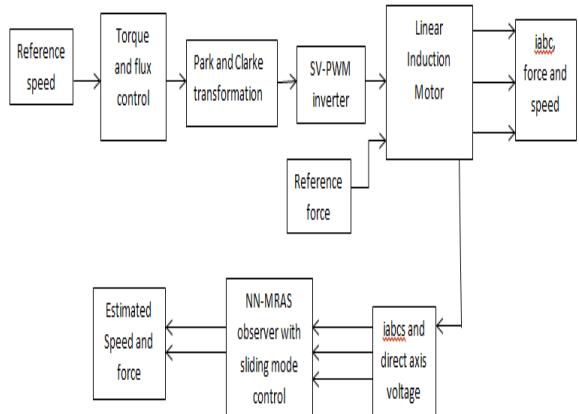


Fig.3. Block diagram for vector control of LIM

V. MRAS using neural network and sliding mode control

In the model reference adaptive system (MRAS) technique [16], the reference model output is compared to an adjustable/adaptive model output until the error is minimized. Since it cannot become practically zero tolerance limits can be set. The reference model is modeled on primary equations and the adaptive model is modeled on the secondary equations. The equations that are governing the reference and adaptive model derived from the equivalent circuit are:

$$d\Psi_r'/dt = u_s - R_s i_s - L_s di_s/dt - R_r f(Q) \Psi_r' / L_m (1 - f(Q)) \quad (9)$$

$$d\Psi_r'/dt = R_r i_s + (j\mu\pi v / \tau_p - R_r (1 + f(Q)) / L_m (1 - f(Q))) \Psi_r' \quad (10)$$

These are the voltage and current models respectively. The equations are derived in the secondary oriented reference frame of the secondary induced flux. The linear speed is estimated from the rotating speed by the equation $\omega_r = (D\pi/\tau_p)v$ and the force is derived from the torque equation as

$F_e = 3\pi P (\lambda_{ds} i_{qs} - \lambda_{qs} i_{ds}) / 4\tau_p$. In the MRAS, the reference model is modeled based on (9) and the adaptive model is modeled based on (10). For the adaptive model, an artificial neural network is developed using (10), where the NN model is a linear

neural network called ADALINE model. The block diagram of the MRAS system is shown in the figure.

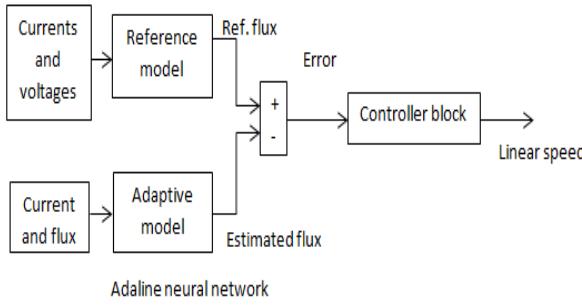


Fig.4. MRAS block diagram using NN

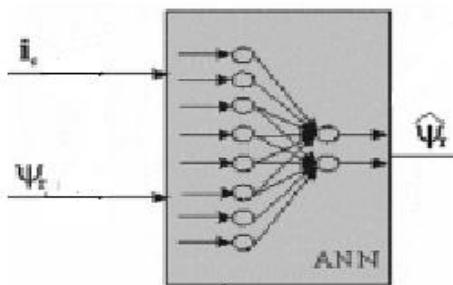


Fig.5. Neural network model

The neural network used is a simple adaline model as shown in the figure. The model uses two inputs and one output with single layer neurons. The two inputs are currents and flux from the feedback. The flux output is the estimated which is compared with the reference flux gives the speed estimated. The error is minimized by the controller, here sliding mode control. On using a sliding mode controller, the effective gains of the error compensator can be increased to adjust the observer for both speed adaptation and for secondary flux estimation. The performance provided is robust with variations parameter changes and torque changes that are caused due to load variations, etc. A switch algorithm is used for the control and so it behaves as a nonlinear control. Here, the conventional and general controllers used i.e. PI are replaced by the sliding mode controller. The conventional MRAS model using PI controller and the proposed model using sliding mode controller are compared in the dynamic performance criteria for the motor drive and results are shown.

VI. Simulation Results

The linear induction motor model has been modelled using the equations and simulated in Matlab/Simulink. The neural network based MRAS system with sliding mode controller is simulated along with the conventional MRAS model and the results of the models in Matlab/Simulink are compared. The parameters of the motor drive are shown in the table.

Table 1
Parameters of LIM

Rated voltage [V]	400
-------------------	-----

Rated frequency [Hz]	50
Pole pairs	6
Stationary resistance $R_s[\Omega]$	0.855
Stationary inductance $L_s[mH]$	0.100792
Secondary resistance $R_r[\Omega]$	1.15
Secondary inductance $L_r[mH]$	0.100792
Magnetizing inductance $L_m[mH]$	0.1004
Inertia J	0.06

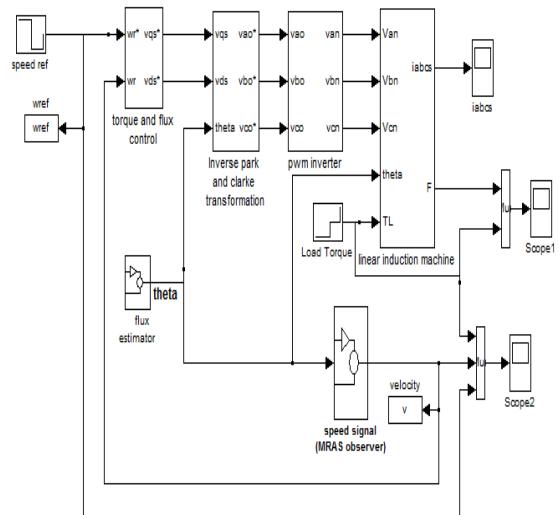


Fig.6. Simulation model of speed estimation using NN-MRAS and sliding mode control for LIM drive

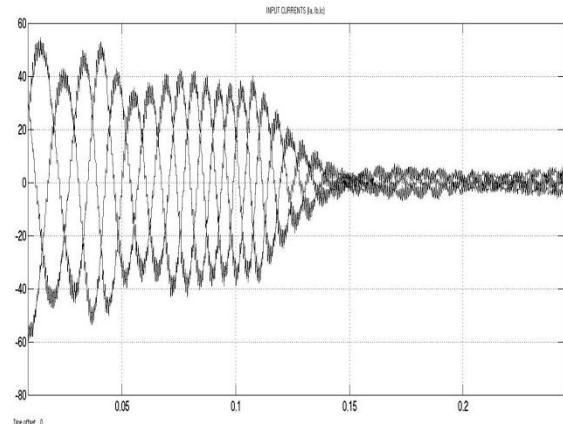


Fig.7. I_{abc} currents of conventional MRAS model

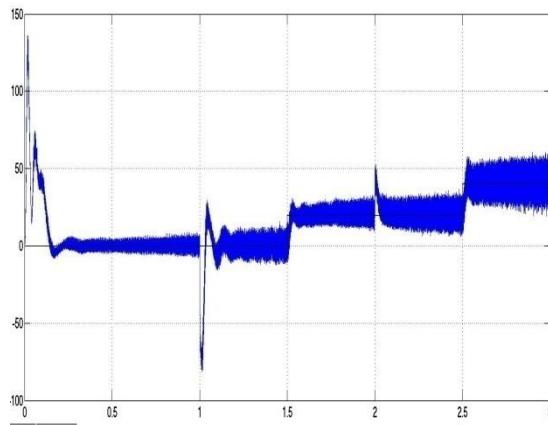


Fig.8. Reference and estimated torque of conventional MRAS model

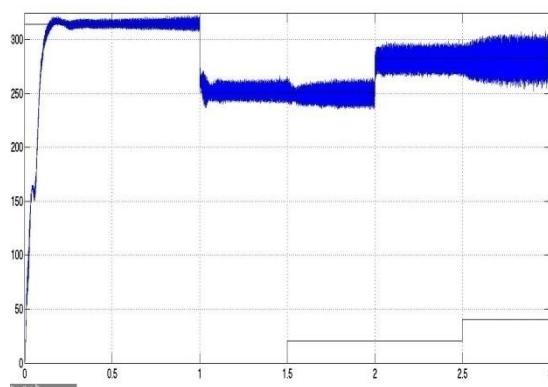


Fig.9. Reference and estimated speed of conventional MRAS model

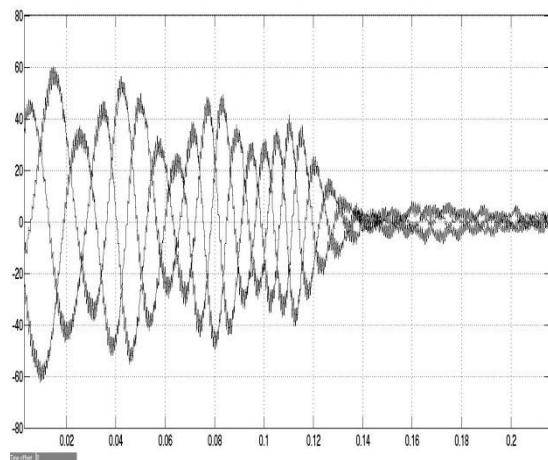


Fig.10. I_{abc} currents of proposed model

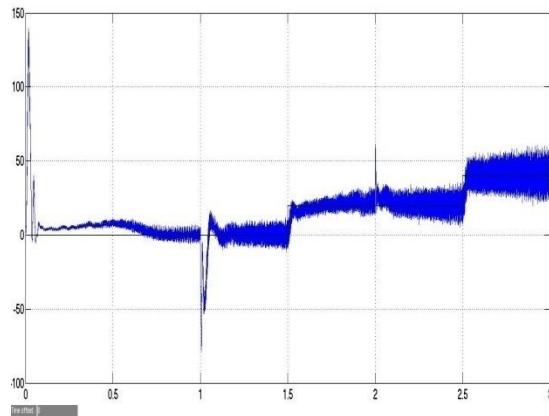


Fig.11. Reference and estimated torque of proposed model

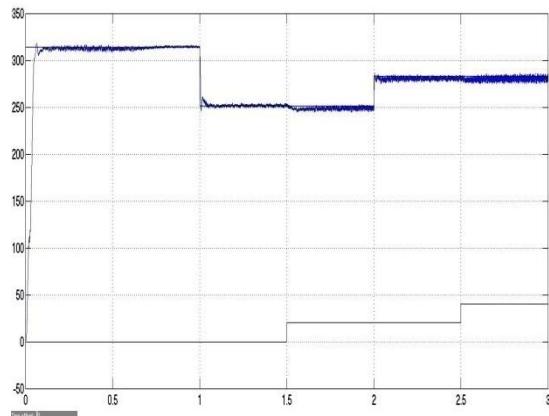


Fig.12. Reference and estimated speed of proposed model

The figures 7 and 10 show the primary currents. The figures 8 and 11 show the variation in load torque in steps from 0 to 45N-m. The figures 9 and 12 show the speed response when it is estimated and the error tracking comparison which is improved as expected. The speed is also varied in steps from 320 to 250 and 250 to 280. The dynamic performance has been compared with respect to torque (output generally is force) and speed of the secondary with varying loads or here step changes are considered. The speed is varied in the positive values which we can consider it as the secondary moves in one direction. The reverse direction of the same can also be analyzed by comparing and we get similar results. The plots are shown for the primary currents and time, torque and time and speed and time. As expected, from the two plots we can observe that the estimated speed, torque tracks their respective references reducing the error. The harmonics are present in the system when the drive is modeled which can be observed in the plots. These represent the imperfect decoupling of the orthogonal axes components of flux. The harmonics in the primary currents are also reduced by using the proposed model.

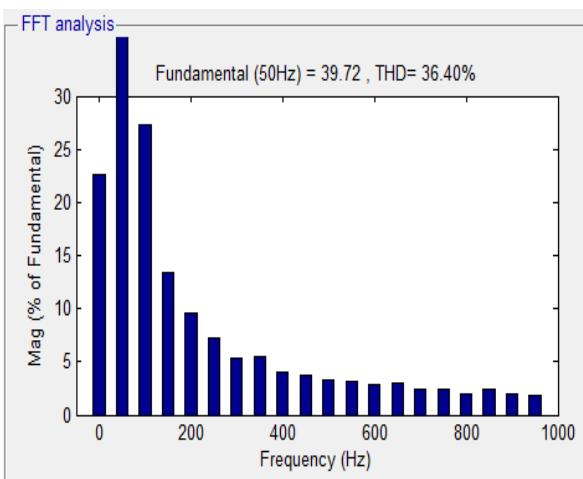


Fig.13. THD of conventional MRAS model

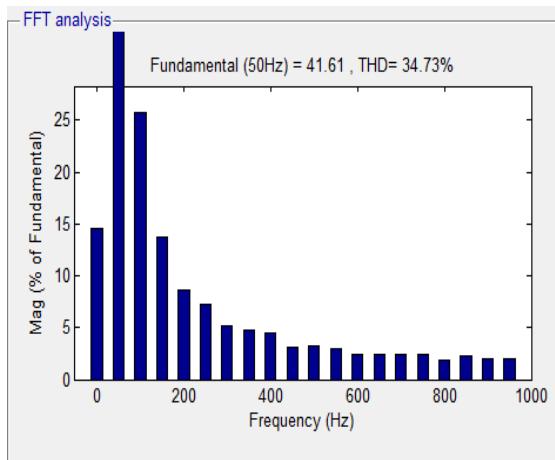


Fig.14. THD of proposed model

VII. Conclusion

This paper finally proposes an artificial neural network based MRAS system by sliding mode control for speed estimation of a linear induction motor drive. Initially, from the equivalent circuit, the expressions are derived and modeled for LIM. Then a NN adaptive system for

The conventional model is also modeled. Both the models are simulated in Matlab/Simulink. The results display that the dynamic performance of the proposed model is better than the conventional model and also the harmonics are reduced in the proposed model.

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MRAS is developed based on the secondary induced equations. The sliding mode controller replaces the conventional PI controller. The THD is also improved in the proposed model shown in the figures 13 and 14. The table shows the steady state responses and comparison of both the models. Table 2

Comparison of results between conventional and proposed model

	MRAS with PI control	NN-MRAS with sliding mode control
Torque(N-m)	Rise Time	0.0052
	Settling Time	3.0000
	Settling Min	-135.0082
	Settling Max	154.5103
	Overshoot	239.4137
	Undershoot	296.5731
	Peak	154.5103
	Peak Time	0.0194
Speed(rpm)	Rise Time	0.0842
	Settling Time	2.9999
	Settling Min	235.5970
	Settling Max	322.9322
	Overshoot	12.9017
	Undershoot	1.2755e-004
	Peak	322.9322
	Peak Time	0.9847
THD		36.40%
		34.73%

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AN ENHANCED MULTI-FACTOR ACCESS CONTROL FOR CLOUD COMPUTING SERVICES

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security of the system, especially in those scenarios where many users

ABSTRACT

Access card authentication is critical and essential for many modern access control systems, which have been widely deployed in various governments, commercial and residential environments. However, due to the static identification information exchange among the access cards and access control clients, it is very challenging to fight against access control system breaches due to reasons such as loss, stolen or unauthorized duplications of the access cards. Although advanced biometric authentication methods such as fingerprint and iris identification can further identify the user who is requesting authorization, they incur high system costs and access privileges cannot be transferred among trusted users. In this paper, we introduce a new fine-grained two-factor authentication (2FA) access control system for web-based cloud computing services. Specifically, in our proposed 2FA access control system, an attribute-based access control mechanism is implemented with the necessity of both a user secret key and a lightweight security device. As a user cannot access the system if they do not hold both, the mechanism can enhance the

share the same computer for web-based cloud services. In addition, attribute-based control in the system also enables the cloud server to restrict the access to those users with the same set of attributes while preserving user privacy, i.e., the cloud server only knows that the user fulfills the required predicate, but has no idea on the exact identity of the user. Finally, we also carry out a simulation to demonstrate the practicability of our proposed 2FA system.

Keyword: Fine-grained, Access control, Two-factor, Web services.

1. INTRODUCTION

Cloud computing is a virtual host computer system that enables enterprises to buy, lease, sell, or distribute software and other digital resources over the internet as an on-demand service. It no longer depends on a server or a number of machines that physically exist, as it is a virtual system. User authentication has become a critical component for any cloud system. A user is required to login before using the cloud services or accessing the sensitive data stored in the cloud. There are two problems for the traditional account/password based system. First, the traditional account/password based authentication is not privacy-preserving. However, it

is well acknowledged that privacy is an essential that must be considered in cloud computing systems. Second, it is common to share a computer among different people. It may be easy for hackers to install some spyware to learn the login password from the web-browser. As the web continues to play an ever increasing role in information exchange, so too is it becoming the prevailing platform for infecting vulnerable hosts. A detailed study of the pervasiveness of so-called drive-by downloads on the Internet.

2.RELATED WORKS

1 Secure Multi-Owner Data Sharing for Dynamic Groups in the Cloud

Anonymous authentication schemes allow members of a group to be authenticated anonymously by application providers for a bounded number of times. Dynamic k-TAA allows application providers to independently grant or revoke users from their own access group so as to provide better control over their clients. In terms of time and space complexity, existing dynamic schemes are of complexities $O(k)$, where k is the allowed number of authentication. In this paper, we construct a dynamic k-TAA scheme with space and time complexities of $O(\log(k))$. We also outline how to construct dynamic k-TAA scheme with a constant proving effort. Public key size of this variant, however, is $O(k)$. We then describe a trade-off between efficiency and setup freeness of AP, in which AP does not need to hold any secret while maintaining control over their clients. To build our system, we modify the short group signature scheme into a signature scheme and provide efficient

feature

protocols that allow one to prove in zero-knowledge the knowledge of a signature and to obtain a signature on a committed block of messages. We prove that the signature scheme is secure in the standard model under the q-SDH assumption. Finally, we show that our dynamic k-TAA scheme, constructed from bilinear pairing, is secure in the random oracle model.

2. Secure Overlay Cloud Storage with Access Control and Assured Deletion

Smart grid is a technological innovation that improves efficiency, reliability, economics, and sustainability of electricity services. It plays a crucial role in modern energy infrastructure. The main challenges of smart grids, however, are how to manage different types of front-end intelligent devices such as power assets and smart meters efficiently; and how to process a huge amount of data received from these devices. Cloud computing, a technology that provides computational resources on demands, is a good candidate to address these challenges since it has several good properties such as energy saving, cost saving, agility, scalability, and flexibility. In this paper, we propose a secure cloud computing based framework for big data information management in smart grids, which we call "Smart-Frame." The main idea of our framework is to build a hierarchical structure of cloud computing centre's to provide different types of computing services for information management and big data analysis. In addition

to this structural framework, we present a security solution based on identity-based to address critical security issues of the proposed framework

In several distributed systems a user should only be able to access data if a user posses a certain set of credentials or attributes. Currently, the only method for enforcing such policies is to employ a trusted server to store the data and mediate access control. However, if any server storing the data is compromised, then the confidentiality of the data will be compromised. In this paper we present a system for realizing complex access control on encrypted data that we call Ciphertext-Policy Attribute-Based Encryption. By using our techniques encrypted data can be kept confidential even if the storage server is untrusted; moreover, our methods are secure against collusion attacks. Previous Attribute-Based Encryption systems used attributes to describe the encrypted data and built policies into user's keys; while in our system attributes are used to describe a user's credentials, and a party encrypting data determines a policy for who can decrypt. Thus, our methods are conceptually closer to traditional access control methods such as Role-Based Access Control (RBAC). In addition, we provide an implementation of our system and give performance measurements.

4. Data Storage Security in Cloud

We construct a short group signature scheme. Signatures in our scheme are approximately the size of a standard RSA signature with the same security. Security of our group signature is based on

encryption, signature and proxy re-encryption

3. Scalable and Secure Sharing of Personal Health Records in Cloud Computing using Attribute-based Encryption

the Strong Diffie-Hellman assumption and a new assumption in bilinear groups called the Decision Linear assumption. We prove security of our system, in the random oracle model, using a variant of the security definition for group signatures recently given by Bellare, Micciancio, and Warinschi.

5. Toward Secure and Dependable Storage Services in Cloud Computing,

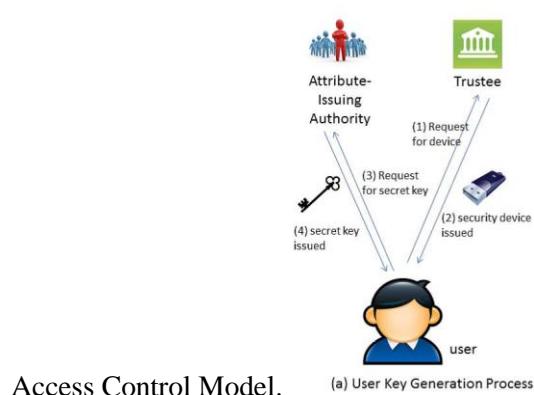
Some users may misbehave under the cover of anonymity by, e.g., defacing webpages on Wikipedia or posting vulgar comments on YouTube. To prevent such abuse, a few anonymous credential schemes have been proposed that revoke access for misbehaving users while maintaining their anonymity such that no trusted third party (TTP) is involved in the revocation process. Recently we proposed BLACR, a TTP-free scheme that supports ‘reputation-based blacklisting’ — the service provider can score users’ anonymous sessions (e.g., good vs. inappropriate comments) and users with insufficient reputation are denied access. The major drawback of BLACR is the linear computational overhead in the size of the reputation list, which allows it to support reputation for only a few thousand user sessions in practical settings. We propose PERM, a revocation-window-based scheme (misbehaviors must be caught within a window of time), which makes computation independent of the size of the

reputation list. PERM thus supports millions of user sessions and makes reputation based blacklisting practical for large-scale deployments.

3.METHODOLOGY

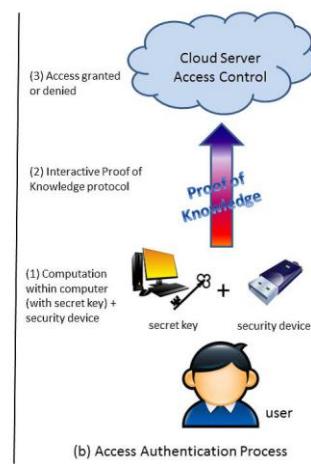
The research methodology mainly focuses on access control models. To deal with the problem of usage of large amount of data by the applications and accessing of different patterns of information's on cloud platforms, we are proposing a model with multi-level authentication which would be implemented by using security questions and image based for the login protection and at last level UIN would be used to access the data from the cloud platforms.

- The first- level authentication pattern consists of 4 random words. These 4 words come out of 8 registered words. Each and every time of registration all 8 words will be positioned randomly. The user will have to correctly match the words and their codes for a particular word.



- The second- level authentication pattern consists of various small images of different objects and colors in 3x3 grid formation. The grid points will be used in the random positioning based grid formation to add more security to the first level of authentication. To implement the higher security to reduce the chance of breaking into, some of the fake images as well as the fake secure images can also be shown to the user, the user will need to recognize the correct objects selected during signup and then provide their secure codes correctly in order to gain the access to the sensitive data on the cloud application.

- After second level of authentication user will be able to log in the cloud, but at last step user has to provide the correct UIN (Unique Identification Number) to access the private data and more sensitive operation according to



4.IMPLEMENTATION AND EVALUTION

In this paper, we propose a fine-grained two-factor access control protocol for web-based cloud computing services, using a lightweight security device. The device has the following properties:

- 1) it can compute some lightweight algorithms, e.g. hashing and exponentiation; and
 - (2) it is tamper resistant, i.e., it is assumed that no one can break into it to get the secret information stored inside.
- In this paper, we propose a fine-grained two-factor access control protocol for web-based cloud computing services, using a lightweight security device. The device has the following properties:
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In this paper, we propose a fine-grained two-factor access control protocol for web-based cloud computing services, using a lightweight security device. The device has the following properties. It can compute some lightweight algorithms, e.g. hashing and exponentiation; and it is tamper resistant, i.e., it is assumed that no one can break into it to get the secret information stored inside. With this device, our protocol provides a 2FA security. First the user secret key (which is usually stored inside the computer) is required. In addition, the security device should be also connected to the computer (e.g. through USB) in order to authenticate the user for accessing the cloud. The user can be granted access only if he has both items. Furthermore, the user cannot use his secret key with another device belonging to others for the access. Our protocol supports fine-grained attribute-based access which provides a great flexibility for the system to set different access policies according to different scenarios. At the same time, the privacy of the user is also preserved. The cloud system only knows that the

user possesses some required attribute, but not the real identity of the user. To show the practicality of our system, we simulate the prototype of the protocol.

5.SCOPE OF THE PROBLEM

This paper has a vast future scope of work. It is highly extensible. The security issues are increasing day by day .Since the technologies and its secure use is an important concern we use different and secure access control and authentication mechanism. The major concern is more user friendly and highly secure measures must be developed and implemented. So the future work has a scope on this area where more user friendly security measures has to be concentrated.

6.CONCLUSION AND FUTURE WORK

The model proposed in this paper give power to the owner of the data to implement the security process on the data to be outsourced, and hence retain the control over the data. The model also proposed the combination of cryptography and access control to keep the data safe from vulnerabilities. A multistep, multi – factor authentication approach is employed for the authentication and authorization of the client, which increase the confidentiality and integrity of the data. This system provides less complex and efficient privacy policy for cloud based applications. If the user is unable to access mobile phone or email account then the system provides alternate ways by checking all the identity attributes of the user. The method also presented the private key, hash and public encrypted ciphers among the owner, the client and the service provider which guarantee the isolation and safe execution of the cloud environment.

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DIGITAL GROCERY COMMERCE: EXPLORING THE POTENTIAL FOR GROCERY SHOPPING

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Abstract:

A grocery shopping is an android application where users can purchase and order groceries online. The objective of developing this application is to make users save their time and money. This application provides multiple products available at one place like dairy products, vegetables etc. The system is developed with a user-friendly and attractive GUI. It delivers a wide range of groceries available online. Users have to first register/login into the system to view the groceries and add them into their cart and click on the home delivery option. This app also allows users to estimable their bill before payment. They can then order it by making a secure online payment via debit/credit card. In case of shortage of products the user can access the request box which is in the right corner of the page to request the product. So that, the user gets their required product at correct delivery time. By doing so, the customer satisfaction is achieved to a greater extent.

Key terms: Logical facilitator, Technophobes, Smart phone GUI, Emolument,Solutium.

1. Introduction

Today's reach of mobile smartphone technology and the personal and commercial blend of social media networks permit instantaneous consumer interactivity on grocery products, pricing and information access. This potential for consumers to access information, savings, and convenience through a mobile app enables a dramatic transformation in food shopping on a global basis. A revolution well underway and continually morphing, new grocery shopping behaviors represent both a challenge to

comprehend and an opportunity to manage for increasing revenue and competitive advantage. Understanding consumer grocery shopping behavior in the mobile age requires fresh approaches to defining the consumer's grocery shopping experience, motivation, and value equation. Sophisticated understanding of food culture occasions, purchase occasions, and retail provision of experience are critical to succeeding and retaining today's consumers. Their interface with technology, enabling the purchase occasion, is their logical facilitator for integrating their product needs, desire to economize, and search for experience appropriate to their purchase situation. The above, written a year ago in the Peck Fellowship application, anticipated the evolution of digital media and grocery shopping during the past twelve months from summer 2012 to June 2013. Research investigations and consultant prognostications are proliferating and consumer digital behavior is both advancing and clarifying. The Peck Fellowship challenge is an exceptionally broad topic exploring an area of accelerating technological innovation across changing consumer behaviors and demographics.

2 .Rationale for Exploring Grocery Shopper Apps

A wide review of industry reports, presentations, and articles identified grocery shopping apps as an area of retailer interest without clear understanding of the best functions and shopper segments for their use. It also is a topic lacking a consensus of best approach and practice. It appears to be an under-researched area, in

both the private sector and in academia. Accordingly it was identified as a high priority area for Peck research to focus as it would address both a retailer need and add to the existing research base.

3. Module Description

- 3.1. Administrative Module
- 3.2. Purchase Module
- 3.3. Sales Module
- 3.4. Billing Module

3.1. Administrative Module:

This module deals with the privileges of administrator, who controls all the activities of the grocery mart. An admin is allowed to maintain the customer database and also manages the purchase history of each and every customer. He is the only authorized person to maintain the user account details confidentially. It enables the admin to update on offers and product availability. A proper billing system is under the admin control. Fig 3.1.1 and 3.1.2 explains the module activities.

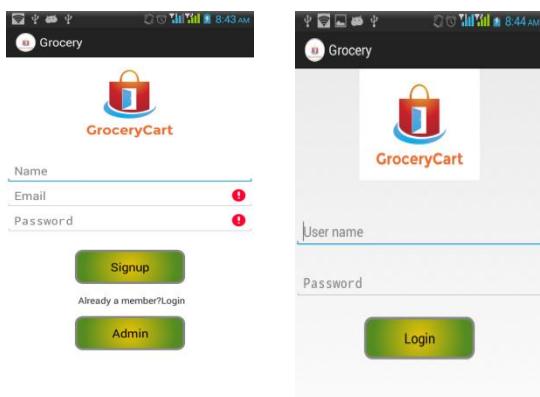


Fig 3.1.1 – Administrator Login Page

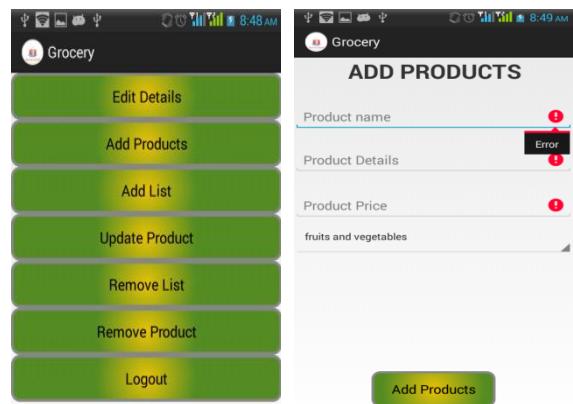


Fig 3.1.2(a) - Administrator activities

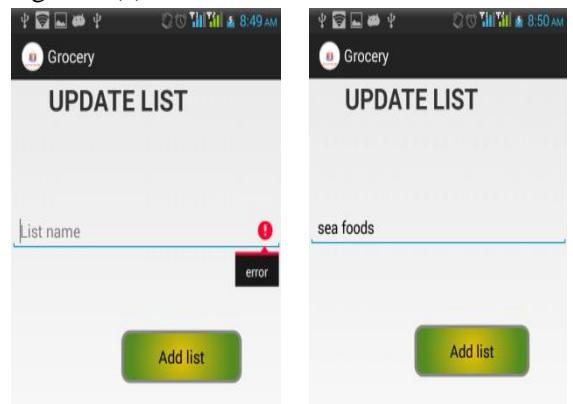


Fig 3.1.2(b) - Administrator activities

3.2. Purchase module:

Admin can purchase the products according to the user request. Ensures and provides provide all time availability of products. They request supplier to provide products which are requested through “request box”.

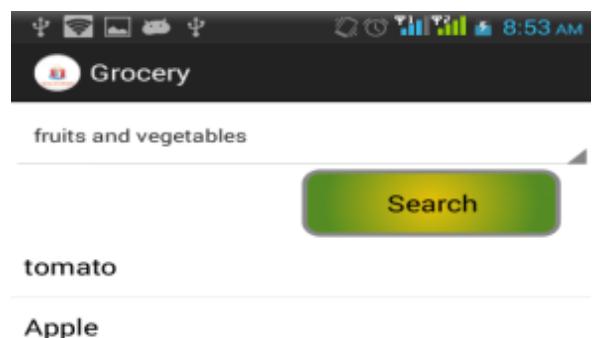


Fig 3.2.1. Purchase details

3.3. Sales module:

User will login using their user name and password. They will search and order the products along with its quantity. When the product expected is not available the user is allowed to request their required product in the “Request box”. Request box- Here user can add their product along with its quantity.

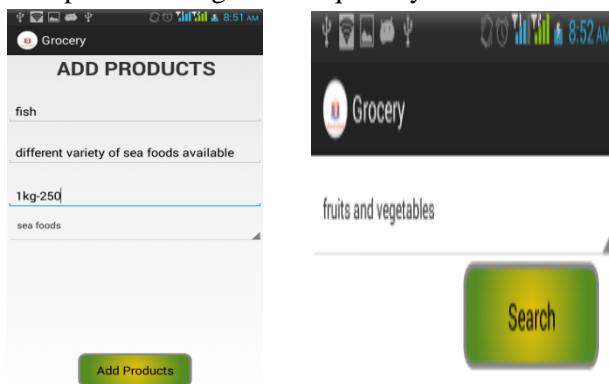


Fig 3.3.1 Sales details

3.4.Billing module:

Customer can pay the bill using :

- Credit card
- Online billing
- Cash on delivery

Their account details are maintained with high security. The withdrawal of cash will be sent through notification. Billing details will be mailed and notification will be send via sms.

4. Segmenting Shopper Digital Behaviors

For many, technology has penetrated their grocery shopping behavior in small ways and for specific functions, such as web coupon access and electronically stored shopping lists, and has made inroads with small segments of consumers. Symphony IRI's research with their Consumer Network panel on digital shopper behavior only identified 12% of shoppers in their active digitize me! shopper segment and another 23% who were a less engaged but a potential group to cultivate.¹⁵ They were labeled wired for work and are digitally savvy but currently

disinterested in using technology for shopping. Other digitally active shopper segments exist but are not as active in expanding their digital activities into their grocery shopping routine.

5. In particular, Symphonyiri identified the five following Active Internet User Segments

Technophobes – least online-savvy, older segment, prefer face-to-face communication over on-line, feel overwhelmed by technology: 28% of Consumer Network panel, median income of \$43,000.

Socializers – use internet for communication and social media, little product research, coupon search, or price comparison: 14%, median income \$27,000.

Wired for Work – primarily use digital media at work, proficient digitally but not for shopping: 23%, median income \$76,000.

Show Me the Money - use technology to save money, embrace the internet, not involved with social media, buy and sell online, somewhat older: 23%, median income \$50,000.

Digitize Me! fully engaged online for shopping, product discovery, interact with brands online, write blogs and reviews, use social networks, youngest segment: 12%, median income \$65,000.

6.Grocery Apps and Mobile Assisted Grocery Shopping

Grocery shopping apps for use on mobile smartphones are available from individual grocers, such as Wegmans, Giant and ShopRite in the local area, and universal grocery shopping apps such as Grocery iQ are available for grocery shoppers independent of the retailers they patronize. Grocery shopping apps can have single function, such as constructing a shopping list, linking with coupons, or providing nutrition information when the product UPC is scanned. The grocery app can be more multi-functional. Some sync and share with multiple devices and users. Many, but not all universal apps involve a fee. Most grocer specific apps are free and are linked to the store's loyalty card. The Wall Street Journal reviewed

universal grocery shopping apps in May 2013 and found a variety of platforms (iPhone, Android, Blackberry, iPad and PC) were accessible. The reviewed shopping list apps were favorably received, but most demanded a fee. The Journal's review of four top apps is below. These are four available apps among a large selection. During Peck research, Grocery iQ, Grocery Gadgets, Aisle 411, Mighty Grocery Shopping List and others were mentioned.

7. Conclusion

Shopper exploration of grocery apps will accelerate as apps become more relevant and dependable and shoppers gain more familiarity with smartphone app operation. Success will not be automatic. Grocery apps need to be strategically promoted, supported in store with employee training, offer the user exclusive and tangible benefits in savings, convenience, or entertainment, and be nearly flawless in operation. Functions provided via a grocery shopping app must be relevant and desired by the targeted digital shopper segment. Barriers, as confined to differing digital shopper segments, need to be neutralized. An obvious and favorable value proposition is necessary. In conclusion, m-assisted grocery shopping holds potential in a rapidly growing world of digitally connected smartphone owners. The user group, and hence the opportunity, may be larger

than anticipated. Research which unveils the grocery shoppers' behaviors and preferences in the digital space offers winning insight for successful sustainable innovation for retailers by building digital relationships and anticipating shopper needs.

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ONLINE BUSPASSRENEWAL SYSTEM USING WEBAPPLICATION

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Abstract: This project aims to provide solution for maintaining Bus Pass information of students using database. Online Bus Pass Renewal is a web application that allows students to get Bus Passes through online. The intention of this project is to minimize the use of student's power, without making them to stand in a queue for a very long time. Online Bus Pass Renewal system helps to reduce the paper work, time consumption and makes the process of getting Bus Pass in a simple and much faster way. The system also provides students a facility to Renewal their Passes, so that the students need not go anywhere for the above purpose. User can refill their account and extend the validity every time when the pass expires. Admin can view all users'details and balance through its login.

The screenshot shows a web-based sign-up form for the Online Bus Pass Renewal System. At the top, there is a blue header bar with navigation links: HOME, NEWS, CONTACT, and ABOUT. To the right of the header is a 'SIGN UP' button. Below the header, the form fields are arranged vertically. Each field has a label on the left and a corresponding input box on the right. The fields are: USER NAME, PASSWORD, PHONE, GENDER (with radio buttons for Male and Female), AGE, ADDRESS, EMAIL ID, COLLEGE NAME (a dropdown menu with placeholder text 'Please select your college'), COURSE (a dropdown menu with placeholder text 'Please select your course'), and DEPARTMENT (a dropdown menu with placeholder text 'Please select your department'). At the bottom right of the form is another 'SIGN UP' button.

Key Words:Login,Apply,Payment,Generation

Notification

1.INTRODUCTION

This project was created to provide "safe, reliable, Timesaving, efficient, comfortable and affordable" services for people, although the cost for providing this service has been substantial. It is heavily subsidized by the government and is reportedly in the red, like most of India's state run road transport undertakings. Even though we have lot of technology development in Tamil Nadu, we haven't got any official website for Bus Pass Registration and Renewal as many of our Neighbor states possess. Hence we got this idea that would help our people in a better way. As per the previous system of our state people had to do each and every process manually but this system helps people to make the work a bit faster Customer can register for the Bus Pass over the Internet, within the first 15days of the month.

Fig 1.1: Student Signup

Furthermore, customers no need to pay cash to buy bus pass because they can pay the amount using Credit Card. Hence there is a need of reformation of the formal system with more advantages and flexibility.

II.RELATED WORK

Online Bus pass Renewal system is already

Implemented in Andhra Pradesh as "Andhra Pradesh State Road Transport Corporation". The pass application form is available online. Online Bus pass Generation system is helpful as it reduces the paper work, time consumption and

makes the process of getting Bus pass simple and fast.fig1.1shows the snapshot of online web application developed.

III.EXISTING SYSTEM:

In existing system students need to register with the application by submitting details of photo address proof and required details in the certain offices. Students need to send the certain offices for renew their bus pass. Student facing problems with the current manual work of bus pass Registration and renewal. In the existing system it does not remain the students for renewal date.

(Student's Concessional Bus Pass Application) To be filled in Block letters	
Full Name: _____	Age: _____
DoB: _____	Gender: _____
Present Postal address: _____	
Door # _____	Street: _____
Locality: _____	pin code: _____
Name of the Parent/guardian: _____	
Permanent address: _____	Contact Tel No.: _____
_____	Email Address: _____
_____	Aadhar No.: _____ (If available)
<u>Student's Requirement : Ordinary pass / Travel as you like pass / Renewal / Extension</u>	
<u>Travel Details</u>	
Class: _____	Educational Institution: _____
From: _____	To: _____
Place of Changeover: _____	Distance (in KM): _____
Validity Period: _____	To: _____
Signature of Parent/Guardian _____	
Student's Signature _____	

In this pass application forms of fig 1.2 are not available through online .The process has to be followed manually. Hence time consumption is more.

IV PROPOSED SYSTEM:

Our work introduces a new method of generating the Bus pass through online. There are several modules:

are several modules:

- Registration Module
- Authentication Module
- Online Payment
- Generation of Bus Pass.

- Bus Pass Renewal.
- Notification (Message Alert).

ARCHITECTURE-SYSTEM

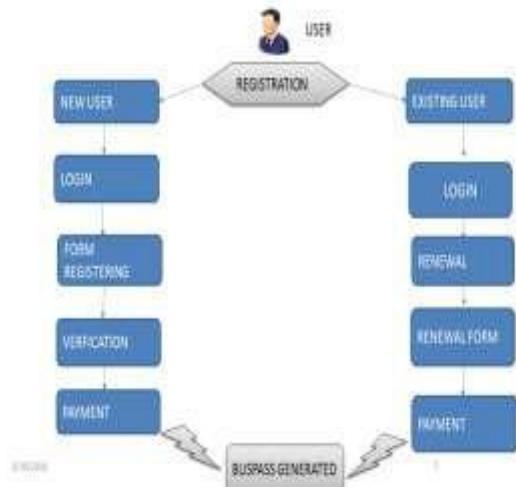


Fig 1.3:
Architecture
system.

Steps involved in maintaining the user/client information in the database. The user needs to register first by providing all the necessary information of the above fields. After registering, the user can login by entering the username and password. If the password doesn't match with the password in the database an error message is displayed. If the user wants to change their password they have to provide the current password and new password to confirm his/her password. The password is in the encrypted form in. After login, user has to apply for the form by providing necessary details to get the pass. The admin can check the received applications, verify and then issue the pass. Depending upon the criteria specified, the fixed amount will be deducted from users account when the submit button is clicked. Information of the applicant provided by them is displayed below which consists of the applicant's name, source Fig1.3

shows the overall architecture diagram of the proposed system.

V. MODULEDESCRIPTIONS

1. REGISTRATION MODULE

Creation of the account is the first phase in this project. The user has to give complete details about him\her to create a new account. After successfully completion of account creation only the user can able to perform the online bus pass facility. All the transactions are performed based on their user id.

2. AUTHENTICATION MODULE

Authentication is the important module in this Project. Once the user submit their details their information are accepted and the user can login with their username and password for renewing their bus pass. Only the registered users can do the renewal process. In this module it checks whether the authorized persons is accessing and it does not allow other users to access.

3. GENERATION OF BUSPASS

After providing all the necessary details such as proofs, college name, phone number etc, the details will be submitted to the admin. The admin verifies and authenticates the detail. If the user is approved as a trusted one, and then automatically Bus Pass will be generated in a pdf form to the user's mail.

4. BUSPASS RENEWAL

In this module, the user logins to his account for renewal of bus pass. The user has to mention the month of renewal, user id and the necessary details. For making the payment through online the user gives the

credit card number and pin number for amount transaction. Once the process is completed the user bus pass will be renewed automatically.

5. PAYMENT MODULE

Payment is one of the challenging task to be done across the wide spread network. The amount paid through online must be secure and it should reach the authenticated user. All the transactions carried must be committed properly. In case of any power failure the transaction should not take place.

6. NOTIFICATION MODULE

To make aware of their bus pass expiry, an alert mail is automatically delivered to the user with registered mail id. Fifteen days before the start of the month, alert mail will be sent. If suppose the user fail store new within the first fifteen days of the month, then the will be closed for that particular month. If he/she fails to renew consecutively for 3 months, then the account will be blocked.

VI.EXPERIMENTAL RESULT:

The overall implementation of the system is described below, fig2.1 shows the login page for the user who wants to avail the bus pass fig2.2shows the details of registration for the user to login to the web application. Fig2.3 shows the payment details once the user has logged in such as college name, identity proof, phone number etc.



Figure2.1

Figure:2.2

MAKE PAYMENT

USERNAME	<input type="text" value="kokila"/>
CREDIT CARD NUMBER	<input type="text"/>
AMOUNT	<input type="text" value="96"/>
CVV	<input type="text"/>
EXPIRY DATE	<input type="text" value="mm/dd/yyyy"/>
<input type="button" value="PRINT"/>	

Fig2.3 Payment details

VII.CONCLUSION

It is a real time project which is useful for the

public who are facing problems with the current manual work of bus pass registration and renewal. It also increases the validity period, frequently warn the people before completion of his validity period by sending Short Message Service or mails. Their renewal or registration can be done using a credit card. In the due course of time if the user expects more than what this system provides, the new requirements can be easily by enhancing the system without making much of changes. The places and the information relating to the place can be updated. We

can use E-cash system. According to our work new packages like new places developed and beaded by the admin.

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LI-FI TECHNOLOGY

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ABSTRACT:

Li-Fi stands for Light-Fidelity. The inventor of Li-Fi Harald Haas a German physicist and professor has come up with this technology which he calls “data through illumination”. This paper focuses on developing a Li-Fi based system and analyzes its performance with respect to existing technology .Today speed of internet is a major issue and everyone be it business, institutions, organizations, entrepreneurs is thrust for getting right information at the right time and right place .This requires fast internet connectivity, technology and large spectrum of channels. Wi-Fi is great for general wireless coverage within buildings, whereas Li-Fi is ideal for high density wireless data coverage in confined area and for relieving radio interference issues. Li-Fi provides better bandwidth, efficiency, availability and security than Wi-Fi and has already achieved blisteringly high speed in the lab. Li-Fi is not expected to completely replace Wi-Fi, but the two technologies could be used complementarily to create more efficient, green and future-proof access networks”. It is a wireless technology that makes use of visible light in place of radio waves to transmit data at terabits per second speeds- more than 100 times the speed of Wi-Fi

Keywords—Li-Fi(Light- Fidelity), Wi-Fi(Wireless-Fidelity)

1.INTRODUCTION

Li-Fi can be rightly regarded as a light based Wi-fi. The difference is that instead of wi-fi modems, transceiver-fitted LEDs lamps are used which can light a room as well as transmit and receive information. This technology uses a part of the electromagnetic spectrum that is still not greatly utilized, from the infrared through visible light and down to the ultraviolet spectrum providing a wide range of frequencies and wavelengths.

Light is in fact a source of life and practically has no ill-effects. Thus li-fi proves to be the most developed technology without any sort of pollution or harms. A flickering light can unexpectedly be a great boon communication. It is possible to encode data in the light by varying the rate at which the LEDs flicker on and off to give different strings of 1s and 0s. The LEDs intensity is modulated so rapidly that human eyes cannot notice, so the output appears constant. Moreover, parallel data transmission using arrays of LEDs, where each LEDS transmit a different data stream is possible. Efforts are being made by using mixtures of red, green and blue LEDs to alter the light's frequency, with each frequency encoding a different data channel which is capable of transmitting of data of about 100-500 Mb/s. Presently we are utilizing the Wi-Fi services within the campus and around the 10-100 meter distances to connect our P.C's, Laptops, palmtops and P.C. notes etc. The challenges faced by Wi-Fi in today's time are

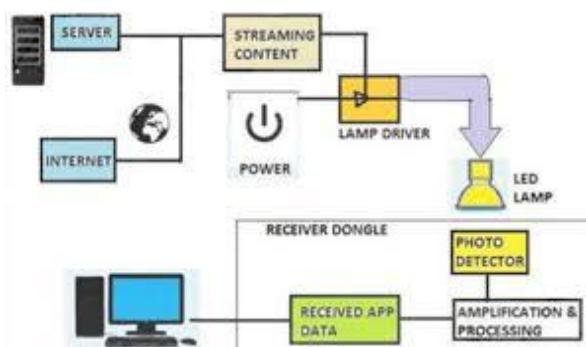
- Capacity
- Availability
- Efficiency
- Security

According to Hass, the light, which he referred to as D-Light, can be used to produce data rates higher than 10 megabits per second which is much faster than our average broadband connection. Li-Fi can play a major role in relieving the heavy loads which the current wireless systems face since it adds a new and unutilized bandwidth of visible light to the currently available radio waves for data transfer. Thus it offers much larger frequency band (300 THz) compared to that available in RF communications (300GHz). Also, more data coming through the visible spectrum could help alleviate concerns that the electromagnetic waves that come with Wi-Fi could adversely affect our health. Li-Fi can be the

technology for the future where data for laptops, smart phones, and tablets will be transmitted through the light in a room. Security would not be an issue because if you can't see the light, you can't access the data. As a result, it can be used in high security military areas where RF communication is prone to eavesdropping.

2.WORKING PRINCIPLE OF LI-FI

The working principle of li-fi was first proposed by Harald Haas from University of Edinburgh, UK, in his TED global vary at extremely high speeds by fast variations of the current. To build up a message we are flashing the LEDs numerous times. In order to obtain data rates in the range of hundreds of mega bytes per seconds we can use array of LEDs which also helps us for parallel data transmission or we can also use combination of three basic colours LEDs red, green, blue to alter the frequency of light. The VLC (Visible Light Communication) uses visible light between 400 THz (780 nm) and 800 THz (375 nm) as the optical carrier for data transmission and for illumination



3. ADVANTAGES OF LI-FI

In Li-Fi the data is transferred through the light without depending on the spectrum of light,it may belong to invisible, of users directly competes for access to bandwidth. The net result is that the more connections there are, the slower the download speeds are for all. By contrast, in the case of Li-Fi, with its greater number of available access points, each pool of light provides full channel data rates with fewer simultaneous users. The overall net benefit to each user is up to 1000 times greater speeds. In addition, and in contrast to radio waves, the light does not pass through the walls. Therefore, with minimal precautions to avoid leakage from windows, etc., security is fundamentally enhanced as compared with Wi-Fi.

talk on VLC. The working principle of li-fi is very simple, it is based on the transmission of digital data 0's and 1's. The logic is, if the LED is OFF, digital 0 is transmitted and if the LED is ON, digital 1 is transmitted, which can't be detected by human eye. The LED's can be switched ON and OFF very quickly by which we can transmit data with the help of light. Generally white LED bulbs are used for implementing the concept of li-fi which is used for illumination by applying a constant current. However, the light output can be made to

visible portion of the spectrum . It provides speed to 1Gbps with the exceptional bandwidth and overcomes the limitations of the Wi-Fi.

- Li-Fi provides 10,000times wider bandwidth than the Wi-Fi are already installed.
- More secure from hacking ,relative to Wi-Fi.
- Li-Fi has the advantage of being useful in electromagnetic sensitive areas.
- Li-Fi is expected to be ten times cheaper than Wi-Fi.
- Researchers have reached data rates of over 10 gbits/s.

4.APPLICATIONS OF LI-FI

Each light fixture in the application environment becomes a separate data channel.These channels can supply different data into each separate pool of light, delivered at the full rated download speed for that channel.

Security

In a meeting room environment, the access area of each channel is the width of the light pool, and can be accessed by multiple users. Each user can receive higher data rates than would be the case for an equivalent Wi-Fi channel. In the Wi-Fi case, each user or group

Dense urban environments

Dense urban environments by their nature tend to have complete artificial lighting coverage. This lighting infrastructure can provide always available high data rate access for users as they move through that environment. For example, along a hotel corridor or reception hall a number of users can receive high data rate downloads at any point. Moreover, high speed wireless communication would be

available in every room since the light waves do not propagate through walls. This results in interference-free wireless communication, and spectrum does not have to be shared among a large number of users in the rooms.

Cellular communication

In external urban environments, the use of Li-Fi enabled street lamps would provide a network of internet access points. In cellular communication, the distance between radio base stations has come down to about 200-500 metres. So, instead of deploying new radio base stations in our cities, street lamps could provide both, illumination during night, and high speed

.Augmented reality

Exhibits in museums and galleries are illuminated with specific lighting. Li-Fi enabled lighting can provide localised information within that light. This means that a visitor's camera or mobile phone can be used to download further information regarding the object being viewed from the light that illuminates the exhibit.

Localised advertising

By using shop display lighting as a Li-Fi broadcast channel, it is possible to transmit advertising information on the goods being viewed, as well as say special offers and coupons. This will allow the merging of the high street and online shopping experience, and provide novel retail business models to emerge. Catalogue information, discount coupons, and advertising videos could all be provided to shoppers.

Underwater communication

Radio waves are quickly absorbed in water, preventing underwater radio communications, but light can penetrate for traffic management systems. This would enable car systems to download information from the network and have real time information on optimal routes to take, and update the network

Connectivity

Our homes already have lighting widely installed. The use of Li-Fi enabled lighting will transform the applications that can be envisaged, not only the interconnection of devices, such as televisions, computers and Hi-Fi, but also connecting ordinary domestic appliances, such as fridges, washing machines, microwaves and vacuums. The "internet of everything".

data communication 24/7. Surprisingly, even when the lights are off as perceived by the eye, full data communication rates are still possible. There is also an additional cost benefit as installing new radio base stations usually comes with large cost – for installation and site lease.

EMI sensitive environments

On aircraft, Li-Fi enabled lighting will allow high data rate connectivity for each passenger. It will allow connectivity at all times, without creating electromagnetic interference (EMI) with sensitive radio equipment on the flight deck. The reduction in cabling requirement also means a lighter aircraft large distances. Therefore, Li-Fi can enable communication from diver to diver, diver to mini-sub, diver to drilling rig, etc.

Safety environments

In explosion hazard environments, the use of electrical equipment, including mobile phones, is generally greatly restricted. The use of Li-Fi to pass data will simplify the configuration of data networks in such environments, and can enable new systems to enhance security in these environments.

Intelligent transportation systems

Car headlights and tail lights are steadily being replaced with LED versions. This offers the prospect of car-to-car communication over Li-Fi, allowing development of anti-collision systems and exchange of information on driving conditions between vehicles. Traffic lights already use LED lighting, so that there is also the prospect offered of city wide

regarding conditions recently experienced by individual vehicles

Sensitive data

Hospitals are a specific case of an environment where both EMI sensitivity and security of data are issues. Li-Fi can enable the better deployment of secure networked medical instruments, patient records, etc.

5. FUTURE ADVANCEMENTS

- A consortium called Li-Fi Consortium‘ was formed in October2011 by a group of companies and industry groups to promote high-speed optical wireless systems and overcome the limited amount of radio based wireless spectrum. According to theLi-Fi Consortium, it is possible to achieve more than 10 Gbps.
- Researchers at the University of Strathclyde in Scotland have begun the task of bringing high speed, ubiquitous, Li-Fi technology to market.
- Further enhancements are possible like using an array of LEDs for parallel data transmission or using mixture of red, green and blue LEDs to alter the light’s frequency with each frequency encoding a different data channels. Such advancements promise a theoretical speed of 10 Gbps.

Li-Fi technology is being developed into a ubiquitous systems technology, consisting of application specific combinations of light transmitters, light receivers including solar cells, efficient computational algorithms and networking capabilities that can be deployed in a wide range of communication scenarios and in a variety of device platforms.



6. CHALLENGES OF LI-FI

Apart from many advantages over wi-fi technology, it is facing few challenges which is need to be overcome.

- For the transmission of data it requires line of sight.

- We lose access to the internet, if the light source malfunctions.
- For internet access we become dependent of light source.
- We have to deal with changing weather conditions ,if the apparatus is set up outdoors.
- As visible light can't penetrate through brick walls so, it can be easily blocked by somebody simply walking in front of LED source.
- A major challenge is how the receiving device will transmit the data back to transmitter.

7. CONCLUSIONS

Li-Fi is an emerging technology and has vast application. If this technology can be put into practical use, every bulb can be used like a wifi hotspot to transmit wireless data. This concept can be used to solve issues such as shortage of radio frequency bandwidth . Thus, this technology provides numerous benefits. By using this technology we can proceed towards a greener, safer and cleaner future. It is an advanced approach that will make our lives more technology driven in the near future.

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LIBRARY MANAGEMENT APPLICATION

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Abstract

“Library management Application” is an android project which aims in developing a computerized system to maintain all the daily work of library. It has a facility for the student to view the list of available books, issued books, and can add new books by filling the book request form. It remained the people about the renewal/return date of the book by SMS alert. We provide a new feature known **DELNET**(Developing Library Network) which provide the user to download the E-books globally. The librarian can view overall reports such as issue report, available report, fine amount.

I Introduction

Library management system is used to maintain the records related to number of books issued and the number of books returned to the library by the student and staff, searching of books available in library, sending message to the student regarding the due date of book to be returned and fine applicable if the book is not returned on time the alert message will be sent. The following are the tasks to be performed in the library which include handling user accounts and issuing/returning of the books. This system implemented maintains the information about all student, staff and can also create, delete and update the record of the student and staff as per requirement.

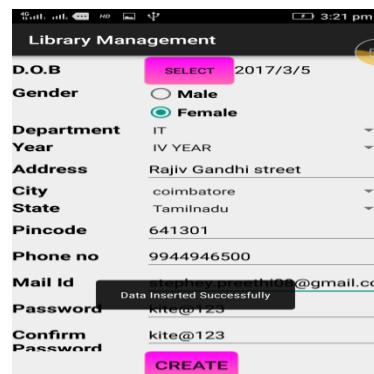
II Purpose

The main purpose of the library management system is to maintain a proper discipline regarding the planning, managing and organizing the library tasks for making the task

of library easy for librarian and the student. Library management relates with entering the records of new book and retrieving the details of book available in the library. We can issue book to the student and maintain their records and can also check how many books are issued and the number of books available in the library. In this project we can maintain the late fine of student who return the issued book after the due date. The information related to book issue and book returns are maintained manually by the librarian along with maintaining the accounts of the students. All these process are automated in the library in order to avoid the manual errors taking place in the library and saving the time of both librarian and the student.

A. Registration

The user can register them by using our android application. This paper is about the application which we developed for our college. So the user can register by using their admission details and their employee code. If once they are registered they can use the library service.



B. Student/Staff Login

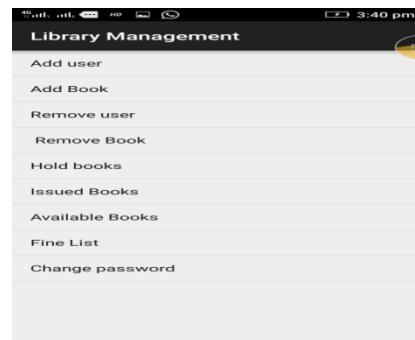
In the student login the student can do the following process.

- View their profile.
- Check the availability books in library.
- Check the books in their hand along with the fine details.
- They can use the DELNET service provided by our college.
- The user can change the password
- They can hold the books for a day in their ID.
- The book will be hold for a day.



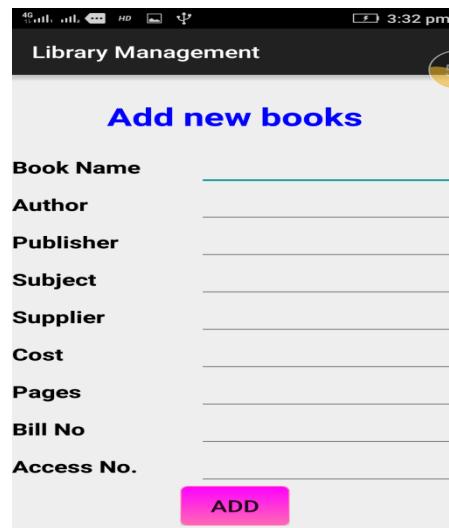
C. Librarian Login

- The librarian can do the following process.
- The librarian can create the new user.
- They can add new books to the library.
- They can remove the user if they completed their academic/ service.
- They can view the Holded book details and can issue the book for that particular user.
- They can view the issued details along with the fine.
- They can change password for their account.
- They can view the availability of books in the library.



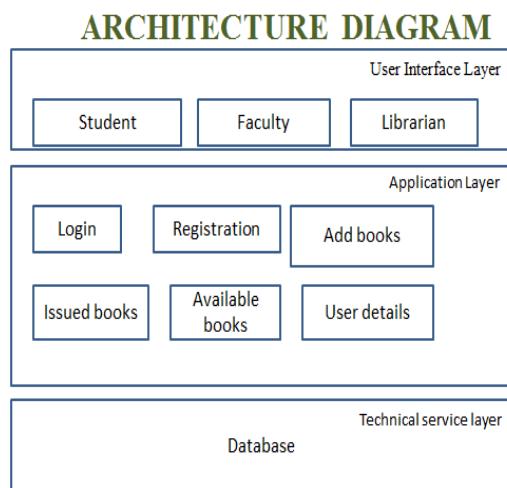
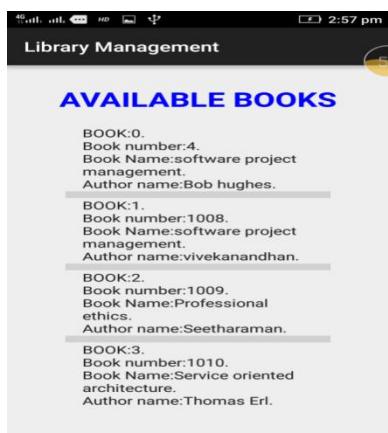
D. Add Books

In this module the new books that come to library will be added in the application. While adding a new book the book number will be generated automatically this will provide us to search the book easier.



E. Available books

The available books in the library will be listed and the student can hold that book in their Id and request the Librarian to issue the book. The Holded book will be in free-zed state for a day after that it will automatically un-Holded. It will display the books with book name, author and book number.



F. DELNET service

We provide DELNET(Developing Library Network) service for the user this helps us to connect the user with the global library to download the e-books and experts lectures and their ppt.

G. SMS Alert

We use the SMS alert to inform the user about the renewal date , return date to the user. If once the book is hold a SMS Alert will be sent. Then after the book is issued it sent a alert message.

III Conclusion

Thus the library management application reduces the manual work of normal library. It provides the user-friendly environment to the students. We provide the DELNET services which is used to buy the books globally.

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BACK TO COLLEGE-ALUMNI APPLICATION

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I.ABSTRACT

“Back to College-Alumni application” is a real time Android mobile application .The aim of this project is to build system that manage alumni data of a college and provide easy access. This app provides a platform for sharing information among different users of Educational institution. With this app, they can contribute much to the institution in providing guidance to their juniors regarding career opportunities, entrance exams and various other activities. Users of this app can chat with each other and maintain good rapport with each other. It mainly helps to keep in touch both socially and professionally with the college. Alumni, faculty, administration and currently pursuing candidates are completely included in this system. Community category and Event category plays main role in this system. Login is separate for each category of people. All the details about the candidate is maintained through database. Events are updated periodically and are notified to all. Faculty maintains the database and update it in various intervals. The alumni app is the fastest and easiest way to get connectedfrom anywhere. The maingoal of this project is to provideinteraction between the institution and alumni.

1.INTRODUCTION

1.1.ALUMNI SYSTEM:

Alumni management system is mainly used for interaction with currently pursuing students and faculty members.This allows students to know about each other and their current activities.This system can be used as an application for the Alumni Information Database to manage the college information and student's information. Communication between graduates and university can be suitable for both sides.During the period of education graduates establish a lot of social contacts between with their classmates and their teachers as well.After graduating, these contacts are usually broken and only rarely continue.Generally,after a student leaves the university, he lost most of his contacts. Graduates are very good source of information and critics that could help to improve the quality of the faculty. The best way to gain the required information are feedback forms.

Once a student graduates from theinstitute, his/her professional life or career begins, with higher education playing an important role in establishing himself/herself in the profession. In respect of College, it has been our experience that from the very beginning, the alumni have maintained personal contacts with one another, rather than use the channel of Alumni Association.The advancements in information technology have certainly helped in creating new resources such as alumni web pages, list servers etc., so as to permit greater interactions between the alumni and currently students and faculties.Networking is and has been taking place all

over the world since the existence of humans. Every person has a network, some recognize it and some do not. Nowadays networking has become easy because of the development of technology. People can interact with one another, share the ideas, and discuss their personal and professional lives without even moving from their desks. Existing alumni systems are usually developed to facilitate networking between the alumni and their respective universities, but most of these current systems are not being used by the majority of the alumni for many reasons.

SCOPE:

The aim of this Alumni Management System project is to build a system that will be able to manage alumni data of a college and provide easy access to the same. Alumni of a college generally stay in touch with their immediate friends but find it hard to stay connected with other college mates. Contact between alumni can be used to forge business connections and to gain references or insight in a new field.

The main objective of alumni management system is;

- To get the entire Alumni of a particular institution together under one roof.
- To build a strong Alumni Network amongst the Alumni Community.
- Engage the current students with the Alumni.
- To maintain a Alumni Database.
- To create common interest groups and provide a forum for discussion.
- To inform the Alumni about the ongoing and future activities.
- Reunions can be organised with the help of the Alumni association.
- Current students can get useful career guidance from the Alumni.

EXISTING SYSTEM:

The Existing system is a computerized system but which is maintained at individual databases (i.e.) in excels sheets, it's a time delay process. And maintaining all the records in Excel sheets is difficult. If they want any record they have to search all the records. It doesn't provide multiple user accessibility and also doesn't have different user privileges. So the system is not accessible for all the members of the organization. Many colleges maintain present and old students manually. Recollecting this data in the manual system is very difficult. If student needs any data about old students they have to approach college management. Overall collecting the information is very tedious task in this system.

LIMITATIONS OF EXISTING SYSTEM:

- The current system is not completely computerized and manual system in entering students and staff data and handling it.
- There is no centralized database maintenance.
- There is no easy access to the particular students record.
- The student cannot easily navigate through the database.

PROPOSED SYSTEM:

The Proposed system is a mobile application which is maintained at Centralized databases i.e. in automated forms it's a very fast process. And maintaining all the records in online systems database which makes it very easy to access and retrieve data from the database.

If they want any record they can easily search all the records. It provides multiple user accessibility and also has different user privileges. So the system is accessible for all the employees of the organization.

ADVANTAGES OF PROPOSED SYSTEM:

- It is completely automated system in handling the college database.
- This system provides centralized database maintenance .
- This system provides easy access to the particular students account or his complete details.
- This system provides student to easily navigate through the application for more information in a most secure manner.

MODULES:

- Profile
- Chat Enterprise
- Make Space
- Live Events
- Gallery

MODULE DESCRIPTION:

PROFILE:

- Profile page is used by all users of this application.
- Users can maintain their information and update it if required.
- There is an option called, Edit Profile, with which they can edit their profile and it will be updated in the database.

CHAT ENTERPRISE:

- Chat enterprise is mainly used to interact with users of the application.
- It is enhanced by interacting personally and also in common chat.

MAKE SPACE:

- In this module, people can be found to retrieve the information about them quickly.

USE CASE DIAGRAM

- This search can be done by typing the respective name in the search box, which displays the information of the respective person.

LIVE EVENTS:

- In this module, the events that are going to taking place in the college will be displayed.
- By clicking on the option, Add Event,new event details can be given and it can be posted,which will be displayedon the events page.

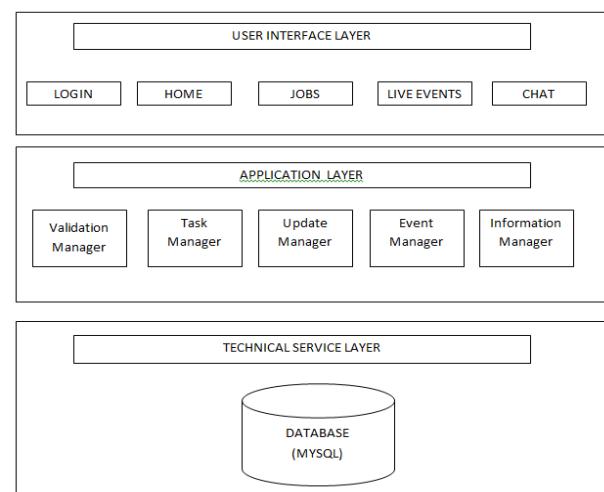
GALLERY:

- In this module, images, videos, audios can be uploaded.
- Everything can be viewed by all and comments, likes can also be given.

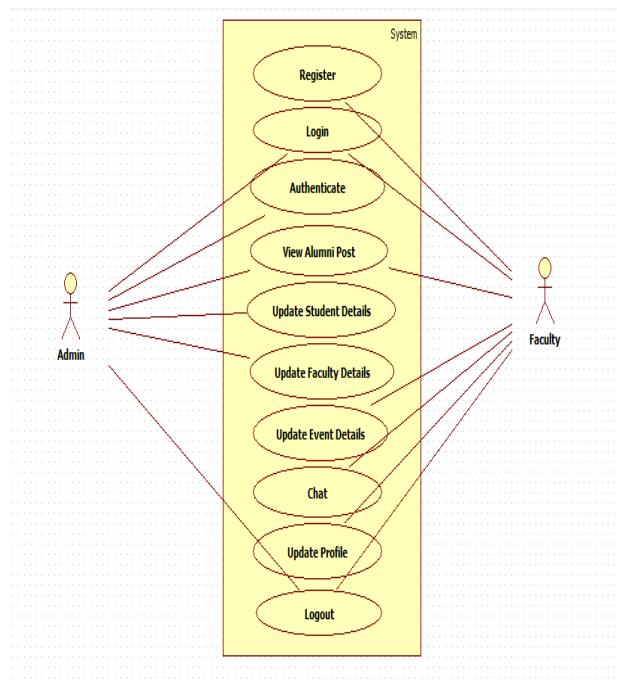
LANGUAGES & SOFTWARE USED:

- Operating System : Windows 8.1
- Front End : XML
- Back End : MySQL
- Version : Kitkat-Marshmallow
- Hard Disk : 10MB
- RAM : 512Mb

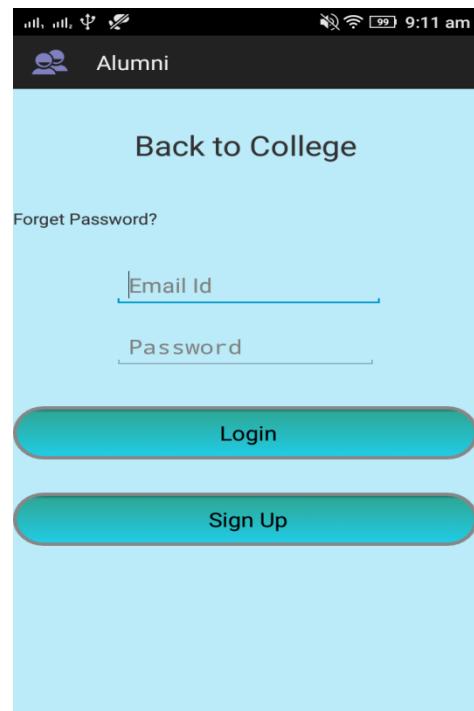
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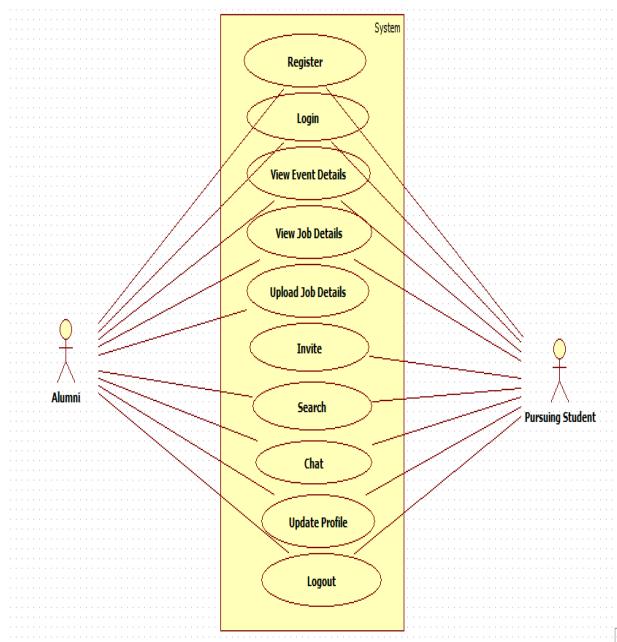
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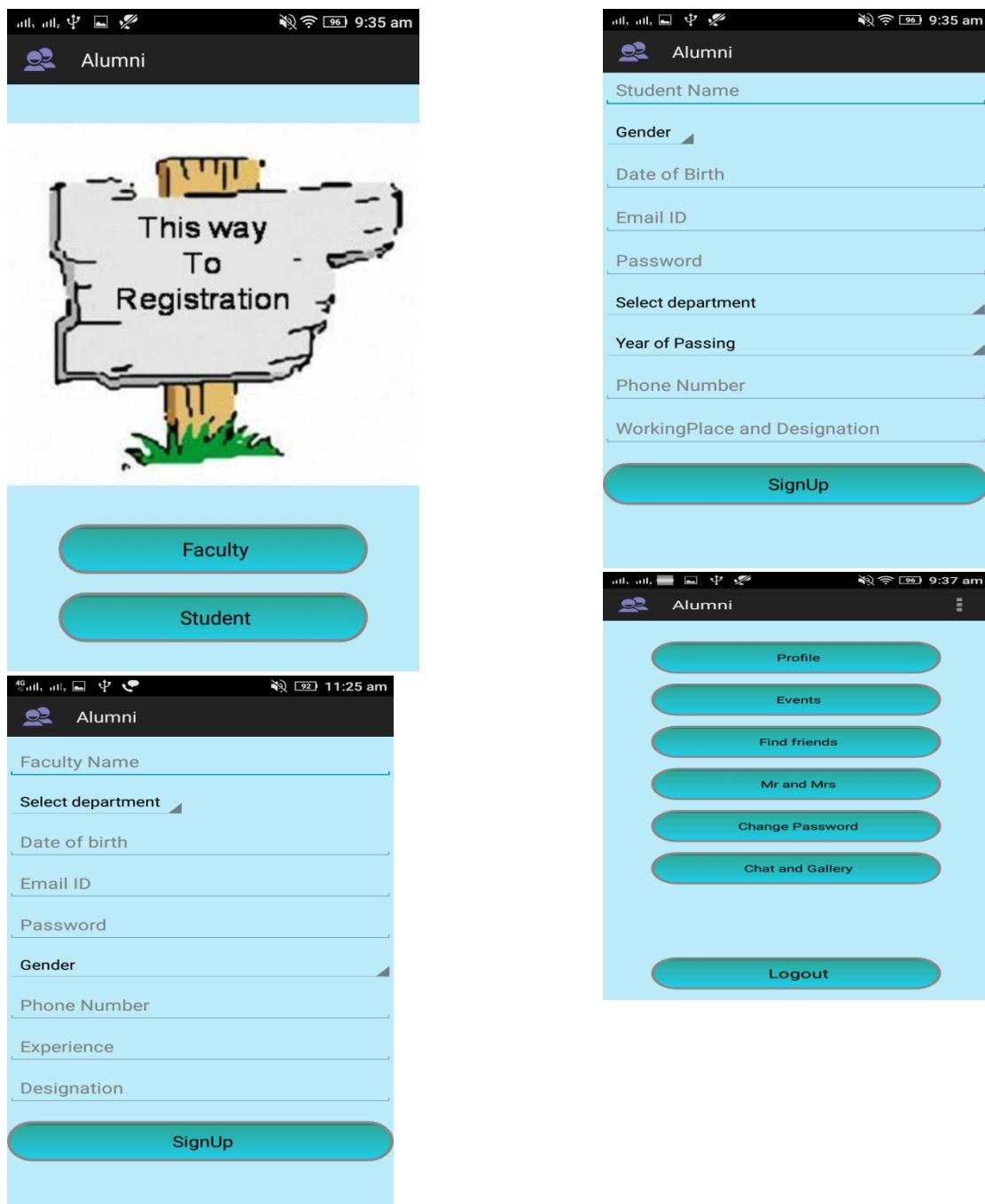


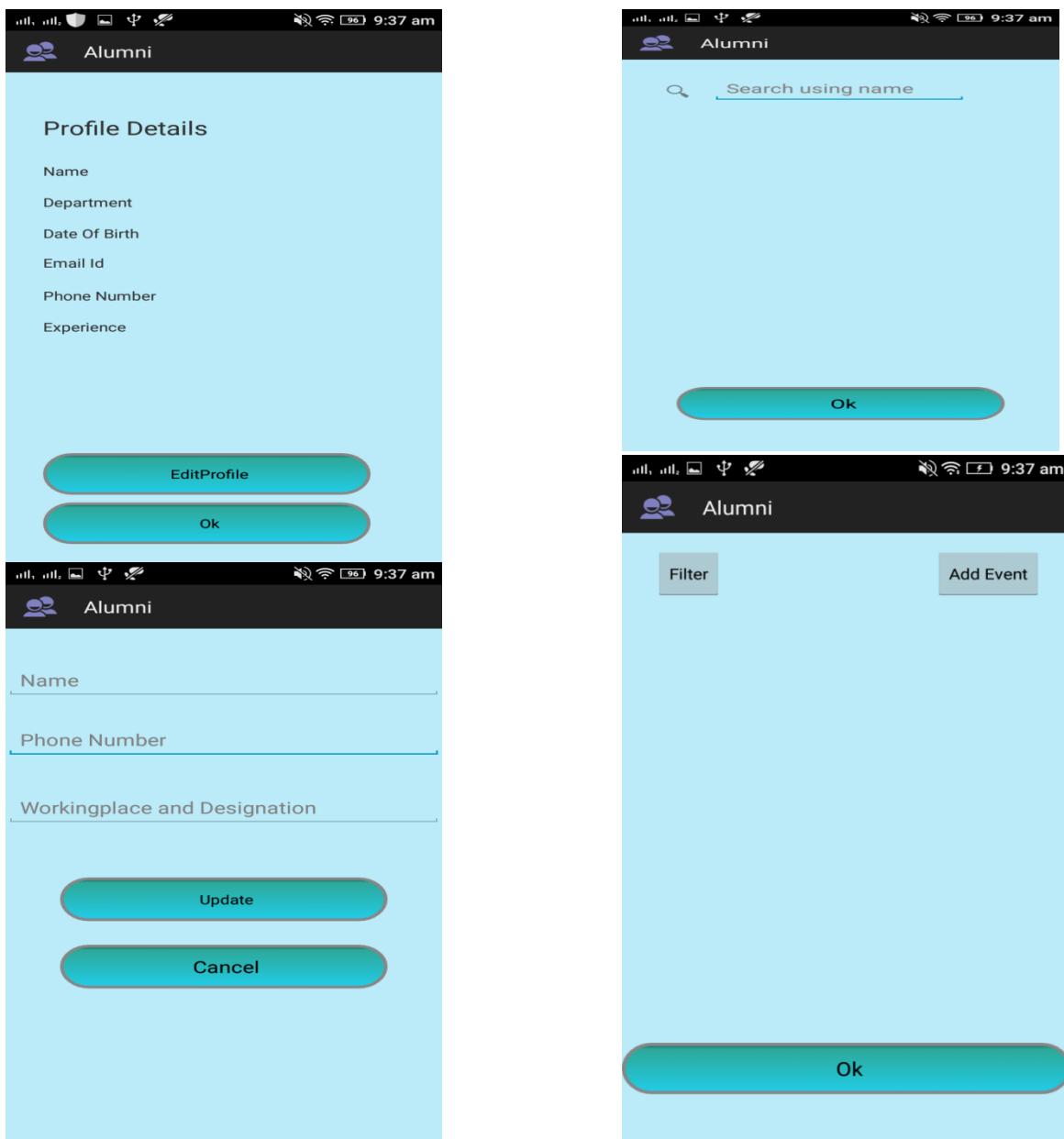
FRONT-END DESIGN:

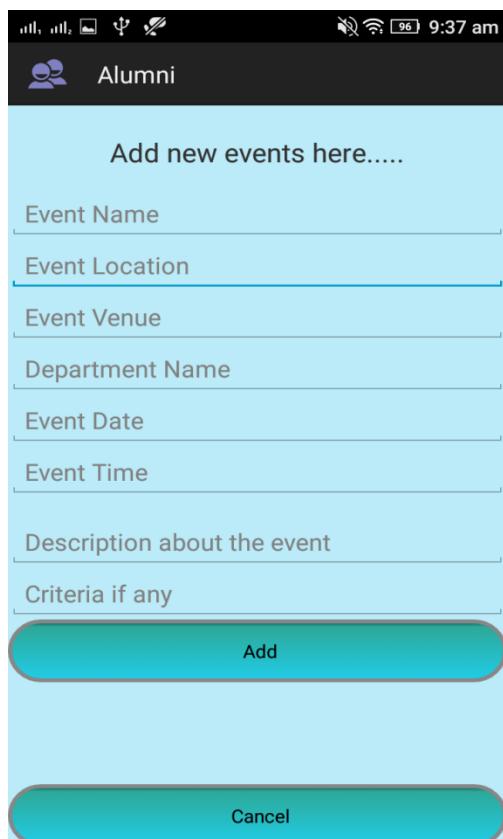


ALUMNI-PURSUING STUDENT:









colleges can communication world wide. This app is developed to have interaction for various purposes. Communication is possible within and outside the institution also. The alumni app is the fastest and easiest way to get connected from anywhere.

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- 4.<https://www.scribd.com/doc/70049324/Alumni-Report>

CONCLUSION:

“Communication is the real work of leadership”...

As of now, students can communicate with each other within their institution only. In futuristic view, students and

HOTEL RESERVATION SYSTEM

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ABSTRACT:

Online hotel reservation system helps customers to reserve hotel rooms by providing them the unique search and booking functionalities. The customers can register and login to the system. Customers can search for hotels, make reservations and also can cancel an existing reservation. The administrator will know the details of reservation and the daily income. Administrator can add or update the hotel and its room information. Once the reservation is done, confirmation message will be sent to the customer. The process of finding the finest hotel in central location is time consuming, information overload and overwhelming and in some cases poses a security risk to the client. Over time with competition in the market among travel agents and hotels, the process of hotel search and booking has improved with the advances in technology.

I.INTRODUCTION:

The process of finding the finest hotel in central location is time consuming, information

overload and overwhelming and in some cases poses a security risk to the client. Over time with competition in the market among travel agents and hotels, the process of hotel search and booking has improved with the advances in technology. Various web sites allow a user to

select a destination from a pull-down list along with several categories to suit one's preference. This with hotels putting up their own sites from which one would enter arrival date and departure dates to check availability and make a reservation. Some of the more advanced ones allow for a search of the destination via a map. Web sites such as hotel guide offer the user minimal input and then search Google map for the location requested or the user can find the location on the map and all hotels popup based on a star rating chosen by the user and booking is also done securely. The results are listed with the cost per hotel along with star rating. In all these hotel search systems, we see that there are lots of difficulties involved for users like time, speed, cost etc.

II.SCOPE:

Unlike other applications, this application helps to find only the hotels with rooms which are available at present. Only the verified hotels tops the list. Reservation can also be made for the dinning which will eliminate the waiting time for the customers. This project aims at creating an Online Hotel Reservation System which can be used by customers to reserve hotel rooms and dining. The customers can check the availability of their preferred rooms and facilities and make the corresponding bookings online. In addition, customers can also

view their booking histories via the interface. The major security requirements for an online hotel booking system are identified to be the following:

2.1 Confidentiality:

Customer's banking details must be kept confidential when he/she makes an online payment against a hotel booking. Confidentiality for customer's banking information is ensured by encrypting them before actually disseminating those data.

2.2 Integrity:

E-transaction details such as transaction amount, beneficiary name and account number must not be altered

2.3 Authentication:

It ensures that the people using the hotel booking system are the authorized users of that system before transacting.

2.4 Non-Repudiation:

It ensures that neither the customer nor the supplier can deny communication or other action regarding information or resources at a specific time.

2.5 Availability:

It ensures that end system (host) and the service are available for access all the time to the authorized user.

2.6 Accountability:

The identities of all users are assured and the users are made responsible for their action

2.7 Copy protection:

This feature ensures protection from unauthorized copying of intellectual information. The security features for the proposed online hotel booking system is provided based on the following components of cryptography.

III RELATED WORK:

The information technology rebellion plays a crucial role in Internet. The progress in web technologies promotes the progress of electronic services. E-services have a tremendous growth in the recent years due to the advancements in Internet technologies. Moreover in Internet, the real power of computers is realized through distributed, open, dynamic and heterogeneous systems which can interact, span organizational boundaries, and operate effectively within rapidly changing circumstances. In the context of addressing such requirements, agent technologies have been developed with the aim of providing solutions for the emergent problems and for managing the complexity that arise in this arena. Software agents are used to implement highly modular e-services that are inter-operable, flexible, co-operative and autonomous. The desire for more cost efficiency and less sub-optimal business processes drives the employment of agent technology in e-Business. From the literature survey carried out as stated above, it has been identified that there is a great need for well defined security solutions in the development of online hotel booking systems.

IV. MODULE DESCRIPTION:

4.1. ADMIN MODULE:

- Admin will maintain the customer database.
- Monitors the customers check-in and check-out time.
- Provides the updated details regarding the rooms and dining.
- Sends the confirmation message to the customers once they are done with the reservation.

- Admin can view all the reservation details and payment details of the customer.
- Admin can also update offers details which can be viewed in the user interface of the customer

4.2. RESERVATION MODULE:

- The customers can check the availability of their preferred rooms and facilities and make the corresponding bookings online.
- Reservation can also be made for the dinning which will eliminate the waiting time.
- Customers can make booking and payment via online.
- Reservations made can also be cancelled and can retrieve the money.

4.3. FACILITY MODULE:

- This module is used to view the facilities that are provided by the hotels.
- Facilities like:
 - Package offers
 - Dining
 - Swimming pool
 - Gym , etc.,

4.4. BILLING MODULE:

- The billing module generates the amount once the customer reserves the room.
- Customer can pay the bill using:
 - credit card
 - debit card
 - cash
- The account details of the customers are been maintained securely.

V.DIAGRAMS:

5.1. USECASE DIAGRAM:

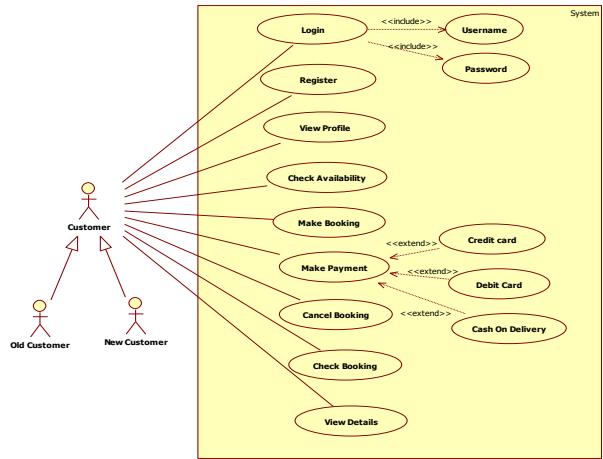


Fig 1: Customer Use case Diagram

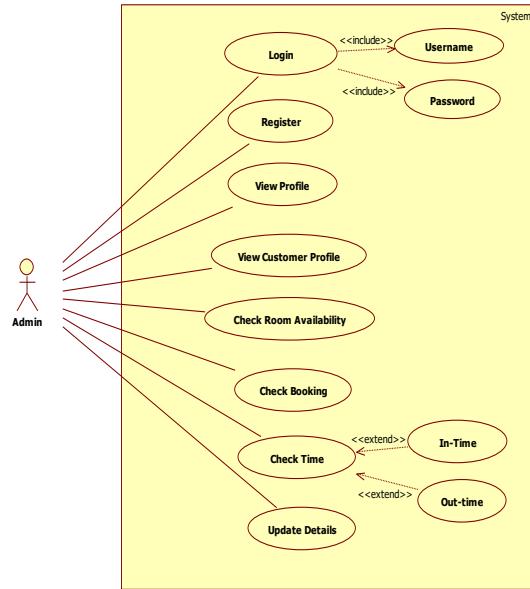
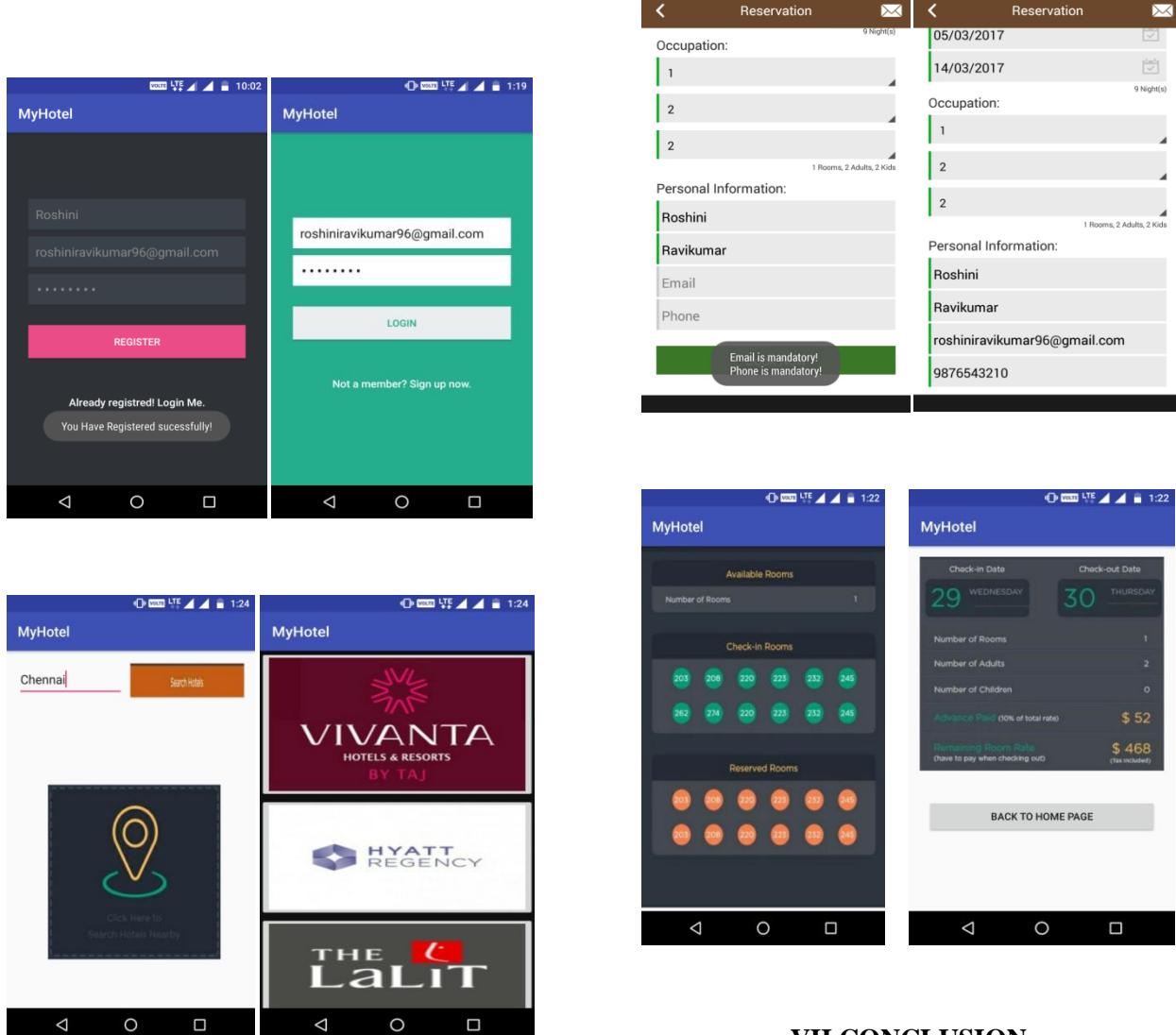


Fig 2: Admin Use case Diagram

VI SCREENSHOTS:



VII CONCLUSION

With the advancements in Internet and e-commerce technologies, the users wish to have reservation of the hotel rooms of their choice without any human intervention. This requirement of the users triggers the automation of hotel booking process over the Internet and provides more personalized information services for customers. The above analysis suggests that the Agent based Secured Online Hotel Booking System performs better than the existing hotel booking systems. With this system,

customers can reserve the rooms as well as dinning from anywhere anytime. The entire system is fully computerized and the records are been maintained and analyzed properly. This system is very secure, user friendly, and reliable.

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E LABOUR MANAGEMENT SYSTEM

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ABSTRACT

E labor management system (ELMS) is comprised of enterprise tools that help business better plan their daily work and processes for better delivery of products and services. These tools are intended to facilitate “labor productivity reporting” and to help analyze units of labor and units of time to enable tracking of changes. An ELMS is software that takes employee activity data and reports productivity levels on a group of employees, or individual employees. E labor management system mainly focus on development and providing works for daily wages workers like plumber, carpenter, Painter, Driver and etc...This is to make it possible easily using the application. The application additionally provides the wages working price and rating according to their experiences. Dealers have some group of wages workers such as plumber, painter, etc...Users, Dealers and Daily wages workers are registered in this application. Then, all registrations and login process are monitored and controlled by admin. The user login using their username and password by using this application and they choose the best rating, working price and experience of wage workers based on above two category. Then user are been provided with the information about the working process and their ratings are given accordingly. This application is used for

increasingly the growth of daily wage workers. The platform used as a front end is Android Application and the database for back end is MySql.

I INTRODUCTION

ELMS is software that takes employee activity data and reports productivity levels on a group of employees, or individual employees. Having an ELMS helps organizations optimize workforce productivity by gaining visibility where their workforce labor dollars are being spent and how to optimize their labor. E Labor management system tools can come in many different packages. Typically, they offer metric-based tools for streamlining work and business processes

Another typical feature of ELMS tools is the ability to analyze and implement training solutions.

An ELMS can help track productivity reporting and planning capabilities. The planning capabilities allow management to analyze workforce requirements based on the workload to be performed, as well as setting standard units of time to perform each element of such work. Labor productivity planning capabilities enable management to measure and report the performance of individuals, groups or facilities and compare these data with predefined standards set for performing individual (and all)

elements of work as defined. ELMS serve as basic tools to collect worker data, including inventory handled, equipment used, paths travelled to complete the job, and all this within the context of time. While introduction and implementation of ELMS software maybe initially costly, the long term savings justify the original investment.

II SCOPE

The aim of “E- Labor Management System” is maintaining the dealers and self wages workers details. The system helps in getting dealer details and wages details. The System makes proper usage of employee’s time in getting reports, maintaining dealer details, Up-dating the employee details and dealer details. The main process involved in this application is registering new employee details. The Scope of the project is that in a very short span it provides employee with many facilities. It provides an elegant management of wage worker and list of employee. The main purpose of this application is to interconnect all the employees, user, dealers into a single network, validation, store various data and information. This system is used to store data over a centralized server which consist of database where the individuals’ information cannot be accessed by a third party. Finally all the information can be stored in database and it can be retrieved.

III EXISTING SYSTEM

3.1 HELPER

- This application contain geographical constrain and this application will work for four major cities in south India.
- Communication between user and employee is not possible.

3.2 SNAP DEAL

- This application contains a fixed price for all employees.
- Payment for the employee was paid online so that employee can get less benefit out of it.

3.3 QUICKER

- This application has fewer categories.
- And user can't filter the employee based on the category and employee can't change daily wages periodically.

IV MODULES

- Client profile
- Dealer profile
- View labors
- Add cart
- Appointment confirmation

4.1 FIELDS IN EACH MODULE:

- Registration module (Client & dealer)
 - Name
 - Password
 - Contact number
 - Location
- Registration module (Employee)
 - Name
 - Password
 - Contact number
 - Location
 - Experiences
 - Select labors
- Client profile
 - Dealer

- Employee
- Dealer profile
 - Mason
 - Carpenters
 - Painters
 - Plumbers
 - Pest cleaner
- Field labors
 - Location
 - View
- Wallet
 - Add wallet
 - Show wallet

4.2 MODULE DESCRIPTION:

4.2.1 CLIENT PROFILE:

4.2.3VIEW LABORS:

- In this module, Client can view the details of labors by selecting the locations.
- Once the location is entered, the respective field of labor details will be filtered and displayed.

4.2.4 ADD CART:

- In this module, the name of respective labor can add to the cart for future use before fixing the appointment.

4.2.5 APPOINTMENT CONFIRMATION:

- All the employee are added to the cart.
- User can fix the appointment based the employee availability.

- Each client can have their unique username & password which identifies uniquely.
- Client can register by filling the required details.
- Client looking for labors by communicating with dealer.
- Client searches for labors by specifying the location.
- Optimized search is done.

4.2.2 DEALER PROFILE:

- For security issue, all the labours should submit their respective certificates and photos to dealers
- In this profile under dealer different labors are categorized.
- The different labors are plumbers, carpenters, pest controllers, electricians, painters and so on.

- SMS will be sent to employee and user, based on the appointment.
- Once the appointment was fixed the day will be hide for that particular employee.

V LANGUAGE AND SOFTWARE USED FOR DESIGN

- Operating system - Window 8.1
- IDE Used - Eclipse juno
- Front End - Xml
- Back End - My Sql
- Version - Minimum Version KitKat(19) Maximum Version Marshmallow(23)
- Hard Disk - Min 10MB

- RAM

- 512MB

CUSTOMER

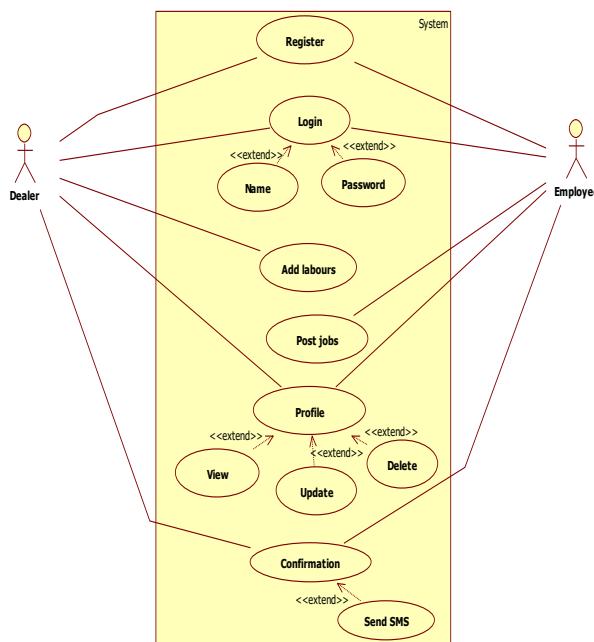
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ADMIN:

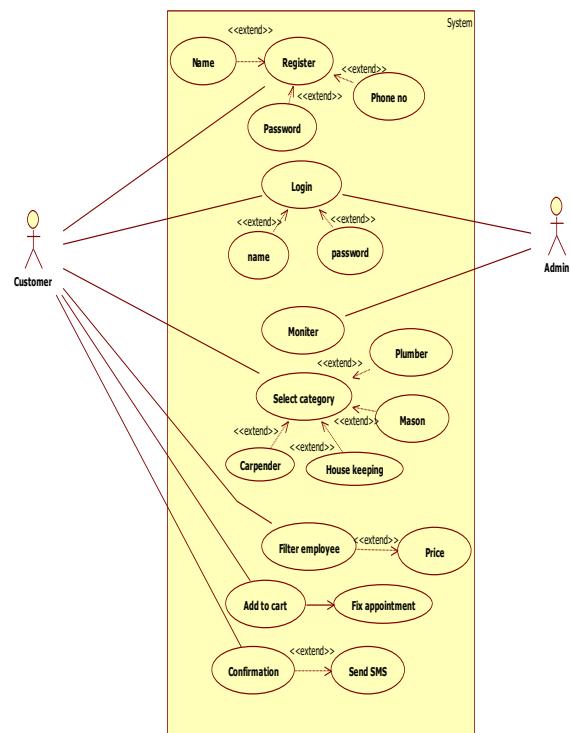
VI DIAGRAMS

6.1.1 USECASE DIAGRAM

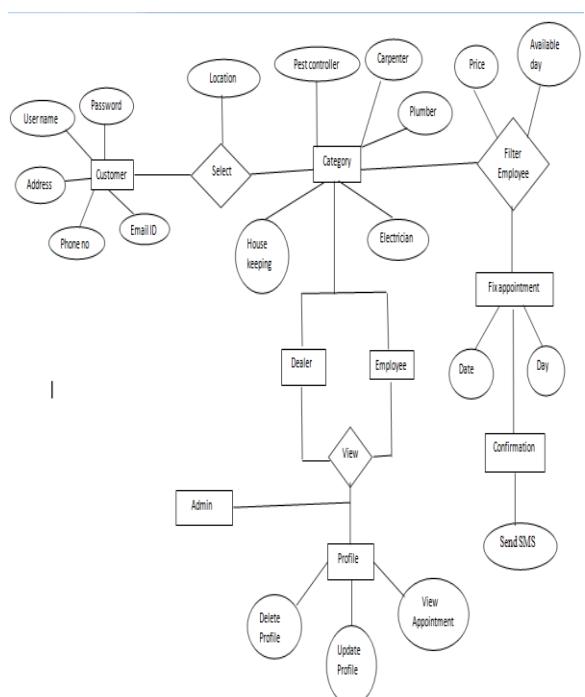
DEALER & EMPLOYEE:



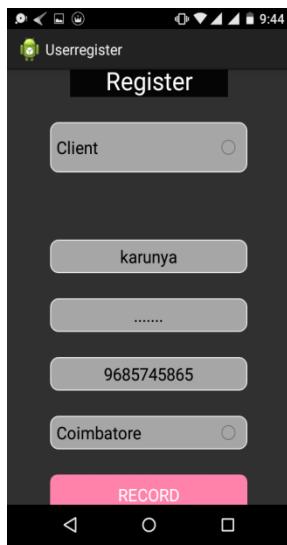
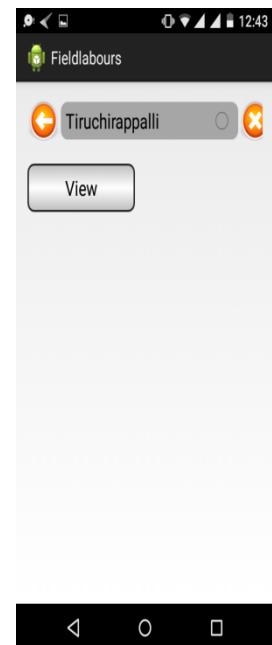
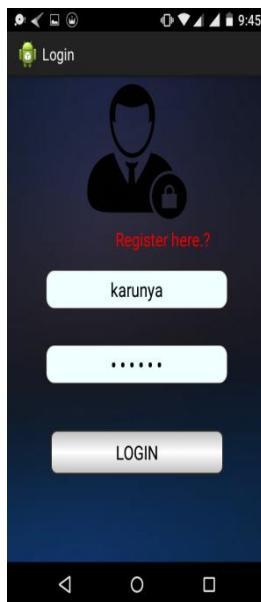
6.1.2 USECASE DIAGRAM

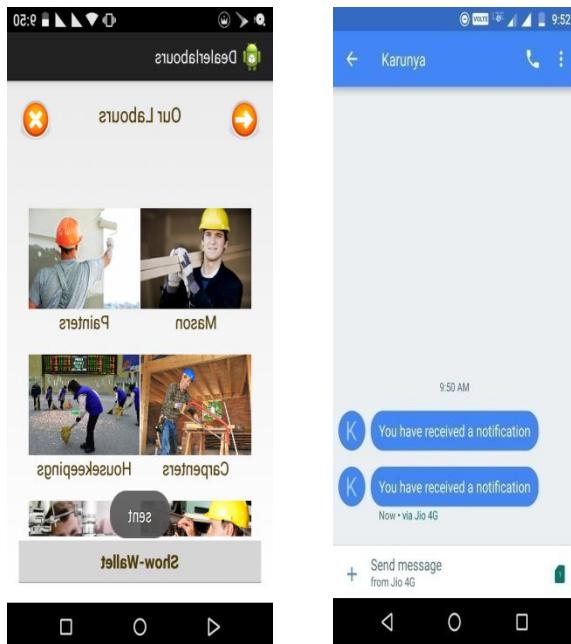


6.2: ER DIAGRAM:



VII SCREENSHOTS





VIII CONCLUSION

- Today the world is become a Global village where everything is online.
- It helps people to find the daily wage worker in and around their local area.
- It helps to find more customer for daily wage worker.
- System is user friendly and reliable.

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CITIZEN VOICE (PUGAR PETTI)

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ABSTRACT

The Citizen Voice app named “PUGAR PETTI” is used to raise the voice of a common man regarding the issues namely civic issues, social issues and other general issues he is facing in his day-to-day life. Firstly every individual must register their details through Aadhar card. Following the registration, the issue which needed to be addressed is selected from the category provided. Then the description of the issue in form of text, image or video is uploaded by the reporter to the appropriate department’s official. A time trigger is set according to the category conforming the norms of the government. If it is solved within the triggered time, the reporter will be notified about the problem clearance, otherwise it will be forwarded to the higher officials along with the same time duration. The complaint will be forwarded upwards through the chain of organization hierarchy until it is solved. Finally the complaint reaches the media and the official wall or timeline of our app which is supported by all the heads of our country, if it remains to be unsolved. The citizen who wishes to initiate the steps with a spirit of moving our country ahead in clearing the issues, those who complaint regularly and the officials who actively take part in solving the issues by doing justice to the app as well as to their work will be noted and recognized at end of year. Both positive and negative actions are posted on the walls of the media’s website. Therefore, the problem will be sorted out by the official for sure as the ultimate thrown weapon is media. Finally this app clears all the issue faced by an individual through a single upload of a message

which makes every individual to join hands together and raise the voice of their concern against all these issues that can make life a living heaven in Indian cities.

I INTRODUCTION

Over generations a common man has never crossed a day by facing a problem. The issues are considered unsolicited and skipped due to several purposes. An impetuous citizen who desire to clear the issue and craving to take step is never invigorated and his voice is never heard in a crowd of spammers. A general problem which is happening very habitually surrounding us is not disentangled till today. The issues are in repeat mode. At many places many issues are filed as a petition or complaint yet unanswered most of the time. This can be cleared if proper ways and means are followed and monitored. A citizen voice can turn a problem to a history and make our country a problem-free nation.

II SCOPE

The ultimate aim of our app is to make the complaint box (pugar petti) void at the end of the time. As world trending smart and all stuffs are circulated within our palm, why the issues alone should be complained as a written document (petition). Subsequently every issue can be complained within a fraction of second

and those must be resolved by the respective official within the allotted time mandatorily. Else it will be forwarded automatically to the higher official and finally to the medias website and the official page or timeline of our app which is viewed by all heads of the country. This pressurizes the job state of the official if the issue is not solved and in turn makes his job to stay in a critical stage. Therefore his/her duty must be done with respect to their position as soon as possible in order to make their job stay with them. As well the issue is solved and the thirst of the citizen to clear the issue is reduced in no time.

III EXISTING SYSTEM

3.1 TOI Citizen Reporter (Times Of India)

- This app covers most of the general, global, public issues but it doesn't show a clear hierarchy about where it is forwarded and who is looking after the problem.
- There is no separate page for those who wish to support the problem.

3.2 MOH Citizen Voice

- This is completely related to Ministry Of Health and it doesn't cover about the other issues faced by the common man

3.3 MT Citizen Reporter

- After posting any news on this app, it doesn't show the approx. timing status when it will be cleared etc.,
- It doesn't show every status for our complaint which we post, that is complaint shortlisted on which date and time will be posted on main site.
- OTP problem.
- Mostly it reflects as failed to upload.

3.4 NBT Citizen Reporter

- Similar to TOI Citizen Reporter.

3.5 Swachhata – MoUD

- This app is mainly for cleanliness and it doesn't cover all the common issues.

IV MODULES

1. User Activity

- Registration
- Login
- Timeline and Profile
- Profile Update

2. Timeline

- Display Registered Complaints
- Display Action Status
- Measure of Supporters and Viewers

3. Complaint posting and Handling

- Problem Category Selection
- Complaint Registration
- Resolving Process
- Tracking Details

4. Data Management

- Recording registration in DB
- Managing Timeline data in DB

4.1 MODULE DESCRIPTION:

4.1.1 USER ACTIVITY

- Here the main participant is the user and the head(official) of the department.
- They will register their details with their aathar card number so that it will be confirmed that the citizen will be trustworthy person.
- They will register the details according to the category and subcategory (for heads) and with other proper details (for users) and complete their registration process.
- Then they will login with their respective mobile number and password.

- They can view all the issues submitted by the citizens and the actions taken by the officials in the timeline section.
- Also they can update their password and any other details here.

4.1.2 TIMELINE

- This timeline module is very similar to the Facebook timeline where the issues posted by all can be viewed here.
- Then they can switch to their home page for their complaint posting process.
- The action status is also displayed in this module.
- Plus the viewers and supporters can like, comment and share the issues displayed in order to support the problem.

4.1.3 COMPLAINT POSTING AND HANDLING

- This can be done through the user login.
- They can select the new post option and they must select the category and an image related to it and a detailed description of the problem.
- By submitting the complaint it will be directly posted in the timeline wall and the in the respective officials home page(named pending).

4.1.4 DATA MANAGEMENT

- All the data namely registration details, complaints posted will be stored in the database and can be retrieved.
- The database is maintained and managed by the admin .

V ARCHITECTURE DIAGRAM

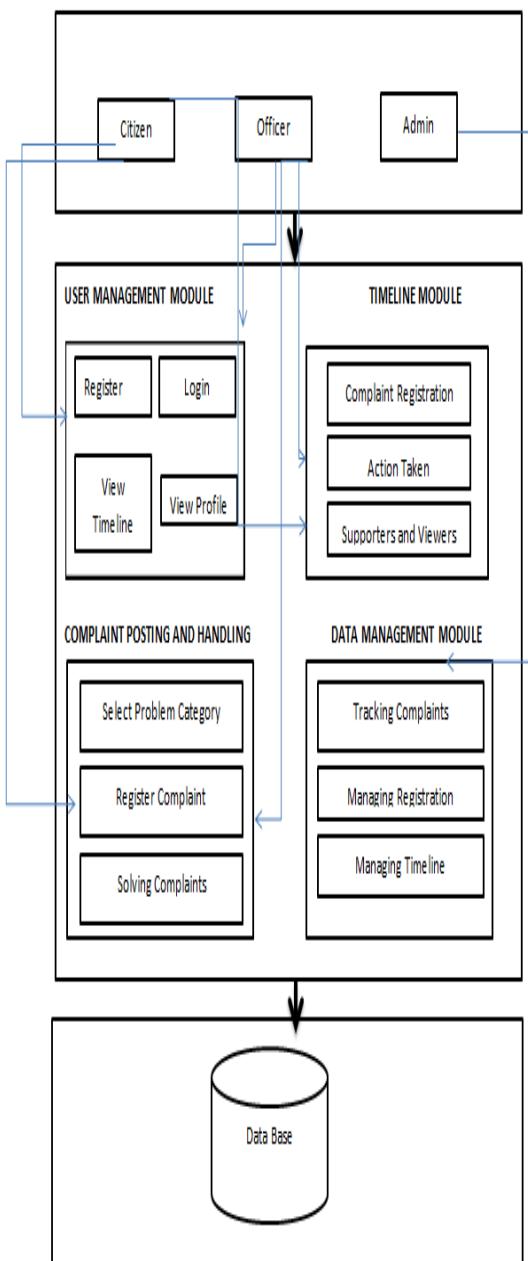
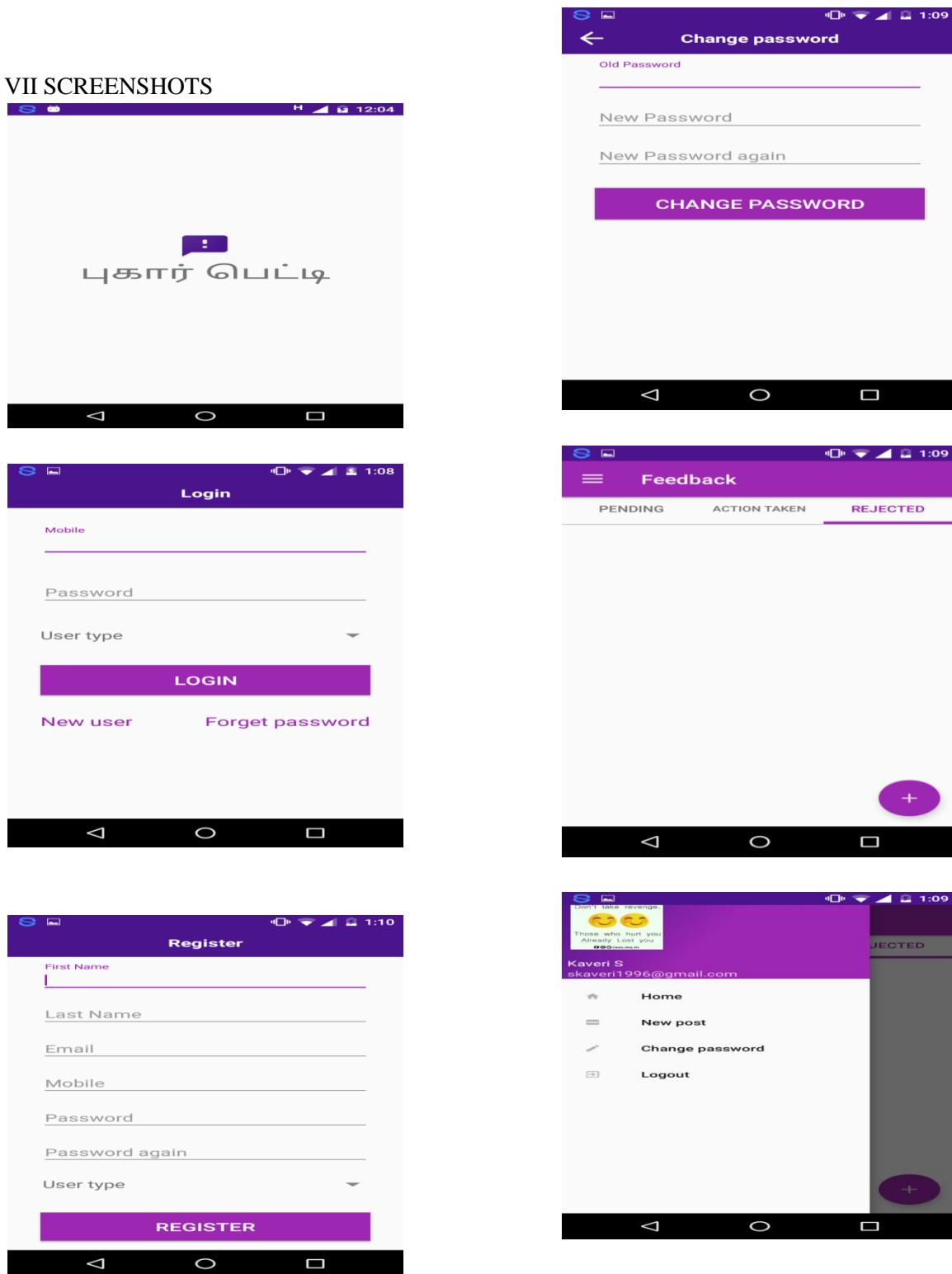
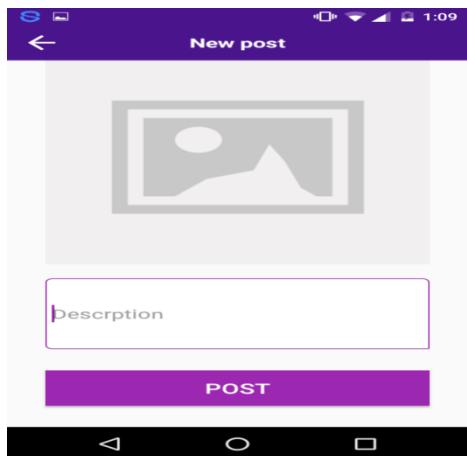
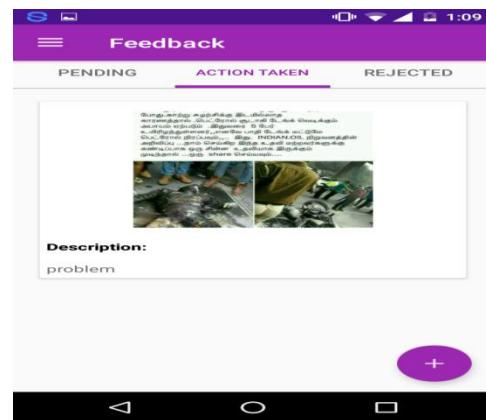
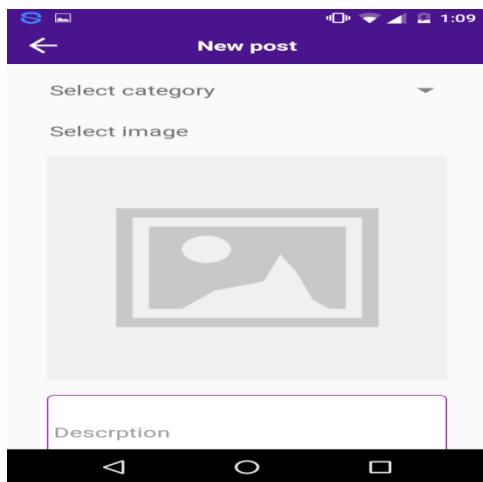


Fig 1: Overall Framework

VII SCREENSHOTS

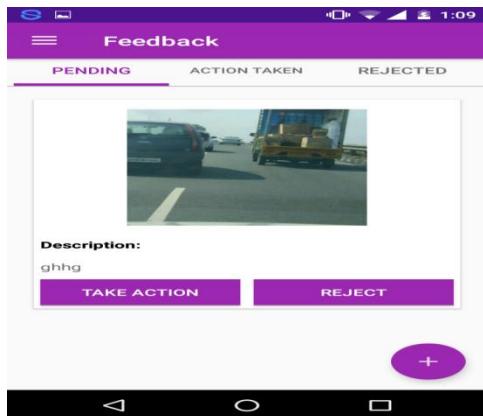




VIII CONCLUSION

"All our problems bow before our stubbornness"

- Therefore a problem can be solved by a single bold initiative step by raising our voice against it.
- Through this app all the common problem faced by the citizen is processed in a proper manner.
- This makes a great pathway for our country to lead towards the top of the world.



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A SURVEY ON CLOUD COMPUTING

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Abstract-Recent years, the concept of “clouds” is not new. Both technology and business models around cloud computing. A business built on aggregating clouds from public and private networks then delivering capacity and services in an automated, on-demand fashion to companies will emerge. Tech industry will have to build some tools: cloud bursting. Cloud bursting refers to moving data and applications instantly from one cloud to another. The main technological challenges identified are commonly associated with cloud systems are: Virtualization, Multi-tenancy, Security, Privacy and Data Management. The cloud concept is strongly related to future Internet. Most available cloud systems these days are provided as closed source or internalized open source. Half of the user said that using the cloud saves them money and/or IT effort. This means that almost fifty percent do not think it will save them money/effort. Due to the strong similarity between the business incentives of Grid vendors and Cloud providers, as well as similar requirements towards the infrastructure, it is comparatively easy for current grid vendors to move towards cloud computing.

Keywords : Cloud computing , Cloud providers, Redundancy , Data centers .

Introduction

Comedian George Carlin has a routine in which he talks about how humans seem to spend their lives accumulating "stuff." Once they've gathered enough stuff, they have to find places to store all of it. If Carlin were to update that routine today, he could make the same observation about computer information. It seems that everyone with a

computer spends a lot of time acquiring data and then trying to find a way to store it.

For some computer owners, finding enough storage space to hold all the data they've acquired is a real challenge. Some people invest in larger hard drives. Others prefer external storage devices like thumb drives or compact discs. Desperate computer owners might delete entire folders worth of old files in order to make space for new information. But some are choosing to rely on a growing trend: **cloud storage**.

While cloud storage sounds like it has something to do with weather fronts and storm systems, it really refers to saving data to an off-site storage system maintained by a third party. Instead of storing information to your computer's hard drive or other local storage device, you save it to a remote database. The Internet provides the connection between your computer and the database.

On the surface, cloud storage has several advantages over traditional data storage. For example, if you store your data on a cloud storage system, you'll be able to get to that data from any location that has Internet access. You wouldn't need to carry around a physical storage device or use the same computer to save and retrieve your information. With the right storage system, you could even allow other people to access the data, turning a personal project into a collaborative effort.

So cloud storage is convenient and offers more flexibility, but how does it work? It is explained below.

There are hundreds of different cloud storage systems. Some have a very specific focus, such as storing Web e-mail messages or digital pictures. Others are available to store all forms of digital data. Some cloud storage systems are small operations,

while others are so large that the physical equipment can fill up an entire warehouse. The facilities that house cloud storage systems are called **data centers**.

At its most basic level, a cloud storage system needs just one data server connected to the Internet. A client (e.g., a computer user subscribing to a cloud storage service) sends copies of files over the Internet to the data server, which then records the information. When the client wishes to retrieve the information, he or she accesses the data server through a Web-based interface. The server then either sends the files back to the client or allows the client to access and manipulate the files on the server itself.

Cloud storage systems generally rely on hundreds of data servers. Because computers occasionally require maintenance or repair, it's important to store the same information on multiple machines. This is called **redundancy**. Without redundancy, a cloud storage system couldn't ensure clients that they could access their information at any given time. Most systems store the same data on servers that use different power supplies. That way, clients can access their data even if one power supply fails.

Not all cloud storage clients are worried about running out of storage space. They use cloud storage as a way to create backups of data. If something happens to the client's computer system, the data survives off-site. It's a digital-age variation of "don't put all your eggs in one basket."

Examples of Cloud Storage

There are hundreds of cloud storage providers on the web and their numbers seem to increase every day. Not only are there a lot of companies competing to provide storage, but also the amount of storage each company offers to clients seems to grow regularly.

You're probably familiar with several providers of cloud storage services, though you might not think of them in that way. Here are a few well-known companies that offer some form of cloud storage:

- Google Docs allows users to upload documents, spreadsheets and presentations to the **google** data servers. Users can edit files using a Google application. Users can also publish documents so that other people can read them or even make edits, which means

Google Docs is also an example of cloud computing

- Web e-mail providers like **gmail** Hotmail and **yahoo** store e-mail messages on their own servers. Users can access their e-mail from computers and other devices connected to the Internet.
- Sites like Flickr and Picasa host millions of digital photographs. Their users create online photo albums by uploading pictures directly to the services' servers. **you tube** hosts millions of user-uploaded video files.
- Web site hosting companies like StartLogic, Hostmonster and GoDaddy store the files and data for client Web sites.
- Social networking sites like facebook and my space allow members to post pictures and other content. All of that content is stored on the respective site's servers.
- Services like Xdrive, MediaMax and Strongspace offer storage space for any kind of digital data.

Some of the services listed above are free. Others charge a flat fee for a certain amount of storage, and still others have a sliding scale depending on what the client needs. In general, the price for online storage has fallen as more companies have entered the industry. Even many of the companies that charge for digital storage offer at least a certain amount for free.

Skills needed for cloud computing

Cloud computing calls for range of new skills. Here are the eight essential skills needed:

1. **Business and financial skills:** Cloud computing proponents need to be able to make the business case for a cloud deployment, or to nix a cloud project that doesn't meet these needs. They also need to be able to build a return on investment (ROI) case, and monitor and make judgment calls on metrics based on business performance versus the costs of supporting or subscribing to the cloud. Cloud computing is very much a powerful business tool, and business-savvy evangelists are needed to make it work for enterprises.

2. **Technical skills:** The knowledge base would need to be heavily focused on Internet capabilities. Java and .NET framework skills may come to the forefront, as well as knowledge of virtualization. Knowledge of open-source tools and languages may also come into play as well.
3. **Enterprise architecture and business needs analysis:** Essential for laying out a roadmap of what services – whether they are coming from IT or an outside provider – will be needed. Able to work with the business, speak the language of business, as well as work with IT professionals. An understanding of the principles of service-oriented architecture would go a long way.
4. **Project management skills:** Project management skills have been a necessity for some time with IT projects, which require marshaling people and a variety of resources from across the enterprise to agree on goals, establish timelines, and meet milestones in a timely manner. Unfortunately, as any IT veteran knows all too well, user preferences change, more deliverables are added and padded into the project (“scope creep”), and projects end up being delivered behind deadline and over budget. Since cloud computing offers end-users the potential to run wild with new requests for services, effective project management skills are needed to keep cloud projects from eventually costing far more than the on-premises systems they were designed to replace.
5. **Contract and vendor negotiation:** Working with cloud providers, able to negotiate service-level agreements, availability. Able to read the fine print in vendors’ contracts and call them on the carpet when things aren’t performing as planned. Who will step up to the plate and make the right noise when a cloud service goes down or is habitually underperforming? Cloud makes vendors omnipresent in day-to-day operations, so individuals with training or savvy with vendor negotiating skills will be a must.
6. **Security and compliance:** An understanding of security protocols is essential, no matter what type of cloud is being deployed. Related to this is an understanding of mandates and regulations – such as Sarbanes-Oxley, HIPAA, and the myriad of data-handling laws from the European Union to states within the United States.
7. **Data integration and analysis skills:** Data is more valuable than oil in today’s economy. But having actionable information on which to base business decision requires consistency and timeliness. Will data generated through cloud-based systems mesh seamlessly with on-premises ERP, data warehouse or other systems? Data professionals are in strong demand, and those who can design systems that can ingest Big Data from the cloud, or use the cloud to provide analytical environments.
8. **Mobile app development and management:** The rise of mobile devices in the workplace is part and parcel of the cloud phenomenon. In many cases, the move to cloud computing is being driven by the need to provide services that can be accessed by any and all devices, be they laptops or smartphones. There is strong demand for professionals who can build and deliver apps that can reside in the cloud and reach employees, partners and customers anywhere and anytime.

Security of Data

The two biggest concerns about cloud storage are **reliability** and **security**. Clients aren't likely to entrust their data to another company without a guarantee that they'll be able to access their information whenever they want and no one else will be able to get at it.

To secure data, most systems use a combination of techniques, including:

encryption which means they use a complex algorithm to encode information. To decode the encrypted files, a user needs the encryption key. While it's possible to crack encrypted information, most hackers don't have access to the amount of computer processing power they would need to decrypt information.

- **Authentication** processes, which require to create a user name and password.
- **Authorization** practices -- the client lists the people who are authorized to access information stored on the cloud system. Many corporations have multiple levels of authorization. For example, a front-line employee might have very limited access to data stored on a cloud system, while the head of human resources might have extensive access to files.

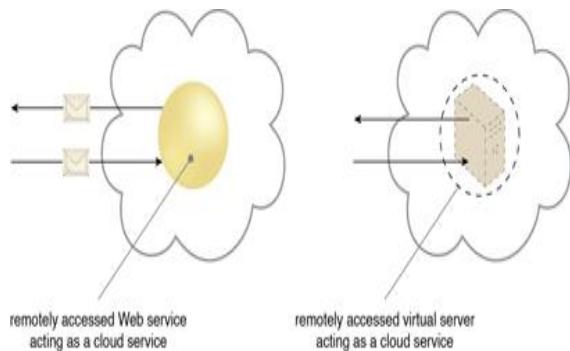
Even with these protective measures in place, many people worry that data saved on a remote storage system is vulnerable. There's always the possibility that a hacker will find an electronic back door and access data. Hackers could also attempt to steal the physical machines on which data are stored. A disgruntled employee could alter or destroy data using his or her authenticated user name and password. Cloud storage companies invest a lot of money in security measures in order to limit the possibility of data theft or corruption.

The other big concern, reliability, is just as important as security. An unstable cloud storage system is a liability. No one wants to save data to a failure-prone system, nor do they want to trust a company that isn't financially stable. While most cloud storage systems try to address this concern through redundancy techniques, there's still the possibility that an entire system could crash and leave clients with no way to access their saved data.

Cloud Service

A cloud service can exist as a simple Web-based software program with a technical interface invoked via the use of a messaging protocol, or as a remote access point for administrative tools or larger environments and other IT resources.

The yellow circle symbol is used to represent the cloud service as a simple Web-based software program. A different IT resource symbol may be used in the latter case, depending on the nature of the access that is provided by the cloud service.



A cloud service with a published technical interface is being accessed by a consumer outside of the cloud (left). A cloud service that exists as a virtual server is also being accessed from outside of the cloud's boundary (right). The cloud service on the left is likely being invoked by a consumer program that was designed to access the cloud service's published technical interface. The cloud service on the right may be accessed by a human user that has remotely logged on to the virtual server.

Cloud provider

The organization that provides cloud-based IT resources is the cloud provider. When assuming the role of cloud provider, an organization is responsible for making cloud services available to cloud consumers, as agreed upon SLA guarantees. The cloud provider is further tasked with any required management and administrative duties to ensure the on-going operation of the overall cloud infrastructure. Cloud providers normally own the IT resources that are made available for lease by cloud consumers; however, some cloud providers also "resell" IT resources leased from other cloud providers.

Types of clouds

Public cloud

A public cloud is a publicly accessible cloud environment owned by a third-party cloud provider. The IT resources on public clouds are usually provisioned via the previously described cloud delivery models and are generally offered to cloud consumers at a cost or are commercialized via other avenues (such as advertisement).

Community cloud

A community cloud is similar to a public cloud except that its access is limited to a specific community of cloud consumers. The community cloud may be jointly owned by the community members or by a third-party cloud provider that provisions a public cloud with limited access.

Private cloud

A private cloud is owned by a single organization. Private clouds enable an organization to use cloud computing technology as a means of centralizing access to IT resources by different parts, locations, or departments of the organization.

Hybrid cloud

A hybrid cloud is a cloud environment comprised of two or more different cloud deployment models. For example, a cloud consumer may choose to deploy cloud services processing sensitive data to a private cloud and other, less sensitive cloud services to a public cloud. The result of this combination is a hybrid deployment model

Disadvantage

As any technology is a boon for an evaluation as the history is evidence, there are disadvantages too which cannot be ignored. Despite a fact cloud computing has so many features which can be awaiting a new horizon there are also key factors which cannot be ignored. Few have been summed up below:

- Lack of connectivity causes 100% downtime, whereas with traditional applications, lack of connectivity allows for some local function to continue until connectivity is restored.
- The lack of industry-wide standards means that a usage surge can easily overwhelm capacity without the ability to push that usage to another provider.
- Companies providing computing services will over-sell these services similar to how bandwidth is over-sold based on average or "peak" usage, instead of "maximum" usage. ISP's typically operate at multiples of 5 to 1, where they sell
- 5 times more than they have in capacity, assuming users will not use more than 20% of their allotted resources. This works, until there is a popular YouTube video that everyone wants

to see at the same time.... resulting in outages. Cloud computing is even more vulnerable to the peak-usage problem than internet bandwidth.

- "Denial of service" attacks, currently common, become easier. What's more they become harder to trace, as compromised "cloud resources" can be leveraged to launch the attacks, rather than compromised "individual pc's". Cloud computing is vulnerable to massive security exploits. Currently, when a system is broken into, only the resources of that system are compromised. With cloud computing, the damages caused by a security breach are multiplied exponentially.
- By "centralising" services, cloud computing increases the likelihood that a systems failure becomes "catastrophic", rather than "isolated".
- No political approach has been made till date to control the uncontrolled factors to bring the service under the boundary lines of trust and ownership, as these services are beyond country lines.

Conclusion

The key motive to publish this paper is to give a glimpse of understanding on cloud computing as a technology for a new era. Its potential is considered so vast that it is surely going to give up a new dimension for the generation to come. So, in the long run, most of the companies (large, mid size or small) do not want to have the overhead cost associated with running a large IT department that is solely involved in sustaining existing enterprise application. Large companies do not have the risk tolerance to start using cloud computing immediately. Most CEO's and top IT Executives in large organizations will wait for the technology to mature before putting even the most non-essential applications on someone else's servers. It gives a new aspect to do a business without owing so much. The concept is so new that work is still going on to cater the world with the best way for the companies having a technology appetite. There is a big push for cloud computing services by several big companies. Amazon.com has been at the forefront of the cloud computing movement. Google and Microsoft have also been very publicly working on cloud computing offerings. Some of the other companies to watch for in this field are Yahoo!,

IBM, Intel, HP and SAP. Several large universities have also been busy with large scale cloud computing research projects. There is no end to the evolution until one stops thinking. In the future, more cloud adoption is certain, this year alone the move to the cloud by many business has been phenomenal, so much so that some cloud business have grown by over 200%. Large vendors see this as the growing model for software and services in the future so more focus by the vendors is afforded. Do not be surprised if the cloud bursts with offerings over the next 24 months.

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An Initial Study on the basic domain to develop a human to machine

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ABSTRACT: This paper presents the initial study on the development of human like machine.

This paper gives precise information about the concepts of Natural language processing which is a technique concerned with the interactions between the computer and human language. Machine ethics concerned with the moral behavior of human to machine. Neural Networks it deals with the operations of neurons in the human brain to the machine ,Trans Humanism it depicts the future that is based on human species.

Introduction

Natural language processing,

Machine ethics,

Neural Networks,

Trans Humanism.

Future Scope

Conclusion

I. Introduction:

Artificial intelligence (AI) is intelligence exhibited by machines. The field of AI research defines itself as the study of "intelligent agents": any device that perceives its environment and takes actions that maximize its chance of success at some goal. Colloquially, the term "artificial intelligence" is applied when a machine mimics "cognitive" functions that humans associate with other human minds, such as "learning" and "problem solving" (known as Machine Learning) As machines become increasingly capable, mental facilities once thought to require intelligence are removed from the definition. For example, optical character recognition is no longer perceived as an example of "artificial intelligence", having become a routine technology Capabilities currently classified as AI include successfully understanding human speech, competing at a high level in strategic game systems (such as Chess and Golf,) self-driving cars, intelligent routing in content delivery networks, and interpreting complex data, the lecture to the students.

This has a long history but it is still constantly actively growing and changing.

Natural Language Processing:

It is a Field of Science, artificial intelligence. It is concerned with the interactions between the computer and Human languages.

Natural language processing gives machines the ability to read and understand the languages that humans speak. A sufficiently powerful natural language processing system would enable natural language user interfaces and the acquisition of knowledge directly from human-written sources, such as newswire texts. Some straightforward applications of natural language processing include information retrieval, text mining, question answering and machine translation.

A common method of processing and extracting meaning from natural language is through semantic indexing. Increases in processing speeds and the drop in the cost of data storage makes indexing large volumes of abstractions of the user's input much more efficient.

Automatic learning procedures can be make use of statistical algorithms.

II. Machine ethics:

It is an ethic of artificial intelligence concerned with the moral behavior of the artificially intelligent beings. It is also referred as machine morality.

The field of machine ethics is concerned with giving machines ethical principles, or a procedure for discovering a way to resolve the ethical dilemmas they might encounter, enabling them to function in an ethically responsible manner through their own ethical decision making. "Past research concerning the relationship between technology and ethics has largely focused on responsible and irresponsible use of technology by human beings, with a few people being interested in how human beings ought to treat machines. In all cases, only human beings have engaged in ethical reasoning. The time has come for adding an ethical dimension to at least some machines. Recognition of the ethical ramifications of behavior involving machines, as well as recent and potential

developments in machine autonomy, necessitate this. In contrast to computer hacking, software property issues, privacy issues and other topics normally ascribed to computer ethics, machine ethics is concerned with the behavior of machines towards human users and other machines. Research in machine ethics is key to alleviating concerns with autonomous systems—it could be argued that the notion of autonomous machines without such a dimension is at the root of all fear concerning machine intelligence. Further, investigation of machine ethics could enable the discovery of problems with current ethical theories, advancing our thinking about Ethics." Machine ethics is sometimes referred to as machine morality, computational ethics or computational morality. A variety of perspectives of this nascent field can be found in the collected edition "Machine Ethics" that stems from the AAAI Fall 2005 Symposium on Machine Ethics.

III. Neural Networks:

It is a computational approach used in computer science and based on the large collection of neural units.

A neural network is an interconnected group of nodes, akin to the vast network of neurons in the human brain. The networks typically consists of multiple layers or cube design.

The main categories of networks are acyclic or feedforward neural networks (where the signal passes in only one direction) and recurrent neural networks (which allow feedback and short-term memories of previous input events). Among the most popular feed forward networks are perceptions, multi-layer perceptrons and radial basis networks. Neural networks can be applied to the problem of intelligent control (for robotics) or learning, using such techniques as Hebbian learning, GMDH or competitive learning.

Today, neural networks are often trained by the backpropagation algorithm, which had been around since 1970 as the reverse mode of automatic differentiation

Hierarchical temporal memory is an approach that models some of the structural and algorithmic properties of the neocortex.

A. Deep feed forward neural networks

Deep learning in artificial neural networks with many layers has transformed many important subfields of artificial intelligence, including computer vision, speech recognition, natural language processing and others

According to a survey the expression "Deep Learning" was introduced to the Machine Learning community by Rina Dechter in 1986^[168] and gained traction after Igor Aizenberg and colleagues introduced it to Artificial Neural Networks in 2000.^[169] The first functional Deep Learning networks These networks are trained one layer at a time. Ivakhnenko's 1971 paper describes the learning of a deep feedforward multilayer perceptron with eight layers, already much deeper than many later networks. In 2006, a publication by Geoffrey Hinton and Ruslan Salakhutdinov introduced another way of pre-training many-layered feed forward neural networks (FNNs) one layer at a time, treating each layer in turn as an unsupervised restricted Boltzmann machine, then using supervised back propagation for fine-tuning.^[172] Similar to shallow artificial neural networks, deep neural networks can model complex non-linear relationships. Over the last few years, advances in both machine learning algorithms and computer hardware have led to more efficient methods for training deep neural networks that contain many layers of non-linear hidden units and a very large output layer.^[173]

Deep learning often uses convolutional neural networks (CNNs), whose origins can be traced

back to the Neocognitron in 1980. In 1989, backpropagation is applied to such an architecture.

Deep feedforward neural networks were used in conjunction with reinforcement learning by AlphaGo, Google Deepmind's program that was the first to beat a professional human player.

B. Deep recurrent neural networks

Early on, deep learning was also applied to sequence learning with recurrent neural networks (RNNs) which are general computers and can run arbitrary programs to process arbitrary sequences of inputs. The depth of an RNN is unlimited and depends on the length of its input sequence. RNNs can be trained by gradient descent but suffer from the vanishing gradient problem. In 1992, it was shown that unsupervised pre-training of a stack of recurrent neural networks can speed up subsequent supervised learning of deep sequential problems.^[182]

Researchers now use variants of a deep learning recurrent NN called the long short-term memory (LSTM) network published by Hochreiter & Schmidhuber in 1997. LSTM is often trained by Connectionist Temporal Classification (CTC). At Google, Microsoft and Baidu this approach has revolutionised speech recognition. For example, in 2015, Google's speech recognition experienced a dramatic performance jump of 49% through CTC-trained LSTM, which is now available through Google Voice to billions of smartphone users. Google also used LSTM to improve machine translation, Language Modeling and Multilingual Language Processing. LSTM combined with CNNs also improved for other applications .

IV. Trans Humanism:

It is abbreviated as H or H+ is an international intellectual movement that aims to transform the condition.

You awake one morning to find your brain has another lobe functioning. Invisible, this auxiliary lobe answers your questions with information beyond the realm of your own memory, suggests plausible courses of action, and asks questions that help bring out relevant facts. You quickly come to rely on the new lobe so much that you stop wondering how it works.

This feature is the future vision of intelligence into humanity and evolve and eventually will supplement or supersede.

The way creation of highly intelligent species by the way of cognitive replacement.

The philosophy whe devolopith we can achieve immortality.

IV. Future Scope:

In recent years the development of Ai have changed our life style.

In Future it may leads to the immortality.

It could also replaces the Human physical challenges.

VI. Conclusion:

As the study about the neural networks which leads the development of human brain into the machine. As far the natural language processing is concerned the human language will be converted into the machine to interact with the people, by using machine ethics we adopt that machine to the environment and the trans humanism helps to predict the future of the human .Thus if the future study has been done in this field we can develop a human like machine, which will be vast useful to create an impact in the world.

SMART FARMING

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ABSTRACT

Agriculture is the broadcast economic sector and plays an important role in the overall economic development of a nation. Technological advancements in the area of agriculture will ascertain to increase the competence of certain farming activities. In this paper, we have proposed a novel methodology for "Smart Farming" by linking the farmers and the agriculture activities through an Android application. Our System focuses on making agriculture more innovative, by resolving the problems in performing agriculture. This provides solutions like Labour management, Equipment renting, farmers voice and seed availability informations. The app also gives detail about the current pricing of the crops in their location. Smart Farming application will provide a digital platform to interact with the peer farmers and wholesale dealers to discuss about their queries. Smart Farming application will provide more information about better agriculture technique which will help the farmer in better decision making, more efficient exploitation operations and management.

I INTRODUCTION

Smart farming is an android application which is developed for the betterment of the farmers in their farming. It focuses on making agriculture more innovative. This app mainly works on resolving the problems that are related to farming. Smart farming creates a communication link between the peer farmers

around the world. This app consists of 5 main modules.

Pest control: This module gives the entire details about the pests that could be used in the soils of India. It also gives the standard cost of each pest.

Seed details: In this module the user can search the nearby agriculture related shops around the user's location. They can view the details of each shop nearby and the seeds available in each shop with standard cost.

Labour Management: This module serves as an agriculture oriented job portal. People can post jobs as well as apply for the available jobs.

Equipment Management: In this module the user can book a vehicle for rent and also if a user has a vehicle he can register in it.

Farmers' voice: This module serves as a forum in which the user can post question and answer for any previous posted questions. This module provides a space to complain if they have faced any problems like the pricing of seeds, improper functioning of rented vehicle etc.

II SCOPE

The Scope of the project is that in a very short span it provides user with many facilities.

It will provide a solution to eradicate the ignorance among people regarding farming. Widespread usage of this application will enhance the knowledge about farming and this will help the people to do farming at ease by accessing the facilities given by the application.

III EXISTING SYSTEM

3.1 IFFCO KISAN

This is an android app which gives the mandi prices, weather forecast reports. This app also gives the agricultural advisories which would be helpful for the farmers.

Drawback: There is a variation in the prices which are provided in the market and in wholesale shops.

3.2 RML FARMER

RML farmer is an android application which could be considered as an advancement of IFFCO Kisan. This is one of its kind agricultural app where farmers can keep up with latest commodity and mandi prices, agricultural news and agricultural advices.

Drawback: There is no information regarding shops which provide the commodity with the mentioned price.

3.3 ORGANIC FARMING

Organic farming is an android app which gives relevant information about organic farming. This app also gives information on how to start with organic farming.

Drawback: This application covers only the information related organic farming.

3.4 FARMERS ORG

Farmers org is an android app which helps to connect farmers, wholesalers, retailers and customers on a common platform to buy and sell the crops.

Drawback: This app consists of only few retailers and wholesalers.

3.5 KISAN SUVIDHA

Kisan suvidha is an android app which is developed to help farmers by giving information about weather forecast, market price, plant protections.

Drawback: The plant protection details are given only for few crops

IV PROPOSED SYSTEM

Smart farming focuses on labour management, equipment renting, pest control, seed details and farmers queries.

- Labour management mainly deals with finding labours with affordable wage.
- Equipment renting is used to purchase farming equipments and vehicles on rental base.
- Seed details allow finding the availability of the seeds nearby location including their prices.
- Farmer voice allows the farmers to interact with the peer farmer, wholesalers

V MODULES

- Pest control
- Seed details
- Labour management
- Equipment renting
- Farmers voice

4.1 MODULE DESCRIPTION:

4.1.1 PEST CONTROL

- Admin feeds the details of the standard pesticides that can be used on the Indian soil.
- The admin analyses the price of each pesticides and uploads the standard.
- The user can login to the app and see the details of each pesticide.

4.1.2 SEED DETAIL

- The user can search the nearby agriculture related shops and check the availability of seeds in each shop.
- The shop keeper can login and give the available seed details and seed prices.

4.1.3 LABOUR MANAGEMENT

- In this module, people can post jobs and apply for jobs.
- The land owner who needs workers to work on their fields can post the job by giving the name of the job, wages per hour and contact information.
- People who are in search of jobs can apply for any of the jobs which are posted.

4.1.4 EQUIPMENT RENTING

- In this module the vehicle owners can register their vehicle details and the expected rents.
- The users who want the vehicles can book on the date in which they want the vehicle.

4.1.5 FARMERS VOICE:

- This provides a platform in which the user can post any queries and the people can respond to queries.

VI ARCHITECTURE DIAGRAM

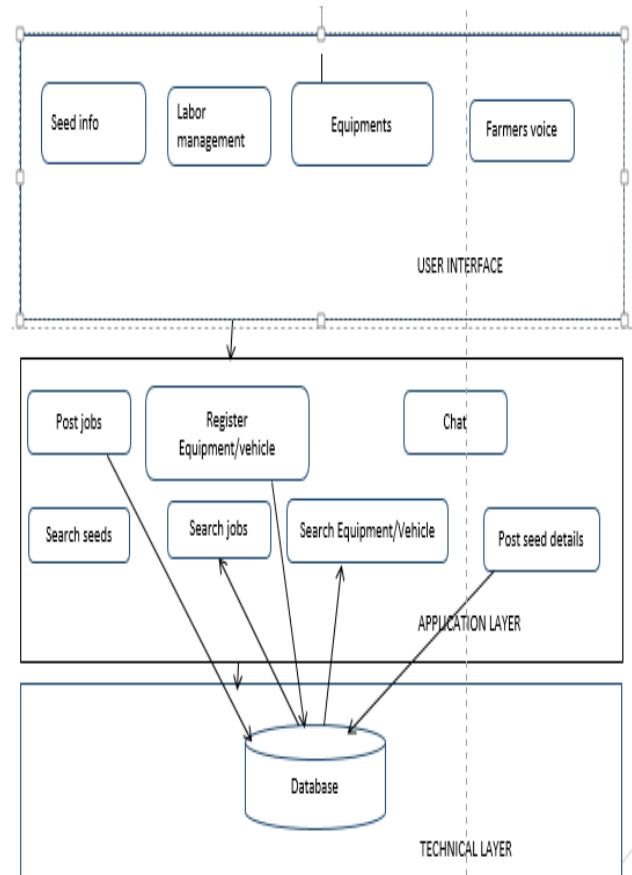


Fig 1: Overall Framework

VII CONCLUSION

Implementing the smart farming app and using this app regularly could show significant improvement in the farming sector. The relevant features which are included in this app will gradually become a supportive pillar to every farmer. Smart farming could soon act as a helping hand to initiate most of the youngsters to step into the farming sector and join hands to bring back our lush full paddy fields and vegetation.

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PHARMACY MANAGEMENT SYSTEM

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ABSTRACT

The main objective of the project is to provide a user friendly application for the customer. This application is very helpful for finding the nearby pharmacy and the customer location using GPS. User can search the pill by name with the amount of dosage for particular age. The user can manually add their own medication within the application, including name, number of doses, reminder times, frequency and the number of days to take the medication. This application provides audible and visual alerts based on the settings assigned to each type of medication. Customers can preview their medication schedule for the day and the expiry date of the stock in 'Reminders' tab. The user's medicine consumption history is stored within the application, allowing them quick and easy reference as to what medications they have taken and when. The platform used as a front end is Android Application and the database for back end is MySQLite.

I.INTRODUCTION

1.1.PHARMACY:

Healthcare is constantly evolving. Modern technologies offer scope for more effective ways to manage disease. Over the course of the last two decades, the Internet has transformed the way in which information is accessed. Mobile devices (i.e. smart phone and tablet platforms) took this a step further by allowing users to have remote access to the World Wide Web at their fingertips.

Such devices now outnumber personal computers and will soon become the most common way to access data. Interest generated in this technology may be ascribed to the availability of over one and a half million applications, or 'apps', available for download. Apps may be described as software packages that are used to enhance the efficiency of a device or to add functionality. Mobile apps can provide the healthcare professional with opportunity for a quick, user-friendly way of accessing important medical information to support patient care. The availability of apps on portable devices may lead to a reduction in the time taken to carry out a particular service or task; this being a key benefit to the pharmacist. To be a useful healthcare tool, a mobile app should inform the decision making process, facilitate pharmacist / staff / patient education, act as a communication aid and provide support to the patient within the community setting. With respect to the practice of pharmacy, mobile apps may be viewed as preferable to hard copy reference material due to their simplicity, user friendliness and regular updates.

II.SCOPE

With the development of specific and potent synthetic drugs, the emphasis of the pharmacist's responsibility has moved substantially towards the utilization of scientific knowledge in the proper use of modern medicines and the protection of the public against dangers that are inherent in their use. Pharmacists are employed in regulatory control and drug management, community pharmacy, hospital pharmacy, the pharmaceutical industry, academic activities, training of other health workers, and research. In all these fields, their aim is to ensure optimum drug therapy, both by contributing to the preparation, supply and control of medicines and associated products, and by providing information and advice to those who prescribe or use pharmaceutical products.

2.1 NETMEDS :- The Netmeds pharmacy app of India is an app useful for both pharmacist and users all over the world. It helps to shop medicines online using mobile phones. Offers and discounts for regular customers. Information about medicines and with various options for users to know about the medicine details. Assured safety of your personal information, with the latest security technology (SSL) in place.

Drawback: No security for the user details from the user side.

2.2 PACKET PHARMACY:- Pocket pharmacy app contains the list of generic medicines and more than 4000 branded medicines. It gives the information of the medicines which works offline. Contains information

about medicines including Mechanism of Action, Side Effects Indications, of various Categories. It also lists the available brands in India with accurate prices. Comparison of Medicine Prices up to 70% Works offline without internet after initial set up Search Drug by Indication Find Drug by Classification Best Offline Drug Dictionary in market trusted by Doctors, Pharmacists and People like you to get information on medicines. The best medicine reminder app to help people take right medicine at right time.

Drawback: There is no security for the user medicine details and no pharmacist guidance for intake of medicine.

III MODULES

- Users
- Pharmacist
- Upload prescription
- Shopping
- Payment
- Remainder

3.1 MODULE DESCRIPTION:

3.1.1 PHARMACIST:

- Admin can manage both users & stock. He can add or remove any order & Stock from the system.
- Every user is given a user id and password, which identifies him uniquely.
- From admin module, user can change stock details.
- Alert message for the expiry date of stock and availability of stock in store.
- Registered users list can be viewed. Mail notification is received along with

- prescription and user details when order is placed.
- If the medicine is available in stock order is processed.

3.1.2 USER:

- User can register using their details.
- Only registered users can access the application using their credentials.
- Only user can edit his details and view history of medicines.
- Nearby pharmacy can be searched and ordered
- Pill remainder is used to set remainder of the medicine intake of the user.
- After order is placed the medicine ordered is sent as a mail notification to the pharmacist.
- Payment is done by user online using their valid account details.

3.1.3 UPLOAD PRESCRIPTION:

- User can be able to view prescription wherever they are, by uploading the prescription.
- The picture of the prescription can be taken or selected from the gallery it is stored in the database and can be viewed whenever needed.

3.1.4 SHOPPING:

- This module helps user to shop medicine online.
- After selecting the nearby pharmacy user can order the medicine.
- Once order is placed payment is proceeded.

3.1.5 PAYMENT:

- This module contains the mode of payment.

- If mode of payment is online then, the account details of the user is used for proceeding the payment.

3.1.6 REMAINDER:

- This module is use to set remainder for the user, about the details of intake of medicine.
- The stock expiry date can be set as remainder and the availability of stock is checked and then if availability is low alarm reminds alerts, if remainder is set.

IV.LANGUAGES & SOFTWARE USED

4.1 SOFTWARE REQUIREMENTS:

- Front end: XML
- Back end: MySql
- IDE: Android studio2.2

4.2 HARDWARE REQUIREMENTS:

- Hard disk: 10 MB
- RAM: 512 MB

Login Page:

Page_Name	Field_Name
Login	Email
	Password

Forget password:

Page_Name	Field_Name
Login	Email
	Password

User Register page:

PAGE_NAME	FIELD_NAME
New User	First name
	Last name
	Email id
	Mobile number
	Password
	Confirm Password
	Address

PAGE_NAME	FIELD_NAME
Add pills	Pill Name
	Purpose
	Number of pills
	Date
	Prescription
	Prescription photo

Payment:

Pharmacy Register Page:

PAGE_NAME	FIELD_NAME
New Pharmacist	First name
	Last name
	Email id
	Mobile number
	Password
	Confirm Password
	Address

PAGE_NAME	FIELD_NAME
Payment	Amount
	Card no
	Exp Date
	Exp year
	CVV

Remainder and Upload prescription:

V.ARCHITECTURE DIAGRAM

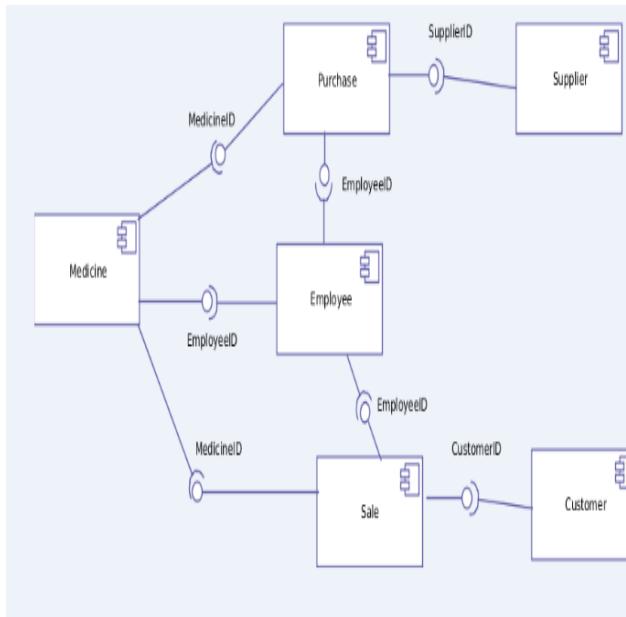


Figure 5.1: Architecture diagram

VI.IMPROVEMENTS

All the above discussed android application based have few of the demerits. Firstly these applications cannot assure that the uploaded prescription is from an authorized doctor. Hence in future this application can be enhanced with QR scan for prescription to find the prescription for a doctor or hospital. Additionally security of the user is ensured by having a security pin in user if in case the device in which the details of the user and the history of the medicine is present is lost, it cannot be accessed by others other than the user who knows the security pin.

VII.CONCLUSION

The proposed system reduces time and manual work for both pharmacist and users. Online shopping is now in trend and in case of pharmacy overcoming the risks of

medicine intakes and the details of the medicine is provide with suggestions. The proposed android application is to build an android application to facilitate customers to buy medicines using smart phones. This application is very helpful for finding the nearby pharmacy and the customer location using GPS. This system many of features that are useful for pharmacy practice using mobile phones.

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BLUEBRAIN TECHNOLOGY

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ABSTRACT

Human brain is the most valuable creation of God. The man is intelligent because of the brain. "Blue brain" is the name of the world's first virtual brain. That means a machine can function as human brain. Today scientists are in research to create an artificial brain that can think, response, take decision, and keep anything in memory. The main aim is to upload human brain into machine. So that man can think, take decision without any effort. After the death of the body, the virtual brain will act as the man .So, even after the death of a person we will not lose the knowledge, intelligence, personalities, feelings and memories of that man that can be used for the development of the human society. Keywords: Nanobotes, Neurons, Sensory System

1. INTRODUCTION:

The Blue Brain System is an attempt to reverse engineer the human brain and recreate it at the cellular level inside a computer simulation. The project was founded in May 2005 by Henry Markram at the EPFL in Lausanne, Switzerland. Goals of the project are to gain a complete understanding of the brain and to enable better and faster development of brain disease treatments. The research involves studying slices of living brain tissue using microscopes and patch clamp electrodes. Data is collected about all the many different neuron types. This data is used to build biologically realistic models of neurons and networks of neurons in the cerebral cortex. The simulations are carried out on a Blue Gene supercomputer built by IBM, hence the name "Blue Brain". The simulation software is based on Michael Hines's NEURON, together with other custom-built

an intelligent brain to have with. But the intelligence is lost along with the body after the death. The virtual brain is a solution to it. The brain and intelligence will be alive even after the death. We often face difficulties in remembering things such as people names, their birthdays, and the spellings of words, proper grammar, important dates, history facts, and etcetera. In the busy life everyone wants to be relaxed. Can't we use any machine to assist for all these? Virtual

components. As of August 2012 the largest simulations are of micro circuits containing around 100 cortical columns such simulations involve approximately 1 million neurons and 1 billion synapses. This is about the same scale as that of a honey bee brain. It is hoped that a rat brain neocortical simulation (~21 million neurons) will be achieved by the end of 2014. A full human brain simulation (86 billion neurons) should be possible by 2023 provided sufficient funding is received.

2. WHAT IS BLUE BRAIN?

The IBM is now developing a virtual brain known as the Blue brain. It would be the world's first virtual brain. Within 30 years, we will be able to scan ourselves into the computers. We can say it as Virtual Brain i.e. an artificial brain, which is not actually a natural brain, but can act as a brain. It can think like brain, take decisions based on the past experience, and respond as a natural brain. It is possible by using a super computer, with a huge amount of storage capacity, processing power and an interface between the human brain and artificial one. Through this interface the data stored in the natural brain can be uploaded into the computer. So the brain and the knowledge, intelligence of anyone can be kept and used for ever, even after the death of the person.

3. NEED OF VIRTUAL BRAIN :-

Today we are developed because of our intelligence. Intelligence is the inborn quality that cannot be created .Some people have this quality, so that they can think up to such an extent where other cannot reach. Human society is always in need of such intelligence and such

brain may be a better solution for it. What will happen if we upload ourselves into computer, we were simply

ourselves into computer, we were simply aware of a computer, or maybe, what will happen if we lived in a computer as a program?

4. HOW IT IS POSSIBLE?

First, it is helpful to describe the basic manners in which a person may be uploaded into a computer. Raymond Kurzweil recently provided an interesting paper on this topic. In it, he describes both invasive and noninvasive techniques. The most promising is the use of very small robots, or nanobots. These robots will be small enough to travel throughout our circulatory systems. Traveling into the spine and brain, they will be able to monitor the activity and structure of our central nervous system. They will be able to provide an interface with computers that is as close as our mind can be while we still reside in our biological form. Nanobots could also carefully scan the structure of our brain, providing a complete readout of the connections between each neuron. They would also record the current state of the brain. This information, when entered into a computer, could then continue to function like us. All that is required is a computer with large enough storage space and processing power.

5. FUNCTIONING OF HUMAN BRAIN:-

The human ability to feel, interpret and even see is controlled, in computer like calculations, by the magical nervous system. Yes, the nervous system is quite like magic because we can't see it, but its working through electric impulses through your body. One of the world's most "intricately organized" electron mechanisms is the nervous system. Not even engineers have come close for making circuit boards and computers as delicate and precise as the nervous system. To understand this system, one has to know the three simple functions that it puts into action: sensory input, integration, motor output.

1. Sensory input: When our eyes see something or our hands touch a warm surface, the sensory cells, also known as Neurons, send a message straight to your brain. This action of getting information from your surrounding environment is called sensory input because we are putting things in your brain by way of your senses.

2. Integration: Integration is best known as the interpretation of things we have felt, tasted, and touched with our sensory cells, also known as neurons, into responses that the body recognizes. This process is all accomplished in the brain where many neurons work together to understand the environment.

3. Motor Output: Once our brain has interpreted all that we have learned, either by touching, tasting, or using any other sense, then our brain sends a message through neurons to effector cells, muscle or gland cells, which actually work to perform our requests

and act upon the environment. How we see, hear, feel, smell, and take decision.

6.BRAIN STIMULATION:-

Natural Brain	Simulated Brain
INPUT : In the nervous system in our body the neurons are responsible for the message passing. The body receives the input by sensory cells. This sensory cell produces electric impulses which are received by neurons. The neurons transfer these electric impulses to the brain.	INPUT: In a similar way the artificial nervous system can be created. The scientist has created artificial neurons by replacing them with the silicon chip. It has also been tested that these neurons can receive the input from the sensory cells. So, the electric impulses from the sensory cells can be received through these artificial neuron
INTERPRETATION The electric impulses received by the brain from neurons are interpreted in the brain. The interpretation in the brain is accomplished by means of certain states of many neurons.	INTERPRETATION The interpretation of the electric impulses received by the artificial neuron can be done by means of registers. The different values in these register will represent different states of brain.
OUTPUT Based on the states of the neurons the brain sends the electric impulses representing the responses which are further received by sensory cell of our body to respond neurons in the brain at that time.	OUTPUT Similarly based on the states of the register the output signal can be given to the artificial neurons in the body which will be received by the sensory cell.
MEMORY There are certain neurons in our brain which represent certain states permanently. When required, this state is represented by our brain and we can remember the past things. To remember	MEMORY It is not impossible to store the data permanently by using the secondary memory. In the similar way the required states of the registers can be stored permanently and when required these

things we force the neurons to represent certain states of the brain permanently or for any interesting or serious matter this is happened implicitly	information Can be received and used.
PROCESSING When we take decision, think about something, or make any computation, logical and arithmetic computations are done in our neural circuitry. The past experience stored and the current inputs received are used and the states of certain neurons are changed to give the output.	PROCESSING In the similar way the decision making can be done by the computer by using some stored states and the received input and the performing some arithmetic and logical calculations

Neuron

The primary software used by the BBP for neural simulations is a package called NEURON. This was developed starting in the 1990s by Michael Hines at Yale University and John Moore at Duke University. It is written in C, C++, and FORTRAN. The software continues to be under active development and, as of July 2012, is currently at version 7.2. It is free and open source software, both the code and the binaries are freely available on the website. Michael Hines and the BBP team collaborated in 2005 to port the package to the massively parallel Blue Gene supercomputer.

Workflow of Neuron•

The simulation step involves synthesizing virtual cells using the algorithms that were found to describe real neurons. The algorithms and parameters are adjusted for the age, species, and disease stage of the animal being simulated. Every single protein is simulated, and there are about a billion of these in one cell. First a network skeleton is built from all the different kinds of synthesized neurons. Then the cells are connected together according to the rules that have been found experimentally. Finally the neurons are functionalized and the simulation brought to life. The patterns of emergent behavior are viewed with visualization software. A basic unit of the cerebral cortex is the cortical column. Each column can be mapped to one function, e.g. in rats one column is devoted to each whisker. A rat cortical column has about 10,000 neurons and is about the size of a pinhead. The latest simulations, as of

November 2011, contain about 100 columns, 1 million neurons, and 1 billion synapses. A real life rat has about 100,000 columns in total, and humans have around 2 million. Techniques are being developed for multiscale simulation whereby active parts of the brain are simulated in great detail while quiescent parts are not so detailed. Every two weeks a column model is run. The simulations reproduce observations that are seen in living neurons. Emergent properties are seen that they require larger and larger networks. The plan is to build a generalized simulation tool, one that makes it easy to build circuits. There are also plans to couple the brain simulations to avatars living in a virtual environment, and eventually also to robots interacting with the real world. The ultimate aim is to be able to understand and reproduce human consciousness. BBP-SDK• The BBP-SDK (Blue Brain Project - Software Development Kit) is a set of software classes (APIs) that allows researchers to utilize and inspect models and simulations. The SDK is a C++ library wrapped in Java and Python. Visualizations of results

RTNeuron

is the primary application used by the BBP for visualization of neural simulations. The software was developed internally by the BBP team. It is written in C++ and OpenGL. RTNeuron is ad-hoc software written specifically for neural simulations, i.e. it is not generalisable to other types of simulation. RTNeuron takes the output from Hodgkin-Huxley simulations in NEURON and render them in 3D. This allows researchers to watch as activation potentials propagate through a neuron and between neurons. The animations can be stopped, started and zoomed, thus letting researchers interact with the model. The visualizations are multi-scale that is they can render is the primary application used by the BBP for visualization of neural simulations. The software was developed internally by the BBP team. It is written in C++ and OpenGL. RTNeuron is ad-hoc software written specifically for neural simulations, i.e. it is not generalisable to other types of simulation. RTNeuron takes the output from Hodgkin-Huxley simulations in NEURON and render them in 3D. This allows researchers to watch as activation potentials propagate through a neuron and between neurons. The animations can be stopped, started and zoomed, thus letting researchers interact with the model. The visualizations are multi-scale that is they can render individual neurons or a whole cortical column. The image right was rendered in RTNeuron.

7. COMPUTER SUPERCOMPUTERS :-

HARDWARE/

The primary machine used by the Blue Brain Project is a Blue Gene supercomputer built by IBM. This is where the name "Blue Brain" originates from. IBM agreed in June 2005 to supply EPFL with a Blue Gene/L as a "technology demonstrator". The IBM press release did not disclose the terms of the deal. In June 2010 this machine was upgraded to a Blue Gene/P. The machine is installed on

the EPFL campus in Lausanne (Google map) and is managed by CADMOS (Center for Advanced Modeling Science). The computer is used by a number of different research groups, not exclusively by the Blue Brain Project. In mid-2012 the BBP was consuming about 20% of the compute time. The brain simulations generally run all day, and one day per week (usually Thursdays). The rest of the week is used to prepare simulations and to analyze the resulting data. The

- Each core is a PowerPC 450, 850 MHz
- Total: 56 teraflops, 16 terabytes of memory
- 4 racks, one row, wired as a 16x16x16 3D torus

This machine peaked at 99th fastest supercomputer in the world in November 2009.

Silicon Graphics: A 32-processor Silicon Graphics Inc. (SGI) system with 300 Gb of shared memory is used for

• visualization of results. Commodity PC clusters: Clusters of commodity PCs have been used for visualization tasks with the RTNeuron software.

8. DEEP - DYNAMICAL EXASCALE ENTRY PLATFORM DEEP :-

(deep-project.eu) is an exascale supercomputer to be built at the Jülich Research Center in Germany. The project started in December 2011 and is funded by the European Union's 7th framework program. The three-year prototype phase of the project has received €8.5 million. A prototype supercomputer that will perform at 100 petaflops is hoped to be built by the end of 2014. The Blue Brain Project simulations will be ported to the DEEP prototype to help test the system's performance. If successful, a future exascale version of this machine could provide the 1 exaflops of performance required for a complete human brain simulation by the 2020s. The DEEP prototype will be built using Intel MIC (Many Integrated Cores) processors, each of which contains over 50 cores fabricated with a 22 nm process. These processors were codenamed Knights Corner during development and subsequently rebranded as Xeon Phi in June 2012. The processors will be publicly available in late 2012 or early 2013 and will offer just over 1 teraflop of performance each.

9. UPLOADING HUMAN BRAIN:-

The uploading is possible by the use of small robots known as the Nanobots .These robots are small enough to travel throughout our circulatory system. Traveling into the spine and brain, they will be able to monitor the activity and structure of our central nervous system. They will be able to provide an interface with computers that is as close as our mind can be while we still reside in our

5. A Global Facility
6. A Foundation for Whole Brain Simulations

7. A Foundation for Molecular Modeling of Brain Function

10. CONCLUSION

supercomputer usage statistics and job history are publicly available online - look for the jobs labeled as "C-BPP".

Blue Gene/P technical specifications

- 4,096 quad-core nodes
- 1 PB of disk space, GPFS parallel file system
- Operating system: Linux SuSE SLES 10
-

biological form. Nanobots could also carefully scan the structure of our brain, providing a complete readout of the connections. This information, when entered into a computer, could then continue to function as us. Thus the data stored in the entire brain will be uploaded into the computer.

Merits and demerits

With the blue brain project the things can be remembered without any effort, decisions can be made without the presence of a person. Even after the death of a man his intelligence can be used. The activity of different animals can be understood. That means by interpretation of the electric impulses from the brain of the animals, their thinking can be understood easily. It would allow the deaf to hear via direct nerve stimulation, and also be helpful for many psychological diseases. Due to blue brain system human beings will become dependent on the computer systems. Technical knowledge may be misused by hackers; Computer viruses will pose an increasingly critical threat. The real threat, however, is the fear that people will have of new technologies. That fear may culminate in a large resistance. Clear evidence of this type of fear is found today with respect to human cloning.

What can we learn from Blue Brain?

Detailed, biologically accurate brain simulations offer the opportunity to answer some fundamental questions about the brain that cannot be addressed with any current experimental or theoretical approaches. Understanding complexity At present, detailed, accurate brain simulations are the only approach that could allow us to explain why the brain needs to use many different ion channels, neurons and synapses, a spectrum of receptors, and complex dendritic and axonal arborizations.

Applications:

1. Gathering and Testing 100 Years of Data.
2. Cracking the Neural Code
3. Understanding Neocortical Information Processing
4. A Novel Tool for Drug Discovery for Brain Disorders

In conclusion, we will be able to transfer ourselves into computers at some point. Most arguments against this outcome are seemingly easy to circumvent. They are either simple minded, or simply require further time for technology to increase. The only serious threats raised are also overcome as we note the combination of biological and digital technologies. While the road ahead is long, already researches have been gaining great insights from their

model. Using the Blue Gene supercomputers, up to 100 cortical columns, 1 million neurons, and 1 billion synapses can be simulated at once. This is roughly equivalent to the brain power of a honey bee. Humans, by contrast, have about 2 million columns in their cortices. Despite the sheer complexity of such an endeavor, it is predicted that the project will be capable of this by the year 2023

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BLOOD BANK MANAGEMENT

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ABSTRACT

Android Blood Bank system is developed with an objective to help people in case of exigency. The project is developed so that users can view the information about registered blood donors with their details of blood group, personal and medical information of donor. On registration the users get tracked to the nearest blood donors. Thus this application helps to select the right donor online instantly using medical details along with the blood group. The main aim of developing this application is to reduce the time to a great extent that is spent in searching for the right blood donor. This application provides the required information in no time and also helps in quicker decision making. It helps to select the nearest hospital instantly by tracing its location using GPS. An enhanced feature added is in case of unavailability of blood among the registered donors an emergency alert message will be shared to social media. The platform used as a front end is Android Application and the database for back end is MySQLLite.

I INTRODUCTION

Blood is universally recognized as the most precious element that sustains life. It saves innumerable lives across the world during emergency. The term "blood bank" typically refers to a division of a hospital laboratory where the donated bloods are stored and where proper testing is performed to reduce the risk of transfusion related events. Large coolers hold

these products at a constant temperature and they are available at a moment's notice.

Blood Bank accept the donated blood, only if donor satisfy all of the following conditions:-

- (i) If the donor are between age group of 18-60 years.
- (ii) If the donor's weight is 45 kgs or more.
- (iii) If the donor's hemoglobin is 12.5 gm% minimum.
- (iv) If the donor's last blood donation was 3 or more months earlier.

Blood Bank do not accept donated blood, if donor have any of the following conditions :-
Cold / fever in the past 1 week.

Under treatment with antibiotics or any other medication. Cardiac problems, hypertension, epilepsy, diabetes (on insulin therapy), history of cancer, chronic kidney or liver disease, bleeding tendencies, venereal disease etc.

Major surgery in the last 6 months.

Vaccination in the last 24 hours.

Had a miscarriage in the last 6 months or pregnant / lactating in the last one year.

Have regularly received treatment with blood products.

Shared a needle to inject drugs/ have history of drug addiction.

II SCOPE

The Scope of the project is that in a very short span it provides user with many facilities. It provides an elegant management of blood, list of hospitals, blood banks and donors online. The main purpose of this project is to interconnect all the blood banks, hospitals, donors into a single network, validation, store various data and information of blood and health of each individual. This system is used to store data over a centralized server which consist of database where the individuals' information cannot be accessed by a third party. At present, the public can only know about the blood donation events through conventional media means such as radio, news paper or television advertisement. The problem is not insufficient number of donors, but finding a willing donor at the right time. This leads to the rise of Blood @ 24*7.

III EXISTING SYSTEM

3.1 BLOOD BANK INDIA

The MIS of Blood Bank India keeps the name of the donor who is donating blood, a unique id through which the donor can view his account , password for accessing the account , date of birth of the donor because his age must be in the range of 18-60 years, gender status of the donor, blood group of the donor, weight of the donor, mobile no, email id, address, city, state, date of last blood donation when a new blood donor registered himself as a Blood Donor. A person or a hospital can request the blood from the blood bank when they need. For this the blood bank keeps the name of the patient, a blood group which is needed, city in which the blood needed, name of the hospital where the blood will be sent, address of the hospital, name of the doctor who demands for blood, date and time when the blood will required, contact name, contact email id, contact phone number, address, city, state of the person who needs the blood in their MIS.

Drawback: The current status of the donor is not given.

3.2 BHARAT BLOOD BANK

The MIS of Bharat Blood Bank keeps the name of the donor, a unique id and password through which the donor can access his account, date of birth of the donor, gender status of the donor, blood group of the donor, weight of the donor, mobile no, email id, address, city, state, date of last blood donation, and information about Hepatitis B, C, AIDS, Cancer, Kidney disease, Heart disease(if a donor is suffered from these disease) when a new blood donor registered himself as a Blood Donor with Bharat Blood Bank. It provides the city wise and blood group wise, state wise and area wise search of the blood (a person who needs blood).

Drawback: There is no information regarding the storage of available blood.

3.3 E-BLOOD DONORS

The MIS of e-Blood Donors keeps the name of the donor who is donating blood, a unique id through which the donor can view his account , password for accessing the account , date of birth of the donor ,gender status of the donor, blood group of the donor, weight of the donor, photo, mobile no, email id, address, city, state, date of last blood donation when a new blood donor registered himself as a Blood Donor. It provides the criteria of city wise and blood group wise and gender wise search of the blood(a person who needs blood).

Drawback: It does not provide any mechanism that a patient can request for blood online.

3.4 LIONS BLOOD BANK & RESEARCH FOUNDATION

Lions Blood Bank & Research Foundation provide the current status of availability of blood through their MIS in the format of blood group, number of availability of whole blood, number of availability of packed

cells, number of availability of frozen plasma, number of availability of platelet.

Drawback: It does not provide any mechanism for register a person as a donor and also does not provide any mechanism that a patient can request for blood online.

3.5 WEB BLOOD BANK

Web blood bank keeps the name of the donor who is donating blood, an email as a unique id and password through which the donor can access his account , date of birth of the donor, gender status of the donor, blood group of the donor, RH factor of the donor, mobile no, email id, address, city, state, date of last blood donation related information in their MIS when a new blood donor registered himself as a Blood Donor.

Drawback: It does not provide the information about the storage of blood.

IV MODULES

- Admin
- Modifying Information
- Donors
- Donor Registration
- Acceptors
- Life Saving Contacts

4.1 MODULE DESCRIPTION:

4.1.1 ADMIN

- Admin can manage both donors & acceptors. He can add or remove any user from the system.
- Each member in a donor & acceptor is given a user id and password, which identifies him uniquely.
- From admin module, user can change donor details, delete donor or change the password.
- Alert message can also be shared via social media.
- Optimized search is done.

4.1.2 MODIFYING INFORMATION

- Only registered donor can modify his details; no other person can modify his details as there was a login form which restricts others from entering the username and password.
- This module provides high security for the information shared by the donor.

4.1.3 DONOR REGISTRATION

- In this module, people who are interested in donating blood gets registered.
- Donor have to give his overall details related to health, i.e. the donor must provide the following details such as name, address, city, gender, dob, blood group, telephone numbers, e-mail address, etc.

4.1.4 DONOR

- From this module user can create their account, when user creates his account the user get a unique user id and password.
- List of donors who had registered already are also available. Donor can also send a link to his/her friend to register as donor, by sharing through social media.
- Alert message will be sent to the donors in case of emergency.

4.1.5 ACCEPTORS:

- Acceptor can register by filling the required details.
- This module helps user to find blood group by entering blood group the acceptor is in need of.
- After entering the blood group, system searches for the availability of the

corresponding blood group and gives the list of the donors at the nearest location.

4.1.6 PEOPLE IN NEED & LIFE SAVING CONTACT:

- The acceptors who has registered the requirement will be available in “people in need”. Life saving contact group then they will be provided a service i.e. he will be given a Contact details for their nearby cities who have the details of many other donors in the city.

V ARCHITECTURE DIAGRAM

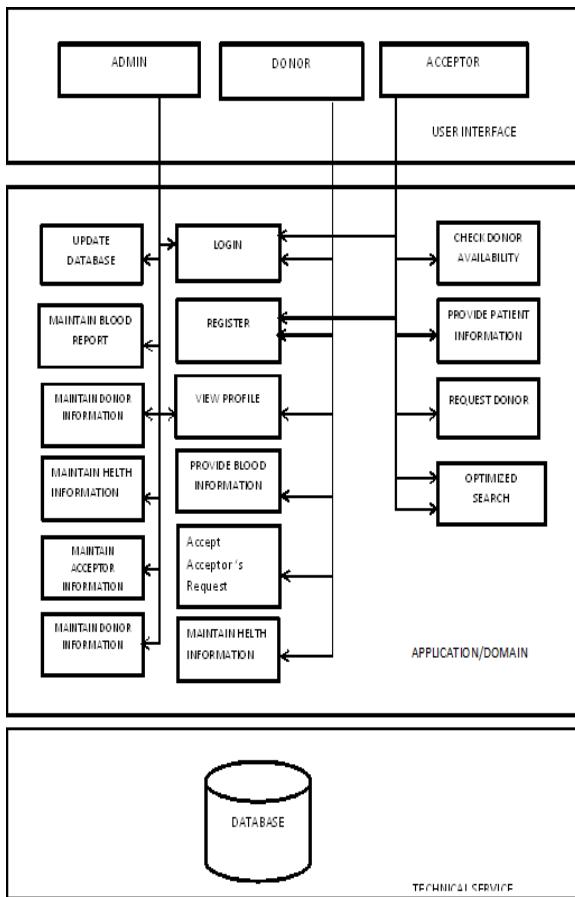


Fig 1: Overall Framework

5.1 USECASE DIAGRAM

ACCEPTOR & DONOR:

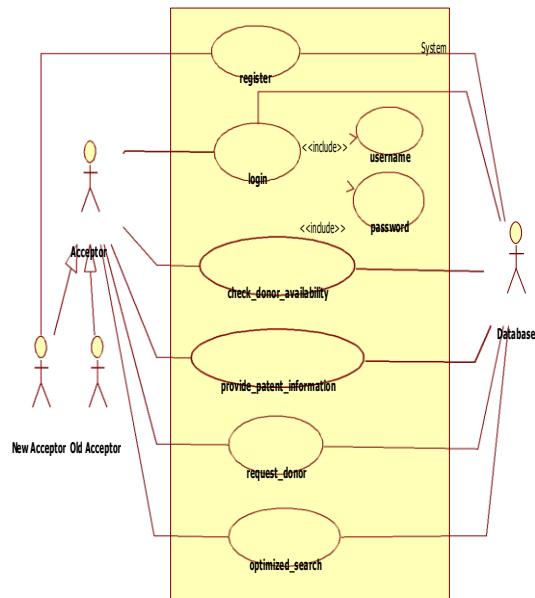


Fig 2: Acceptor Usecase Diagram

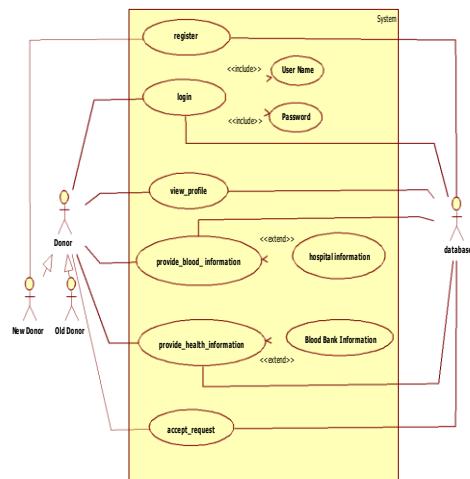


Fig 3: Donor Usecase Diagram

ADMIN:

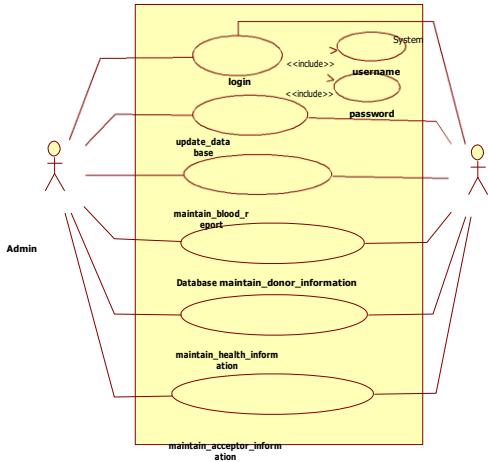


Fig 4: Admin Usecase Diagram

VI IMPROVEMENTS

All the above discussed web based blood bank management information have few of the demerits. Inventory management plays a vital role in the blood bank management, because this function provides the precise information like how much unit of the particular blood group is available, which blood group is going to finish, etc. There should be proper report generation for the inventory used in the application.

The searching technique can be improvised by giving the results area-wise using GPS and blood group-wise. If a donor for a particular blood group is not available then an alert message will be sent to an organization and the organization will notify the authorized donors. All the blood requests are shared through the social media. Lastly, all the notifications reach the user-end without any delay.

VII CONCLUSION

Today the world is become a Global

mankind. “From me to you, a gift of life”, the Blood @24*7 application helps to select the right donor nearby through online instantly using medical details along with the blood group village where everything is online. There are so many web based solutions provided in the market for the comfort of the people. This system is just one more step in order to serve the

and overcomes traditional way of searching the donors.

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CALL TAXI CUSTOMER APPLICATION

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ABSTRACT

The proposed project provides a more convenient and centralised methodology for documenting and availing rental cars to clients. The existing systems consider managing by manual means which is prone to human error, less performance, delay and inconvenience for the customer. However, the proposed system overcomes these shortcomings by providing a centralised Android application. The application has can be used in two different modes- by the admin and the customer. The admin has the overall control and monitoring features so as to edit, add or delete any entries relating to the available rental cars, the rentals, the type of car, etc. The user can view the available car details, including the rental, and select an appropriate car and book it for his purpose. He can also provide feedback to the admin relating to his experience and the admin can view these and try and resolve the problems in future. So, the system proposed is extremely convenient and interactive for the admin as well as the user. Our location will send to nearest relations or friends when we cross the particular place.

INTRODUCTION

Call taxi customer application is an android application. Here the customer can book a taxi by viewing all cab details and pricing details available according to selected city and area. It is a reliable service provided to customers. Here the details of the customers whereabouts can be sent to their nearest friends or relatives in case of emergency. The taxi service systems in big cities are immensely complex due to the interaction and self-organization between taxi drivers and passengers. An inefficient taxi service system leads to more empty trips for drivers and longer waiting time for passengers, and introduces unnecessary congestion to road network. Although understanding the performance of urban taxi service system is important, the performance of the urban taxi service is rarely examined. In this experimental paper, we investigate the efficiency level of the taxi service system using real world large-scale taxi trip data.

The existing call taxi have certain drawbacks like:-

- The existing system in the literature survey consists of paper work of the details, done manually.

- Doesn't have any safety measures.
- Feedback provision is not available to express their views.
- Location intimation not available.

The new system has following advantages:-

- The new system is totally computerized.
- The customer can give the feedback to the admin.
- An inquiry can be done easily by user.
- An information can be passed easily to the nearest relatives and friends.
- It is the most convenient application for managing online car rental business.

ARCHITECTURE

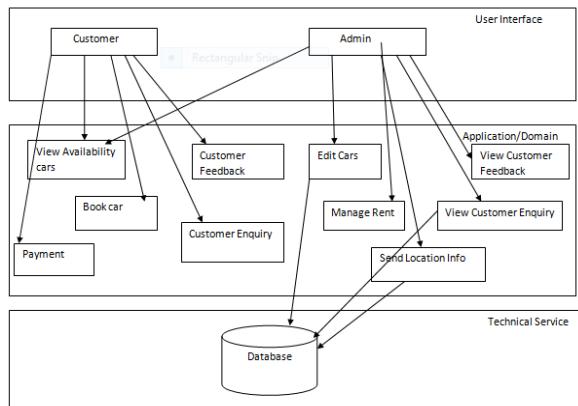


Fig1.1a) Architecture of application

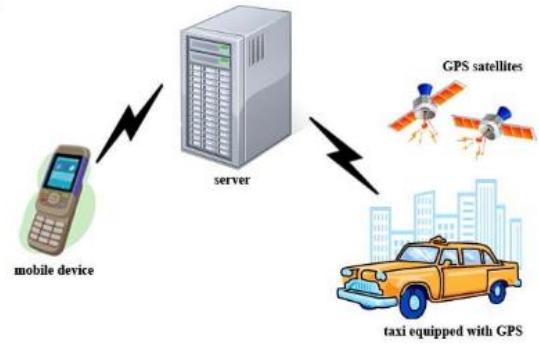


Fig1.1b) Overview of application

SCOPE OF CALL TAXI APPLICATION:

Online Cab Booking application specializing in Hiring cabs to customers. It is an application through which customers can view available cabs; register the cabs, view profile and book cabs. Cab booking service is a major transport service provided by the various transport operators in a particular city. Mostly peoples use cab service for their daily transportations need. The company must be a registered and fulfils all the requirements and security standards set by the transport department. Online Cab Booking is an android application that allows your customers to book their taxi's and executive taxis all online from the comfort of their own home or office. The platform should offer an administration interface where the taxi company can manage the content, and access all bookings and customer information. More and more Taxi companies are looking for integrated taxi booking systems as it makes life much easier for (1) The traveler - this is highly important and in today's internet age people should be able to book taxis online without having to pick up the phone and (2) the taxi company as all their bookings are now managed via an automated system which means they have an electronic record of future and historic bookings

Taxis play an important role in offering a comfortable and flexible service within Singapore's public transport system. However, customers and taxi drivers sometimes experience frustration while

seeking taxis and passengers respectively. For example, taxis may be waiting at a vacant stand while customers may be queuing in vain elsewhere. This problem has baffled taxi service ever since it existed

A Cab Booking/Hiring is an application that can be used temporarily for a period of time with a fee. Hiring a car assists people to get around even when they do not have access to their own personal vehicle or don't own a vehicle at all. The individual who want to hire/rent a car must first contact the cab hiring company for the desire vehicle. This can be done online. At this point, this person has to supply some information such as: dates of rental, and type of car. After these details are worked out, the individual renting the car must present a valid Identification Card. Most companies throughout the industry make a profit based of the type of cars. The hiring cabs are categorized into economy, compact, compact premium; premium and luxury & customers are free to choose any car of their choice based on their purse and availability of such car at the time of reservation.

MODULES:

- View Available Cars
- Booking Car
- Give Feedback
- Enquiry
- Edit Car
- Manage Rent
- View Feedbacks
- View Queries
- Send Location Info

Admin: The admin has the capability to add a car for rental purpose, manage any booking of car, manage the car rental details (cost, etc.), and also view feedback and enquiry of the customer.

User: User can view information of available cars, booked car details, car rental, etc. and easily get the car on rent. He also has an added facility to

provide feedback. He can also raise an enquiry related to any query if needed. This can be viewed by the admin and he can respond to the query directly with the customer for clarification.

MODULE SPECIFICATION

The following are the modules involved:

- Register:

From this module user can create their account, when user creates his account the user get a unique user id and password.

- View Available Cars:

This module involves details of the cars rental type such as large, premium and small car rental business. The user can view the available cars and can book a car of his/ her choice based on the rental and other specifications or features, in the 'Booking Car' options.

- Booking Car:

Here, the user can view the 'View Available Cars' and based on his preference select the booking option in order to contract or hire that particular car for use. Customer can select the time duration of the hiring in specified fields to indicate from what time to what time the car is needed for use. Corresponding rental amount will also be viewable for the customer.

- Give Feedback:

This page is for the customer to provide his/ her feedback to the administrator. This feature provides the capability for the admin to keep up the performance by ensuring that any negative feedback is noticed and the problems are rectifies as soon as possible.

- Enquiry:

In case the customer or user has any query or doubt or inquiry, they can raise the query request by using this page. They can enter their contact details

along with their query so that the admin can review and get back to the user to clarify the doubts.

- Edit Car:

This facility is provided for the administrator to add any new rental car information, or to edit any existing car details as well as to delete car details from the database. This module is linked with the 'View Available Cars' page and will be updated as and when 'Edit Car' page is updated.

- Manage Rent:

The administrator can manage the rental for each and every car updated on the application as and when required. This is helpful for the customer to estimate the cost of the rental ahead of time rather than on the spot of travel.

- View Feedbacks:

The admin can view all feedbacks that have been provided by the customers. Based on the feedback, the admin can improve on the rating of the application and improve its performance and preference in the society.

- View Queries:

The admin can view any queries or doubts posted by user. Alongside, the contact details (phone number or email ID) of the queried party will also be known. The admin can then reply to clarify the queries using the contact number provided or by mailing the user.

- Send Location Info:

When the user reaches a particular location, the Auto-messaging feature helps us to spread the news to the nearest relation or friend of that user of our whereabouts. The user has to update a contact list in the repository in order to avail this feature. At first it finds the person who is nearest to the current location for this the contacts in the database should turn on GPS service. Then the message will be sent to the

person immediately with the help of this module. The cost will be reduced from user balance.

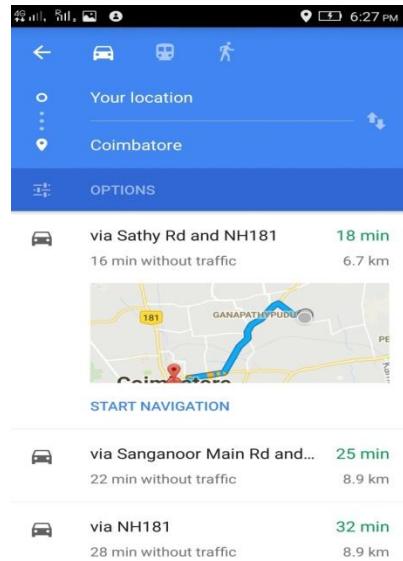


Fig1.2)Possible route to destination

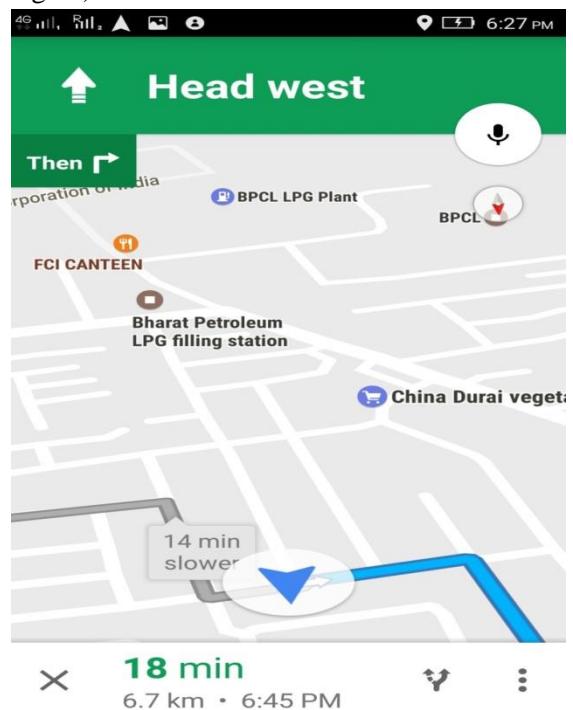


Fig1.3)Route to destination location

The GPS concept is based on time and the known position of specialized satellites. GPS satellites continuously transmit their current time and position.

A GPS receiver monitors multiple satellites and solves equations to determine the exact position of the receiver and its deviation from true time. A GPS navigation device is a device that accurately calculates geographical location by receiving information from GPS satellites.

CONCLUSION:

The main purpose of proposed system is essentially to automate entire operations and Information of Vehicles at a particular given

point of time. So that the Cab Operator and Their Customer can get best and fast Information about Their Vehicles and drivers at any Point of Time. He needs to exercise tight control on the operations and input costs if he is to provide good service at reasonable rates and yet remain profitable.

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FIND YOUR DOCTOR

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ABSTRACT

The prime objective is to create a fully-fledged application which could be used to find the doctor's list who are all registered. The users can also view the details of the doctor about where they are working and their availability. If the doctors are available the user can able to make an appointment to the specific doctor. The appointment option will be enabled to the user if the doctor is available, the message will be triggered to the user when the appointment is confirmed. The user cannot replace the time of another user's appointment, in that situation the available will be disabled. The appointment can also be cancelled which was first accepted by the doctor due to some issues. While fixing the appointment, the user can also attach the past prescription. The platform used is Android Application as front end and back end as MySQL.

I INTRODUCTION

Nowadays, The enhanced establishment of doctor-patient interaction system is a very important requirement, especially when the mobile communication technology is developing rapidly. The advantages of mobile web can be made full use of to make up the time and distance gap between doctors and patients and to provide fast and adequate medical services. Through the connection between mobile terminals and specific service, both doctors and patients are able to obtain required data to achieve a better interaction. Android is a Linux based

various Web Based Hospital Management Information System:

1.1 PRACTO:

In this application the specifications are,

open source operating system which is mainly used in portal devices with excellent performance thus making its market share growing. The platform, Web services and database technology are all gradually maturing, so that we can develop a doctor-patient interaction system on Android platform to meet the needs of the patients and provide doctors more efficient and convenient means of communication with patients.

II SCOPE

Here we present a doctor-patient interaction system based on Android. Its excellent performance on mobile terminals makes it possible for the patients to find the doctors who are all registered. The user makes the appointment depending on the status of the doctor. The appointment conformation/rejection will be send as a notification to the user. The patient can make an appointment whenever and wherever possible and interact with the doctors on their own mobile terminals. The doctor can also manage his/her appointments anywhere. In addition to this, the patient can communicate directly through call for any queries. Our solution is to build a system that will help the needful people who wants to save their precious time. It will also be useful for the people who are new to such places. Comparative Study of

- Book doctor appointments and lab tests easily.
- Consult online with a doctor.
- Set medicine reminders.

- Store your medical records.
- Get medicines delivered to your doorstep.
- Introducing the all new “List”:
- Stay on top of your health with timely health cards.
- .

Drawback:

The status of the appointment are not notified to the users.

2.2 LYBRATE:

In this application the specifications are,

- Book doctor appointment
- Ask health tips.
- Receive health tips.

Drawback:

The status of the doctor is not displayed.

2.3 BEST DOC-SEARCH & BOOK DOCTOR:

In this application the specifications are,

- Filter doctors using various parameters such as speciality, experience, fees, consulting time etc.
- Filter medicals centres.
- Can make appointment requests .
- Get appointment from Doctor
- Get details and alternative of Medicine.

Drawback:

The communication cannot be done before fixing the appointment.

III MODULES

- Registration
- Login
- Search
- Appointment
- Profile
- Help Line
- .

3.1 MODULE DESCRIPTION

3.1.1 REGISTER:

- Handy cards that keep you updated always and keeps all your medical records and medical profiles

Drawback:

The appointment is enabled even the doctor is not available. The notification also not specified.

2.4 CONSULT DOCTOR @24*7:

In this application the specifications are,

- Ask your Health question on app
- Online Doctor will be appointed to you in a minute.
- Pay Consultation Fee, Share your problem.
- Upload health reports.

Drawback

The appointment is fixed only for an online treatment.

2.5 MY DOCTOR:

In this application the specifications are,

- Find doctor near you.

The doctor and the user will register then only they can further access this applications.

The fields of doctor for registration are Doctor Name, Last Name, Age, Qualification, Email, Mobile Number, License, Specialist In, Hospital Name, Password, Confirm Password and Land Line Number.

The fields of patient for registration are Patient Name, Last Name, Sex, Age, Patient Id, Email, Mobile Number, Password, Confirm Password and Address.

3.1.2 LOGIN:

Only registered doctor and patient will logged into the application by providing their respective Email and Password.

The Forget Password also designed if the doctor or patient forget their passwords they can create a new password by providing their registered Email.

3.1.3 SEARCH:

This search module is used by the user. The registered doctors list will displayed in the page of the patient. So the patient will search the doctor for their perspective and then they make an appointment. The details of the doctor are fully displayed.

3.1.4 APPOINTMENT:

Appointment module is for both the patient and the doctor. The patient can fix the appointment

3

.1.5 PROFILE:

The registered details of the doctor and the patient is displayed.

The doctor and the patient has the option to update their profiles. The doctor can update their First name, Last name, Specialist In, Qualification, Hospital Name, Mobile number.

Likewise the patient can update their First Name, Last Name, Age, Address and Mobile Number.

The Three layers are,

- User Interface
- Application/Domain
- Technical Service

The User Interface layer specifies of the actors. The actors are doctors and the patients.

The Application/Domain layer specifies the operations of the actors. The operations are Register, Login, Search, Update Profile, View Doctor Profile, Chat, Fix Appointment and View Appointment.

The Technical Service layer specifies the database. All the details and the operation are stored in the MySQL database. Through that database the information can be retrieved.

only if the doctor is available. They provide the time, date and the problem to fix the appointment. If they needed the patient can snap the image of the prescription as an attachment.

The appointment module for doctor consists of the list of appointments that received. The received appointment will have the details about the patient and the duration. The doctor can either fix or cancel the appointment. After the conformation or rejection that popped as a notification to the patient. Due to some issues the doctor will cancel the appointment after the conformation. That also notified to the patient.

3.1.6 HELP LINE:

This module which is used to communicate with the doctor or help desk through call. The queries can be communicated with the help desk through call. By clicking the call they number is directed to call.

IV DIAGRAM

4.1 ARCHITECTURE:

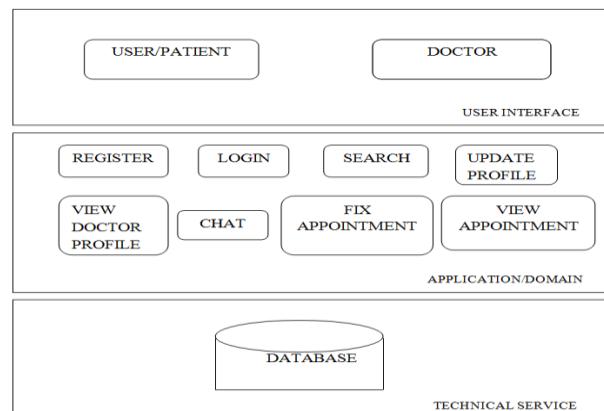


Fig 1: Architecture Diagram

4.2 SYSTEM ARCHITECTURE:

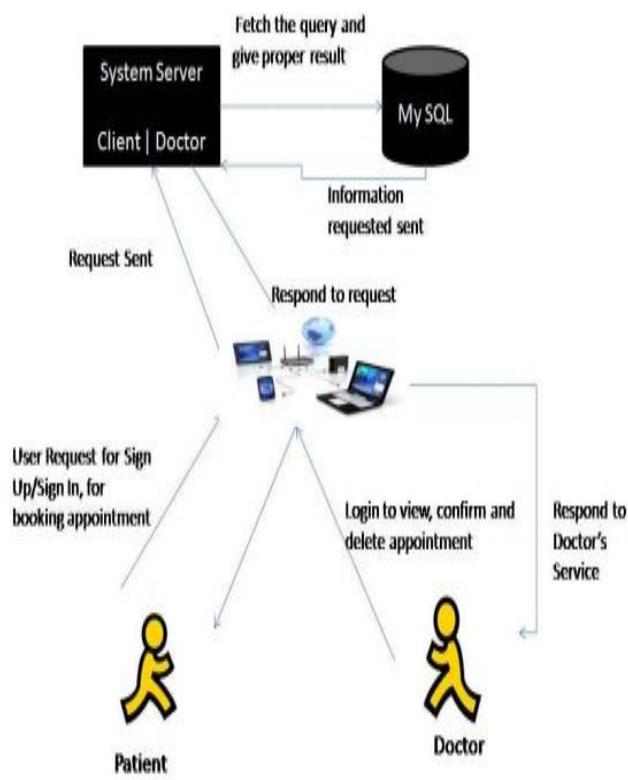


Fig 2:System Architecture

V IMPROVEMENTS

All the above discussed applications have some demerits. The improvements that we did in my project are the availability of the doctor is displayed. The appointment is fixed only if the doctor is available. While making an appointment the already fixed time is freeze so it avoids the repetition. The notification is send to the users about the conformation or rejection of the appointment. The doctor can also cancel already confirmed appointment due to some issues. That also is send as a notification to the user. The doctors have constraints to register. The doctor should provide their license to register. The user can communicate to the help desk or doctor for their queries through call.

VI CONCLUSION

This system aims to simplify the task of the patient and the doctor. It will make patients more relaxed as they do not have to stand in a long queue to fix their appointment and also book an appointment according to their choice in a more convenient way. Doctors need not worry about managing their appointment. Though you are not going to clinic for taking an appointment, your appointment gets booked from anywhere and however you want. This helps to save the time of patient. Also the patient can get the doctor of his choice through various filters used in the application. The doctor is also able to view his day to day appointment list which makes it easier for him to plan his schedule. This application will help to optimize the work of patient and doctor.

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- 17.Reducing healthcare costs with supply chain best practices. How standardized data capture saves time

GAME BASED APPROACH FOR CHANNEL SELECTION IN COGNITIVE RADIO AD HOC NETWORKS

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Abstract In cognitive radio ad hoc networks, the nodes exhibit autonomous behavior and selfishly search for the available channels to make spectrum selection decisions. A natural competition among cognitive users arises that may result in chaos and serious degradation in spectrum utilization. In this competitive and hostile environment, game theoretic model can ease this rivalry and autonomously assist in creating a subdued environment. We introduce a repeated game to alleviate the spectrum allocation problem and facilitate the cognitive radio users to make spectrum selection decision simultaneously or asynchronously. In contrast to sequential games, the proposed simultaneous move multi-stage game model is appropriate for practical applications where paucity of central spectrum management resources is common. In order to avoid the conflicts arising from coinciding concurrent decisions, we incorporate learning via history statistics to attain a stable and efficient equilibrium point. Every player computes the feasibility of playing a strategy from the action of the opponents in the previous iterations by incorporating the proposed learning rule. This learning process assists in decision making for the next iteration and the Nash equilibrium is achieved.

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Keywords Cognitive radio Game theory Convergence Spectrum allocation Learning Simultaneous move game

1 Introduction

Cognitive radios have recently become a widespread research area due their ability to efficiently use the scarce and under-utilized licensed bandwidth in a frequency spectrum. While cognition seems to be a lucrative option, it comes with a complexity of its own, especially in ad hoc networks where no governing authority exists for the regulation of frequency allocation. These cases demand a self-evolving mechanism to ensure smooth distribution and utilization of resources. The main concern regarding the resource allocation is to acquire a stable solution, called Nash equilibrium in game theory.

Almost all cognitive games discussed in literature involve a sequential playing mode where CRs or secondary users (SUs) take turns in opting for channels [1]. This leads to added delay in the network to stabilize [2], which is correlated with the number of participating players. In [3], the authors discuss CR game as a simultaneous moves game but the problem is simplified by assuming that at a certain time, only one player makes a decision with a fixed and equal probability, and the problem is solved assuming sequential moves. Similarly, other works also assign equal probabilities for making a move and the game reduces to a sequential play [4].

In [5], the authors model the spectrum access game as a purely sequential Stackelberg potential game, with license holder or primary user (PU) as the leader. On the other hand, [6] assumes that the players only choose to make moves with a fixed probability. Hence there is always a

finite probability that a player does not make a move in any iteration. This work also employs a learning algorithm to assign weights to suitable strategies for a simultaneous setup. The learning mechanism is used to alter these probabilities according to the history in order to encourage players to opt for high probability strategies. This eliminates the need for a sequential potential game. However, due to practical implications of information exchange, the players, nevertheless, make moves based on a weighted probability to avoid collisions. Another one-shot simultaneous moves game is discussed in [7], but the problem is not competitive as more channels are available for a couple of users and address a completely different scenario.

A preferred solution would be if the players can make decisions simultaneously without having to wait for their turn according to some probability. The main concern in simultaneous decisions is to avoid conflicts due to being uninformed of other player's strategy [8]. The simultaneous moves game structure eliminates the need to be informed about other players' strategies and instead only requires a player to consider its own strategy from previous plays. This process of attaining information is called learning, which serves to minimize regret, where regret is the difference in payoffs from opting certain strategies and not opting the others in previous iterations. If the regret for a certain game increases, the utility or payoff for that game decreases. The simultaneous moves inherently cannot be incorporated in potential game scenarios. To the best of our knowledge, learning and potential games are treated independently in literature [6]. Learning allows to discuss heterogeneous players, but the cognitive system mostly involves players with shared objectives.

In this work, we aim to combine the learning with simultaneous decisions setup, where players only have knowledge of history and are ignorant of currently opted strategies of opponents. This allows us to reap the benefits of learning, allowing simultaneous moves by providing improved network performance and reduced delay.

We explore the problem of cognition for a simultaneous moves game. The lack of information created due to switching from sequential to simultaneous moves is compensated in a way so as to feed the information by other means. This source of information is generated through history. The information gained from previous moves is utilized as a learning tool for players during decision making. We present a different learning algorithm, which computes the actions of opponents by a forecast rule. This creates some additional overhead for the players but improves the convergence time. This faster convergence will reduce the processing time to establish stability and hence the processing overhead is eventually reduced.

The next section presents the related works in literature. Section 3 explains the system model for the simultaneous

moves repeated game for CR spectrum allocation. Then the simulations and numerical results are explained in Sect. 4 and in Sect. 5 we conclude this paper.

2 Related work

Many researchers have employed learning in game theory to reduce information exchange and incorporate decentralized approaches [9–13]. Most of these works are based on hedge algorithms proposed by Freund and Schapire [14]. This work presents a learning based simultaneous moves game, where players take actions by computing a weight function to minimize regret. The Freund and Schapire Informed (FSI) algorithm, however, takes a much longer time to converge, though with a reduced overhead. The FSI or hedge algorithm reduces the loss by playing a safe strategy, i.e., the strategy with the highest probability of providing a better gain.

In [9], the authors present a comparison of existing game theoretic solutions for channel selection. This work describes the various challenges related to spectrum sensing and access. It is suggested that in order to address various challenges faced by the CR system, a hybrid approach incorporating multiple game theoretic solutions must be employed.

[10] discuss distributed uncoupled learning partially overlapping channels with interference mitigation, which provides improved spectrum utilization. Heterogeneous game models are explored that provide faster convergence. Binary interference model is considered for interference, which lacks the incorporation of distance and considers only the interference among neighboring nodes.

[11] propose a potential game for minimizing interference that achieves Nash Equilibrium. Two uncoupled learning solutions are provided, where the first learning scheme requires a common control channel to achieve optimal solution. The second learning algorithm does not depend on the control channel, but provides only suboptimal solutions.

In [12], the CR users compute the probability for choosing an action based on the proposed learning algorithm. The proposed scheme employs time slotting to allow a single player to transmit in one slot. This limits the CR implementation to a sequential set up. SUs select channel according to the probability computed based on the payoff obtained for all users and time slots.

The proposed scheme in [13] requires information exchange among SUs. The network is modeled as a Markovian process. The spatial adaptive play (SAP) algorithm presented allows only one player to change its action at any time. This discrepancy is removed in concurrent-SAP by allowing only random non-neighboring nodes to choose

their action. This restricts the system and requires knowledge of neighboring nodes. The work also fails to incorporate time varying networks. Moreover, the processing overhead is also large.

Besides the few selected works explained above, there are various researchers who employed learning in CR networks [15–20]. These previous works employ learning to determine a suitable channel based on highest probability. However, this still retains the sequential setup and does not allow the freedom to choose anytime by all players. Moreover, these works do not discuss transmission power and lack the consideration of impact of transmission power on other network users. We propose a solution to improve the resource consumption in terms of reduced interference and efficient spectrum utilization.

In the proposed scheme, the users decide their actions simultaneously, and examine their previous actions to observe their best strategy so far. These strategies depend on the channel cost that is determined from the amount of interference for that channel and the probability of channel utilization in the recent history. This also ensures convergence through a careful design of the utility function.

3 System model

The network consists of K PUs, each with their own channel and N cognitive players. The number of SUs is assumed larger than the number of available channels to depict a competitive environment. Since the main concern in the problem is the allocation of spectrum bands to the cognitive users, the game is played among the N SUs for over time. The PU is a silent player in this game and is assumed to be not transmitting for the duration of the K available channels as possible choices. $a_i \subseteq A$, is the action set for player i according to its strategy $s_i \subseteq S$, where $C_{ik} \delta t \leq a_k \delta t \leq N$. These action sets comprise of the available channel choices, i.e., $a_i \subseteq \{1; K\}$.

There are two different types of competitions in this cognitive game. One form of competition exists in PUs for efficient utilization of available channels. The other kind of competition exists among SUs who have the objective to gain access to the available channels. These two competitions conflict with each other in their objectives. PU strives to gain a better revenue by charging a price that is high enough to benefit but should not be too high to discourage CRs from opting it. Similarly, the SUs must opt for channels offering lower price but avoid the higher level of interference due to the presence of large number of users present on a cheaper channel. Hence, the proposed cost function is designed to balance these two scenarios.

The objective of learning is to devise one's strategy by

the game, leaving the game to be played among SUs only. If, however, a PU chooses to transmit or reclaims its channel, the game is simply played for the remaining available channels.

In this work, we assume that the transmit power levels p_{ik} , for user i over channel k are fixed for every user, though they may vary from user to user. The link gain between nodes i and j is given by h_{ij} and is assumed to be inversely proportional to the squared distance between transmitting and receiving nodes. The cost function C_{ik} for ith player over channel k depends on the amount of interference created; greater cost is charged from a player that creates higher interference over a channel. Similarly, the interference suffered by a user on a channel makes that channel less attractive, thus lowering the cost of that channel. The cost also lowers depending on the number of available channels; higher number of available channels increases the competition for attracting users, lowering the cost of channels. We incorporate the cost based on the fact that all players are attracted to an empty channel. This fact, however, is also known to the players in the game and every player knows that its opponent can opt for same and the seemingly vacant channel may become over occupied; leading to conflicts. These conflicts can be avoided by keeping a cost function that every user must pay for channel access. The channels, which are vacant, provide the best utility but at a higher cost than the channels that are pre-occupied by a few users. This eventually lowers the higher utility of a vacant channel. Hence the cost function employed is given by:

$$\frac{I^0 \delta t}{K} \quad 1 \leq \frac{I_{ik} \delta t}{I_{ik} \delta t} \quad \frac{I_{ik} \delta t}{1} \\ \frac{1}{K I_{ik} \delta t} \quad 1 \leq \frac{P}{I_{ik} \delta t} \quad 1 \leq \frac{I_{ik} \delta t}{I_{ik} \delta t} \quad 2 \leq \frac{\delta t}{\delta t}$$

where, $I_{ik} \delta t \leq p_{jk} h_{ji} f_{ji} \delta t$ is the amount of interference a user i suffers on channel k, and $I_{ik}^0 \delta t \leq p_{jk} h_{ji} f_{ji} \delta t$ is the amount of interference a user i creates over a channel k. This term behaves as a cooperative parameter, as it allows the players to behave considerately towards other network users. $I_{ik} \delta t \leq \sum_{s \neq i} I_{ik} \delta t$ is the sum of interference in all previous iterations. $a_k \delta t \leq p_{jk} h_{ji} f_{ji} \delta t$ is the probability of constantly updating its belief about the strategy of the opponent. This allows a more informed and calculated action, which may be used to provide a better performance channel usage in the previous iteration for channel k. This

factor increases or decreases the channel cost according to its suitability. The game learns by evaluating the probability of channel access from previous iteration and utilizes this probability to scale the price for next iteration. Hence, the first term scales the cost of channel according to the probability of channel access and the ratio of interference created to the interference suffered. The second

term adds to the channel cost according to the interference it provides in the current iteration as compared to the interference observed in the history. The third term

reduces the channel cost by determining the wisdom of player in recent history. If a player is successful in achieving an improved solution in the previous iteration, it is rewarded by a lower price in the next iteration.

The function $f_{ij}\delta t^p$ is the binary indicator for the presence of users on the same channel at time t and is given by:

$$f_{ij}\delta t^p = \begin{cases} 1; & \text{if } s_i\delta t^p \leq s_j\delta t^p; i \neq j \\ 0; & \text{if } s_i\delta t^p > s_j\delta t^p \end{cases}$$

The utility function for i th node with strategy s_i over a channel k , when s_i is the strategy of its opponents, is given by:

$$U_{ik}\delta s_i; s_i\delta t^p \leq \frac{p_{ik}}{N_o \int_{I_{ik}\delta t^p}} C_{ik}\delta t^p \quad (2)$$

The proposed utility function is concave in nature, hence we can utilize the following theorem to establish its convergence.

Theorem 1 The Nash equilibrium of a game with concave utility function, is achieved at the maximum value of the utility function.

Proof A point $\delta s_i; s_j\delta t^p$ is a Nash equilibrium, if it satisfies:

$$U_i\delta s_i; s_j\delta t^p \geq U_i\delta s_i; s_j\delta t^p$$

and

$$U_i\delta s_i; s_j\delta t^p \geq U_i\delta s_i; s_j\delta t^p$$

If the utility function U_i is concave, it has a maxima at point $U_i\delta s_{imax}; s_j\delta t^p$, such that:

$$U_i\delta s_{imax}; s_j\delta t^p \geq U_i\delta s_i; s_j\delta t^p$$

Similarly, for player j with concave utility U_j , the maxima $U_j\delta s_i; s_{jmax}\delta t^p$ satisfies the condition:

$$U_j\delta s_i; s_{jmax}\delta t^p \geq U_j\delta s_i; s_j\delta t^p$$

Hence, $\delta s_{imax}; s_{jmax}\delta t^p \leq \delta s_i; s_j\delta t^p$ is a Nash equilibrium solution.

Lemma 1 For the function U_{ik}^t to be concave, the second derivative of utility should be negative, i.e.,:

p_{ik}

$$\frac{\partial^2 U_{ik}^t}{\partial p_{ik}\delta t^p} = \frac{1}{N_o \int_{I_{ik}\delta t^p}} \left(\frac{\frac{1}{I_{ik}\delta t^p} - \frac{1}{I_{ik}\delta t^p}}{K_{I_{ik}\delta t^p}} + \frac{\frac{1}{I_{ik}\delta t^p} - \frac{1}{I_{ik}\delta t^p}}{I_{si}\delta t^p} \right) \frac{1}{2} \frac{1}{\int_{I_{si}\delta t^p}}$$

The first partial derivative of utility with respect to power $p_{ik}\delta t^p$, can be written as:

$$\frac{\partial U_{ik}^t}{\partial p_{ik}\delta t^p} = \frac{1}{N_o \int_{I_{ik}\delta t^p} \left(\frac{1}{p_{ik}\delta t^p} \right)^{1/4} \prod_{j \neq i} \int_{I_{jk}\delta t^p} p_{jk} h_{ji} f_{ji}\delta t^p}$$

The remaining three terms of the utility vanish after derivative as they are functions of previous time or of the power of other users p_{jk} . This simplifies the second derivative as:

$$\frac{\partial^2 U_{ik}^t}{\partial p_{ik}\delta t^p} = \frac{1}{N_o \int_{I_{ik}\delta t^p} \left(\frac{1}{p_{ik}\delta t^p} \right)^{1/4} \prod_{j \neq i} \int_{I_{jk}\delta t^p} p_{jk} h_{ji} f_{ji}\delta t^p}$$

Hence,

$$\frac{\partial^2 U_{ik}^t}{\partial p_{ik}\delta t^p} < 0$$

Thus the proposed utility function is concave with respect to the transmission power of CRs.

This work is based on determining a stable strategy set for a simultaneous moves CR game. Usually when all players make their decisions simultaneously, they tend to go for the best choice at the moment. Since all players are doing the same, the best choice no longer remains the best due to conflicts leading to higher interference levels. This instead of jumping off for the apparently best choice, the players are encouraged to analyze the players' past and 'guess' the behavior and likely action of other players. Since the players are cooperative, they are ready to accommodate other network users, instead of greedily searching for an even better payoff. Based on history, players are made to be contend with their choices if the previous choice provides a better interference than the currently available choices. Hence, players do not feel the need to change their choices unnecessarily.

Due to simultaneous decisions of players, the best response utility function formulations incorporates the pre-

favor of strategy set providing the maximum value of utility function among all previous iterations. Thus the decision function for this game can be written as:

$$W(t) \max_s \sum_{i=1}^N \sum_{k=1}^K U_{ik}^t s_i; s_i \in \mathcal{S}$$
(3)

where, $s_i \in \{0, 1, \dots, t\}$. The basic idea is to make all channels comparable so that players do not get biased towards one particular channel. Higher number of users lead to better performance due to simultaneous nature of decision making process. Instead of waiting for all users to one-by-one choose their strategies, our algorithm empower users to make their decisions at the same time as their opponents by analyzing the historical data.

When assigning power according to the water-filling algorithm, the strategy set involves jointly opting for channel and transmission power. From [6], the k th channel users have the power vector given by:

$$P_k = \frac{1}{\lambda} I - H_k^{-1} C_k \quad (4)$$

where, I is the identity matrix and $C_k = \frac{c_{kk} N_0}{h_{kk}}$. The channel vector H_k is given by:

$$H_k = \frac{1}{\lambda} h_{kj}; s_i = s_j \leq k$$

These power levels are assigned to the cognitive users based on their respective channel choices.

Algorithm 1: Iterative algorithm for the convergence of strategies

```

Randomly choose initial actions (channel and transmission power);
Define T as number of iterations, K available channels and N number of CRs;
for i=1:N do
    if two CRs choose the same channel then
        | Compute interference and utilities based on initial actions;
    end
end
for t=1:T do
    Players decide their strategies simultaneously;
    Players make moves and compute interference and utilities for all channels K;
    Choose the channel with the maximum utility value;
    Compute the best utility of all players till the current iteration;
    if previous iteration yields higher utility than the current utilities then
        | move to the channel with higher utility;
    end
    Choose the action set corresponding to the weight function W(t) for the next iteration;
    Repeat for all iterations or till players no longer change their strategies and convergence is achieved;
end

```

The basic algorithm for the proposed scheme is given in Algorithm 1. The algorithm explains the iterative procedure of channel choice by the CRs. Each player observes the interference over a channel and computes its suitability according to the payoff obtained from the channel. The

players make their moves only after determining the highest payoff channel. However, this payoff is determined based on the knowledge of previous iterations and may actually lead to a lower value due to the moves made by the opponents. Thus, an apparently suitable channel may not remain so after the completion of simultaneous game and convergence becomes hard to achieve. This algorithm allows players to utilize the knowledge of previously played games and use it as the initialization of next game. Since all players perform this operation, a weight function $W(t)$ can be formulated which is employed as the decision function, achieving network convergence.

4 Numerical results and simulations

The simulation setup consists of $N = 20$ SUs, which are competing for $K = 4$ available channels. The network topology is two-dimensional that has uniformly distributed nodes in a square region of 200 m^2 . The game is played repeatedly for some time to observe convergence. Each iteration serves as a source of learning for the next iterations. Based on each iteration, the users evaluate the probability of each channel according to the number of players opting for it in the previous iteration and utilize this probability to increase or reduce the price of that channel in the next iteration. The final decision is made by the SU based on the best utility provided by a channel among all possibilities. The results are shown in Fig. 1, which demonstrates the steady state solution for simultaneous game. The strategies or the selected channel choices for users are shown for each iteration. It can be seen from the figure that the convergence time for the game is less than or

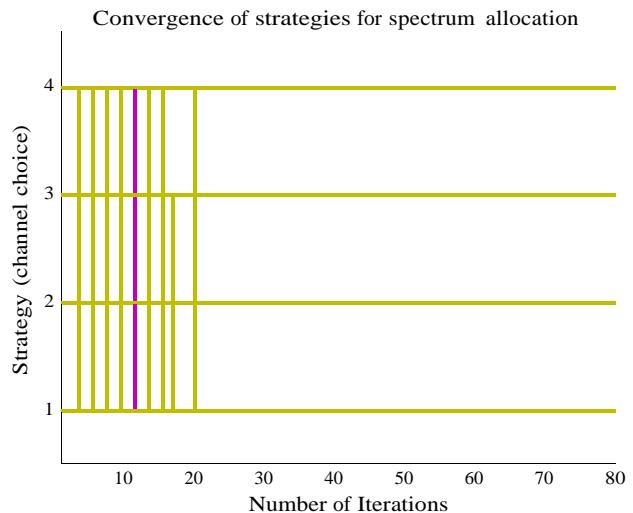


Fig. 1 Convergence of strategies for spectrum allocation

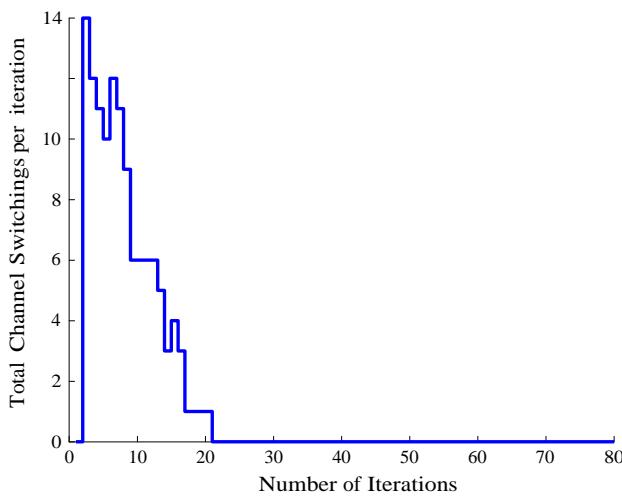


Fig. 2 Channel switching leading to convergence

equal to N and the players are able to establish their strategies according to the network size.

Figure 2 is a demonstration of aggregate channel switching observed over time. We can see that initially almost all users change their strategies. As time passes, the players get more informed through learning and fewer users need to change their strategies. This leads to convergence, observed as zero switching, and is shown in the figure.

Figure 3 provides a comparison of average network capacity obtained by employing learning schemes. The figure elaborates the learning schemes when a fixed transmission power is assigned to SUs. It is seen that the network performance is considerably improved when learning is employed in combination with the water-filling power allocation. The third curve shown as dotted line in Fig. 3 represents the no-learning scenario and performs better than fixed power learning scheme. However, it should be noted that the no-learning game is a sequential moves game and provides better performance at the cost of additional delay. This is depicted in Fig. 4, which demonstrates the increase in convergence time with increasing number of SUs. This figure is plotted in log scale for convenience and it shows the average time required to achieve convergence as the number of CRs is increased. The curve shown in bold circles represents the sequential move scenario. As previously discussed, the simultaneous move game requires much less time to achieve convergence as compared to sequential game.

5 Conclusions

This work presents a potential game framework for spectrum allocation in cognitive radio ad hoc networks. The game is played in a cooperative environment with all players

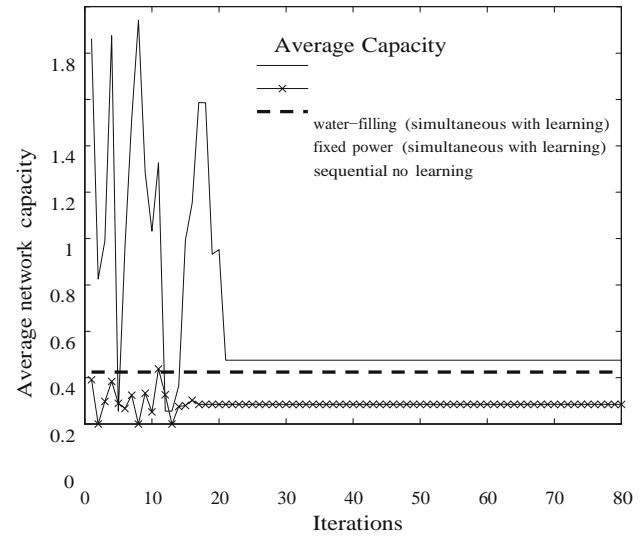


Fig. 3 Comparison of average capacity for different schemes

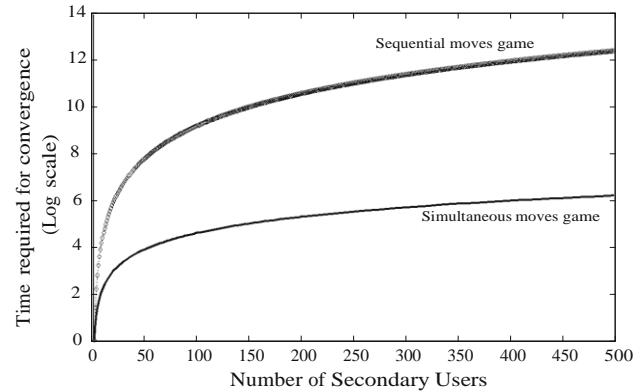


Fig. 4 Comparison of convergence for sequential and simultaneous moves games

simultaneously choosing their strategies. The cooperation is enforced among selfish players by devising a pricing scheme based on the level of interference for each channel. In order to achieve a stable and meaningful solution to the spectrum allocation problem, learning technique is employed along with the pricing mechanism. The proposed learning algorithm, which is based on the weighted knowledge of historical data, assists in avoiding conflicting and imprudent choices. To achieve a stable solution for an otherwise unsteady simultaneous moves system, we employ the concepts of learning to compensate the lack of information. This assists in achieving convergence by determining a stable solution. The time taken by the players to establish their strategies is directly proportional to the number of SUs involved in the game, which is a considerable improvement as players do not have to wait for making a decision. In sequential games, the convergence time for each user is proportional to the square of network size $O(N^2)$ due to the delays in decision making. This work deals with transmit

power levels that are assigned optimally through water-filling algorithm. The water-filling power allocation performs better in terms of network performance and reduced delay with efficient energy consumption.

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Aiswarya.R,Roshini.R	142
Akshaya Devi.S,Kaveri.S	154
Anjana.R,T.Prabhu Pandiyan	46
Ashwin Titus	14
Bhaziria J,L.Sindhu	1
Clint paxton samuel	83
Deepika.G,S.Prakadeswaran	110
Deepika.S,M.Nisha Angeline	17
Emi Tharanya L,Aswin.R	209
Hari Kowshick.L	203
Haripriya T.N,A. Haritha	104
Jahazil Samraj.M,Dharsan.K	162
Janani.S,M.P. Sushmitha Kamu	97
Mageshwaran.S,Sachin Swaminathan	
Mohan Kumar.R.S, Dr. C.Velmurugan	92

Nandhini.E,V. Madhumita	31
Nishanthini.K.T,Gethsia.S	120
Padmajaa.B,Dini Kokila.K	126
Pooja.S,Keerthika.J	222
Poongodi.D,Ranjith.M.S	131
Rajeswari.K	25
Sahaana B,Soundarajan R	61
Sakthivel.R,Rittesh G.Kothari	52
Sanju Prakash.k,Vijay kumar.s	88
Saravana Kumar.S,Arthi.A	147
Sasi Prabha.B,R.Uma	7
Sharmitaa.R,Anusha Mani	116
Sindhu A.P,Rangeela Rajendran	74
Sindhujा. V,Rathi R Nair	217
Sivasangari.T.A,A.Sudhanandhi	42
Sowmiya M,Sreemathi C.P	42
Sreelakshmi P.N	11
Sugha.K,Sreedhi.S	135

Surya M,Sowndharya E R 37

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