HEALTH ASSIST AND MONITORING SYSTEM

by

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1. INTRODUCTION

- OBJECTIVE

To solve the issue stated in the previous slide, this project has two parts basically-Location Tracking and Health Monitoring. The system will be useful for monitoring patient's location using GPS.

The second part of the system which will contain the health monitoring system will be able to track the patient's pulse rate and using the GSM Module all the information can be shared through SMS service to the desired phone number.
Density of COVID-19 cases in India are one of the highest across the world. Using advance wireless technology of GPS, it is possible to provide medical facility to COVID-19 victim within short period of time. On the other hand, where the patient's family members have no contact with the patient, they will be able to track their beloved family member's health and location.
It will also become more convenient for the hospital to track down the health of all the patients' health data through a single monitor when they scale the project.

- MOTIVATION

The COVID-19 Pandemic has given a major blow to the medical system of our country and the world. India has witnessed over 1.1 Crore cases of COVID-19 and caused over 1.57 Lac deaths. As per various journals and newspaper articles a lot of causalities could have been avoided if our medical system would have been more equipped and the infected patient's health could have been monitored in a more efficient way. Design a system which will help in monitoring a patient's basic medical condition and track their location in an efficient way.

2. LITERATURE SURVEY

1.1 Study of Health Monitoring System

Literature Survey: Paper [1]

Paper Title	Authors	Year	Methods	Conclusion	Limitations
Study of Health Monitoring System	Megha Chavan VLSI & Embedded, Electronics and Telecommunication, MITCOE, Kothrud, Pune meghachavan555@gmail.com Prof. Prajakta Pardeshi VLSI & Embedded, Electronics and Telecommunication, MITCOE, Kothrud, Pune Dr. S.A. Khoje VLSI and Embedded, Electronics and Telecommunication MITCOE, Kothrud, Pune suchitra.khoje@gitcoe.edu.in Prof. Manasvi Patil VLSI & Embedded, Electronics and Telecommunication, MITCOE, Kothrud, Pune	2020	This study reviews enhancement in health care system. It focuses on portable, wearable and android technology-based health monitoring system. This study reveals different approaches for health monitoring.	Most monitoring system major vital signs and send it to remote station like local server, PC/Laptop for further processing. Different communication protocols like Zigbee, Wi-Fi, Bluetooth are used in smart health monitoring. Various health monitoring platform are validate by different experimental study and clinical trial. By validation procedure, one can easily understand accuracy, flexibility, precis ion rate etc. of various systems in depth	

1.2 Sensing Heart-beat and Body Temperature Digitally using Arduino

Literature Survey: Paper [2]

Paper Title	Authors	Year	Methods	Conclusion	Limitations
Sensing Heart-beat and Body Temperature Digitally using Arduino	Salomi S. Thomas; Mr. Amar Saraswat; Anurag Shashwat; Dr. Vishal Bharti	2016	Arduino is used because it can sense the environment by receiving input from variety of sensors and can affect its surroundings by controlling lights, motors, and other actuators. The microcontroller on the board is programmed using the Arduino programming language". LM35 is used for the sense body temperature. Body temperature is a basic parameter for monitoring and diagnosing human health. Heart-beat sensor was used for sensing heart rate. This device will allow one to measure their mean arterial pressure (MAP) in about one minute a n d the accurate body temperature will be displayed on the Android.	Digitally sense body temperature and blood pressure using gardenia can show the accurate results will be displayed on the LCD monitor. This device will allow to measure continuously the mean arterial pressure (MAP) in about one minute and the accurate body temperature will be displayed on the LCD screen.	It is not possible for a doctor to observe a patient's heart rate per minute and body temperature all the time

1.3 An IoT based Patient Health Monitoring System

Literature Survey: Paper [3]

Paper Title	Authors	Year	Methods	Conclusion	Limitations
An IoT based Patient Health Monitoring System	1D.Shiva Rama Krishnan, 2Subhash Chand Gupta, 3Tanupriya Choudhury 1,2Amity University, UttarPradesh,Noida,India, 3University of Petroleum and Energy Studies, Dehradun, India 1d.shiva90@gmail.com, 2 scgupta@amity.edu, 3 tanupriya1986@gmail.com	2018	This system uses Temperature and heartbeat sensor for tracking patients health. Both the sensors are connected to the Arduino-uno . To track the patient health micro-controller is in turn interfaced to a LcD display and wi-fi connection to send the data to the web-server(wireless sensing node). In case of any abrupt changes in patient heart-rate or body temperature alert is sent about the patient using IoT.	The Health-monitoring system takes less than a minute to compute the result of ECG ,Blood Pressure and Temperature Monitoring .This Research Paper planned this Patient well-being nursing scheme by the requirements suggested by the Patient. Because of wireless Sensor network and data transfering over the internet. From this all the health related data and information of the Patients will be easily accessed on doctor's smartphone	PIC controller working here is needed to connect external outlying for gesture acclimatizing. Therefore, time-cost ,memory storage and increases. Hence, as exterior outlying upsurges price and mem-size similarly rises.

1.4 Design GPS and GSM based Ambulance Tracking with Health Monitoring System

Literature Survey: Paper [4]

Paper Title	Authors	Year	Methods	Conclusion	Limitations
Design GPS and GSM based Ambulance Tracking with Health Monitoring System	A. Palanisamy; S. Praveen Kumar; K. Santhosh Kumar;S. Vaitheswari; D. Nithyanandhan	2016	with the help of GSM technology, the data of patient health can be sent to a longer distance through SMS. With the help of this, doctor could have all prior information ready in hand before the patient reaches to the hospital. With the use of GPS technology, the exact co- ordinates of ambulance can be tracked. And then distance from the hospital can be found out. Thus we can get / manipulate approximate time for the ambulance to reach to hospital.	This project basically focuses on monitoring the condition of patient and transmitting it to hospital along with patient's location ,so that hospital can prepare in advance and also have an estimate time in which patient will reach the hospital	It can only be used to monitor simple health conditions and not any complex condtions.

1.5 A SMART PATIENT HEALTH MONITORING SYSTEM USING IOT

Literature Survey: Paper [5]

Paper Title	Authors	Year	Methods	Conclusion	Limitations
A SMART PATIENT HEALTH MONITORING SYSTEM USING IOT	C. Senthamilarasi ; J. Jansi Rani; B. Vidhya ; H. Aritha	2018	Vital parameters are measured and then transferred to an Arduino Uno and then amplified there and then transferred to the cloud so that it can be stored and monitored, and data can be collected .	The proposed system of patient health monitoring can be highly used in emergency situations or pandemics like covid-19 to collect data records and stored in as a database	Like most of the other Arduino board projects.. there is a small error percentage in measuring which won't affect much in a single diagnosis but if the collected data is from a large group base, the average data may vary a bit which might affect further researches which use that data.

1.6 RSA Public Key Cryptography Algorithm – A Review

Literature Survey: Paper [6]

Paper Title	Authors	Year	Methods	Conclusion	Limitations
RSA Public Key Cryptography Algorithm – A Review	Shireen Nisha, Mohammed Farik	2017	It is an assymetric encryption, which means a public key is used to encrypt the information and a private key is needed to decrypt the infromation at the other end.	RSA algorithm helps in increasing the security. While passing the information of the patients to the hospital or their loved ones, the security is most important and vital thing which is needed to be taken care of and RSA helps in increasing the security.	This algorithm increases the securiyt but also consumes time for encoding the message and then decoding the message. And the decoding of messages have some minimum requirments of system which sometimes are not fulfiled at that time.

1.7 Research and Implementation of RSA Algorithm for Encryption and Decryption

Literature Survey: Paper [7]

Paper Title	Authors	Year	Methods	Conclusion	Limitations
Research and Implementation of RSA Algorithm for Encryption and Decryption	Xin Zhou, Xiaofei Tang	2011	RSA is an asymmetric type encryption. In this encryption, we get a public and private key. The private key needs to distributed to the correct person and public key helps in editing the current information.	The encryption and decryption helps in solving the security problems of the system. The distribution of keys also needs security. Teh paper discusses all about encryption, decryption, RSA approach, uses of public key and at last enhancement of RSA algorithm.	

1.8 Secure SMS Encryption Using RSA Encryption Algorithm on Android Message Application

Literature Survey: Paper [8]

Paper Title	Authors	Year	Methods	Conclusion	Limitations
Secure SMS Encryption Using RSA Encryption Algorithm on Android Message Application	Hüseyin Bodur and Resul Kara	2015	This paper focus on the testing of SMS application for encrypting the SMS using RSA algorithm. It secures the messaging process, and the developed app is tested with various key sizes, powerful messaging.	RSA algorithm is stronger than symmetric algorithm in terms of security and offers better security. The SMS travels from one point to another and is transferred through various platform and hence RSA encrypts the SMS in a better form.	The encrypted message is larger than the original message because of some symbols used in between and the length of the message which can be encrypted and shared is limited.

1.9 A Hybrid Approach for Enhancing Security in IOT using RSA Algorithm

Literature Survey: Paper [9]

Paper Title	Authors	Year	Methods	Conclusion	Limitations
A Hybrid Approach for Enhancing Security in IOT using RSA Algorithm	Shireen Nisha, Mohammed Farik	2019	IOT is all about the communication and digital machine. This paper explains us about the encryption using RSA algorithm and concentrates on the hybrid approach to RSA.	The researchers combined their own appoach to RSA algorithm to enhance the security and lower the limitations. This improves real time security. The system takes 2 factor authentication.	It takes more time than normal RSA algorithm because of 2 factor authentication and delay in processing.

1.10 A STUDY AND PERFORMANCE ANALYSIS OF RSA ALGORITHM

Literature Survey: Paper [10]

Paper Title	Authors	Year	Methods	Conclusion	Limitations
A STUDY AND PERFORMANCE ANALYSIS OF RSA ALGORITHM	M. Preetha , M. Nithya	2013	Many users world-wide feel a constant threat to their security. And most of them want to get secured with better security measures. So, this paper aims towards creating a better workspace for such users.	There has been a slight modification of RSA-OAEP which provides extra advantage to the user by enhancing the RSA algorithm and the braking system. Moreover, this scheme can be used to eliminate the use of hybrid or symmetric approach.	It takes more time than normal RSA algorithm because of 2 factor authentication and delay in processing.

3. TECHNICAL SPECIFICATIONS

We have used various components and sensors and coded on Arduino UNO and stimulated these components on online software. The simulation shows the pulse rate and heart beat of the patient using the heart beat sensor. The software uses GPS and GSM module to communicate the location and contact details of patient to the doctors and the family members. The security of the process is maintained with the help of RSA algorithm which is an asymmetric algorithm with public and private keys. The private key is provided to the family members after authentication.

All the components used in proteus:

- **Arduino UNO:**

Arduino is an open-source electronics platform based on easy-to-use hardware and software. Arduino boards are able to read inputs - light on a sensor, a finger on a button, or a Twitter message - and turn it into an output - activating a motor, turning on an LED, publishing something online.

- **GSM Module:**

It describes the protocols of 2G digital cellular networks used by mobile phones and is now the default global standards. It is used to establish a communication between the mobile devise and system.

Function of 3 pins:

1. Power Supply: For supplying basic power.
2. TXD: It is GSM Transmitter pin. It connects the MCU RXD pin. It will send the response for your commands
3. RXD: This pin will receive the commands from MCU.

- **GPS Module:**

The GPS receiver gets a signal from each GPS satellite. The satellites transmit the exact time the signals are sent.

GPS module comes in a complete package that requires no other external circuitry for GPS reception. It may or may not contains antenna on it.

- **Pulse Sensor:**

Pulse Sensor is a well-designed plug-and-play heart-rate sensor for Arduino.

The sensor clips onto a fingertip or earlobe and plugs right into Arduino with some jumper cables. It also includes an open-source monitoring app that graphs your pulse in real time.

- **Virtual Terminal:**

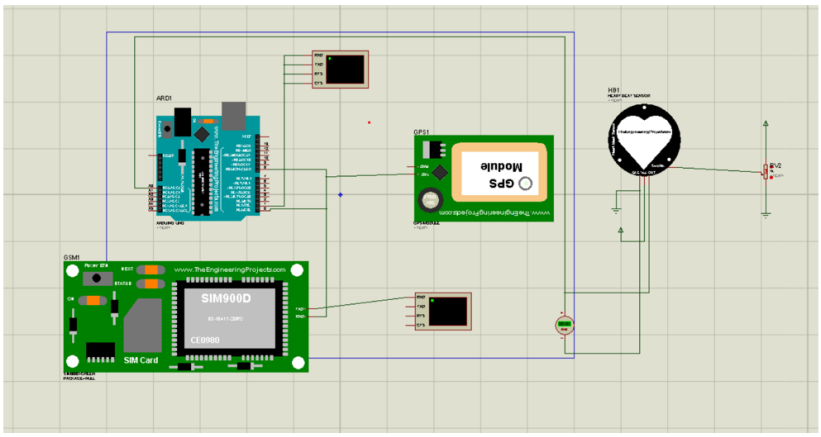
Virtual Terminal is a tool in Proteus, which is used to view data coming from Serial Port (DB9) and also used to send the data to Serial Port.

- **Connecting Wires**
- **Ground**

4. DESIGN

The system is designed on online software- Proteus and coded on Arduino IDE. The design of the system includes proper functioning of various sensors and modules working collectively to execute the patients' health report to the doctors and the guardians and family members. The designing module includes displaying the information with the help of Virtual Terminal.

Design



5. PROPOSED SYSTEM

The system takes the information of the patients and measures the heart eat and pulse timt-to-time and communicates the information with the hel SIM900 GSM module and also the GPS module helps conveying the exact location of the patient to the private key holders. The SIM900 GSM module shares the location and health details.
The RSA algorithm is then used to enhance the security of the system. The RSA algorithm is an assymetric algorithm that encrypts the data and then generates the public and private key corresspondingly which are shared to the doctors, hospital staff and the family members after proper authorisation.

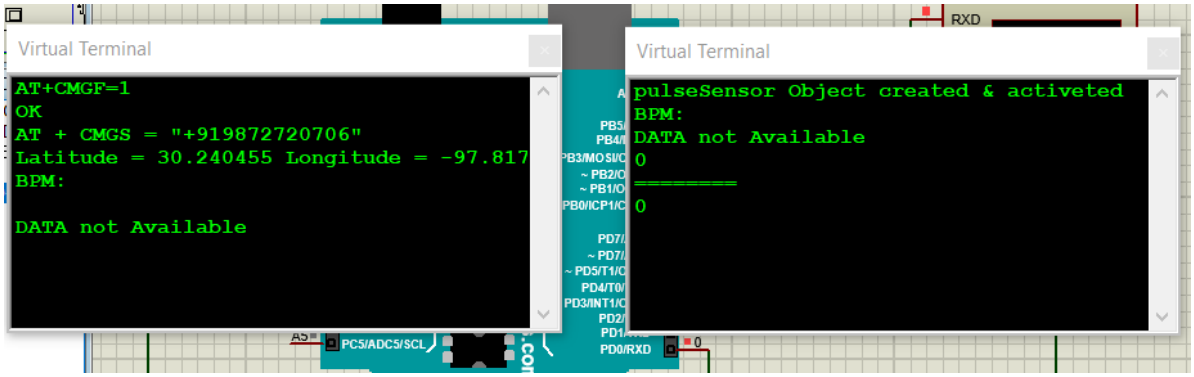
6. Cost Analysis & Future Work

Cost analysis: Cost includes the tool used.

- Pulse sensor cost: 400 INR
- GPS sensor: 700INR
- GSM sensor: 600 INR + sim cost for establishing communication

Future work includes designing a software which would transmit the public and the private key to the holders in safe and secure manner.

7. RESULTS AND CONCLUSION




```
                 from /usr/include/c++/6/string:52,
                 from /usr/include/c++/6/bits/locale_classes.h:40,
                 from /usr/include/c++/6/bits/ios_base.h:41,
                 from /usr/include/c++/6/ios:42,
                 from /usr/include/c++/6/ostream:38,
                 from /usr/include/c++/6/iostream:39,
                 from main.cpp:14:
/usr/include/stdio.h:638:14: note: declared here
 extern char *gets (char *__s) __wur __attribute_deprecated__;
              ^~~~
main.cpp:94:13: warning: 'char* gets(char*)' is deprecated [-Wdeprecated-declarations]
     gets(msg);
             ^
In file included from /usr/include/c++/6/cstdio:42:0,
                 from /usr/include/c++/6/ext/string_conversions.h:43,
                 from /usr/include/c++/6/bits/basic_string.h:5429,
                 from /usr/include/c++/6/string:52,
                 from /usr/include/c++/6/bits/locale_classes.h:40,
                 from /usr/include/c++/6/bits/ios_base.h:41,
                 from /usr/include/c++/6/ios:42,
                 from /usr/include/c++/6/ostream:38,
                 from /usr/include/c++/6/iostream:39,
                 from main.cpp:14:
/usr/include/stdio.h:638:14: note: declared here
 extern char *gets (char *__s) __wur __attribute_deprecated__;
              ^~~~
main.cpp: In function 'void decrypt()':
main.cpp:203:26: warning: format '%c' expects argument of type 'int', but argument 2 has type 'long int' [-Wformat=]
         printf("%c", m[i]); //converting ascii to alphabets
                          ^
/tmp/ccQYEsyf.o: In function `main':
main.cpp:(.text+0x2c3): warning: the `gets' function is dangerous and should not be used.

Level of Encryption
1.Mobile/Portable
2.Intermediate
3.Crucial
```

- We aimed at designing a health monitoring system which would communicate the health report of the patient to the doctors and guardians using the software in an encrypted manner. We were successful in building the contact and implementing the RSA algorithm for encrypting the data as well as decrypting the data at same time.
- The tool transmits the pulse and BPM of the patient along with the exact location coordinates of patient to the key holders in an encrypted manner

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