



Report
On
REMOTE MONITORING

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1. ABSTRACT

Now a day's technology has become even more advanced, challenges in the design of Home Automation Systems are increasing apparently. Seamless control on home appliances by the end user have yet to be entered in the mainstream. This could be a challenging task to create a fully independent and flexible Home Automation System that can support all kinds of devices and technologies related to different functionalities and networking protocol. This report describes how to monitor and control home appliances using the android smart phone app which can works over the Bluetooth network. Though there are many different type of home automation system present in the market however they all have some limitation in their design and operate only under certain condition. Therefore, there is need to develop a home automation system which can control and monitor the home appliances efficiently. This system will prove helpful to the physically challenged people. The main objective of this report is to propose a virtual yet practically useable android based home automation system. The android app is used to send the commands to the microcontroller like Arduino to control and monitor the home appliances. The main feature of this proposed system is to integrate sensors sensed data along with the user commands to control the appliances. The data collected by the sensors will be processed by the microcontroller and based on that further action will be taken regarding the home appliances. The sensors can be used to control the intensity of the light and fan accordingly to the surrounding environment in which the system is placed. The system will help the user in conserving energy by automatically switching of the lights and fans when there is no need of them i.e. if enough day light is present in the room the system will turn off the lights automatically. Similarly, if the room temperature is drops down the user specified comfortable temperature the system will reduce the speed of the fan or turn the fan off.

Keywords: Remote monitoring, Arduino Mega, Wi-Fi, Low cost, Human interfaced system

2. INTRODUCTION

2.1 General introduction of IoT

The Internet of Things is a basic concept to work with different devices connected over a specific network. These devices synchronize amongst themselves, sense and collect the data from the surrounding environment and then exchange this data across the network where it can be processed and used for various purposes. Interestingly all appliances of our house can be integrated to work with the IOT system. This creates a whole new domain of Home Automation System where all the devices and gadgets of the home gets integrated with the IOT system using Sensors, Wi-Fi or Bluetooth adaptor, Microphone, Cameras etc.

2.2 Application of domain

Home automation systems implements the basic version of IOT concepts for devices like light bulb, fans, A.C.'s, television etc. Using the IOT concepts these devices can be controlled by the user as well as the computing systems. Many different types of sensors are now available in the markets creating a whole new era of complete automation of our home appliances where the user doesn't have to wake up from his chair to switch off the light or to open a door for the guests, all these were handled by the Automation system with the help of appropriate sensors.

2.3 Specific information about domain

With the development in the field of IOT a whole new era of smart devices has been emerged in today's world. With the help of sensors, we can sense physical parameter and used to monitor or control home appliances. In this project we have added four sensors which will help the user to use home appliances with more efficiency.

3. Literature Survey

- 1) In [1], with the advancement in technology and in different aspects of science, we have observed that sustainable sources can be used to generate energy for the different fields like industries, domestic etc. Since there has been such advancement in technology, the way to control home appliances has also changed drastically. If we compare the two eras, we can see that in the olden times we used custom made electrical cables whereas now we use the Zigbee technology. This paper tells us about this new technology that focuses on both the aspects of energy that's energy consumption as well as generation of energy. This Zigbee controls and monitors the energy consumption and also uses PLC to generate the energy. At that point home server gathers the vitality utilization information and vitality era information and breaks down them for vitality guess and control the home vitality use calendar to droop the vitality cost.
- 2) There has a lot of research going on in the recent years regarding home automation. There are various ways in which this can be done. Now days researchers are using technology like visual basin and PLCC. Optimization of this also helps us to reduce the energy consumption
- 3) This research paper is about using android phones via an app to control the different appliances at home. This saves our long time problem of conserving the energy thus is energy efficient. This research paper tells us the different hardware and software used to bring this app into existence and thus helping us understand the mechanism behind the complete working of this app and also gives us insight of the various issues that we may face while building this app and also while operating it.
- 4) The Framework of Home Remote Automation System Based on Smartphone Technology makes life easy. The major aim of technology is to make us lazy or in other words reduce the workload on us. Technology makes us utilize our time more efficiently and thus technology of home automation which works on the SMS and voice recognition principle aims t the same. This research paper tells us about the prototype which helps us control the home 0appliance using SMS and voice recognition.
- 5) With the advancement in technology, we tend to forget the people who need it most. This research paper focuses on these people and makes their life easier. The people who are paralyzed, it is difficult for them to control the home appliances. Hence this research paper has introduced a system for these people. The system of home automation works on the principle of voice recognition and has a voice recognition module installed. Thus helping the people to control the home appliances according to their comfort.

- 6) Speech Recognition Based Wireless Automation of Home Loads- E Home Every day we are going for an unwinding and more laid back home. Paper presents outline and model usage of an essential home mechanization framework in light of SMS innovation and voice acknowledgment. Innovation assumes a noteworthy part in making our homes more computerized and subsequently laid back. This exploration intends to outline and actualize a practical yet adaptable, versatile, and secure Home automation framework.
- 7) Smart Home Automation: GSM Security System Design & Implementation
Speech Recognition Based Wireless Automation of Home Loads- E Home Every day we are going for an unwinding and more laid back home. Paper presents outline and model usage of an essential home mechanization framework in light of SMS innovation and voice acknowledgment. Innovation assumes a noteworthy part in making our homes more computerized and subsequently laid back. This exploration intends to outline and actualize a practical yet adaptable, versatile, and secure Home automation framework.
- 8) There are many advantages of home automation and hence its gaining popularity day by day. This can be done by various methods, for example, local networking and remote control. This research focuses on home automation via Emails. Home automation is highly affordable and makes life simpler and hence is gaining a lot of support, research and implementation.
- 9) Internet of things has become very popular however people don't actually know what is internet of things. People have the wrong notion regarding internet of things. Now a days it has become a trend more than a technology. IOT is about the optimizing objects so that it can be controlled via internet. Various devices are connected with each other or linked with each other to make this work and hence give us a smoothly functioning technology.
- 10) Bluetooth has brought a drastic change in the world of technology. Being wireless and helping transfer data at a short distance helps it greatly in today's world. Bluetooth has found its application in many appliances and in many ways in today's world. In this research paper, Bluetooth has been used to control our day to day appliances, that is, home automation.
- 11) Radiofrequency Interconnection between Smart Grid and Smart Meters Using KNX-RF and 2.4 GHz Standard Protocols for Efficient Home Automation Applications Smart networks have pulled in extensive enthusiasm for the exploration group and among market performing artists. The principle enthusiasm of savvy framework is to ceaselessly screen the entirety framework vitality and upgrade it keeping in mind the end goal to build the by and large vitality proficiency.

To this reason, a power vitality administrator like Linky (ERDF extend - France) is expected to guarantee the trade of control and sensor data between the savvy lattice arrange and the keen network end-gadget gear inside the house. This paper gives a full comprehension of the Linky meter that works under a two-way productive radio home robotization convention: KNX-RF (868MHz) and ZigBee (2.4 GHz). In this setting, the paper displays a review over the KNX-RF convention regarding the ZigBee convention as far as range, utilization, heartiness and arrangement. It likewise gives a investigation of a run of the mill utilize case situation including Linky brilliant meter.

- 12) Home automation has become of the advanced technologies when it comes to the surveillance system. Technologies like the Wi-fi and the Bluetooth have been utilized as they are one of the most efficient ways as in it is of low cost, requires low maintenance and most importantly helps in energy conservation as it helps in saving electrical energy and also is of low complexity.
- 13) In this research paper they have described about controlling the home appliances using micro controllers and android mobile via GSM module. People are moving towards the advancement of technology, not only it has become a need but also status symbol. The newer the technology is implemented, the higher is the status symbol. Technology and science have its own pros and cons along with these home automation technologies.
- 14) This research paper focuses on rehabilitation engineering, an engineering which deals with making the life easier for people having disabilities using technology. This research paper focuses on one such engineering. It focuses on home automation using hand gestures. This technology improves the quality of life for the people who are vision impaired. They use MEMS accelerometer for the same.
- 15) This paper tells us about the advancement in smart home technology, that is, the embedded system within home appliances. There is dependably a stipulation for home automation through cell phones. The fundamental targets are to help old matured individuals and crippled and to control the home apparatuses from remote spots. The application is made and optimized with to control home appliances via Bluetooth and GSM for indoor and outdoor respectively.
- 16) In [16], Yen-Shin Lai proposed an internet based automation system for home. The system is based on the client server architecture. The system also allows the user to control the inverter for A.C. system. The user can send command to the client which as a result look up into the database containing the information for that particular user using a Web Browser. The server handle control of the appliances, take care of communication with the interface and PLC. The server also handles the

job of creating and maintaining the database for the sensed physical parameter like temperature and light.

- 17) In [17], Ximin et al describes an online remote monitoring system. In this system, a microcontroller is connected to the PC which is connected to the internet server via RS232 interface. The input/output ports are used to connect house appliances. The code is based on JAVA and C. The sensors are directly connected to the pins of the microcontroller. For security purpose secret protection was used in this system.
- 18) In[18], Colak Ilhami produced a system which can control the HVAC system i.e. Heating Ventilation Air – Conditioner system. The system can be controlled by three completely different units namely web based device, a hand-held device and a manual control unit placed on the top of HVAC system. PIC microcontroller is used to control the hardware of AC. User send commands on forms which have CGI program that perform the task requested by the user. The current status of the system is analyzed by the PIC microcontroller and displayed on the display module.
- 19) In [19], Chen Chao described a system which can monitor the house remotely. The system was formed in the 3 parts: a PC used for watching appliances, a dominant terminal consists of ARM microcontroller, information acquisition module and a GRPS communication networks. The GRPS module is connected to ARM system using port. The client can access the remote monitoring system through internet and can analyze parameter of wind turbines.
- 20) In [20], Kumari and Malleswaran proposed a real-time equipment condition observation system based on internet based technology. The system uses ARM based LPC microcontroller board, sensors and communication interface. The main function of this system is to gather real time information data of the appliances. The system uses TCP/IP protocol as transport protocol. The pc gather the information and current status through the network and compute the comparison with the previously stored data.
- 21) In [21], Burger and Frieder introduced a new technology known as KPML i.e. Key Press Terminology and SIP Event package to control the home appliances remotely from anywhere in the world without any need to install any specialized hardware within the home appliances. This new tech provides an cost-effective, dependable protocol for the remote controlling of user devices.
- 22) In [22], Hongping and Kangling described the design of embedded remote monitoring system using internet. The system uses embedded internet server which helps in improving the stability and reliability of system. System uses JAVA application program to provide the interface for dynamic monitoring of the appliances. The system was able to bring a lot of convenience to the user.

- 23) In [23], Zhu and Cui introduced an intelligent observation system that can work remotely and based on Internet. The Internet Monitoring Terminal(IMT). The IMT provide anti-theft alarm function along with detection of temperature, air and sound pollution. The system uses MCU that operates with 32-bit ARM kernel. It contains TCP network protocol module and provide support for internet technology.
- 24) In [24] (Bing Li et al., 2008) proposed a system which uses the internet for communication. There is a USB based internet camera which monitors all the activity of the home. The internet connectivity is done using GPRS module. The operating system running behind is the LINUX kernel which employs network programming to connect using GPRS module.
- 25) In [25] (Yang Musheng et al., 2008) describes a model which uses GPRS module to send data over the internet for remote communication. The system employs serial interface module and display module. The system adopts some advanced concepts of mathematics and electrical to analyze and process the database data using relation curve, discharge curve etc. After analysis the system take smart decisions and save power utilisation.
- 26) In [26] (Yang Musheng et al., 2008) proposed a home automation system based on GPRS module, the output of different sensors is given as an input to an intelligent processing unit which is made up of two IC's AT89C55 and serial EPROM X25045. The EPROM also take care that in case of power cut all the data is stored and can be retrieved whenever power is re-supplied.
- 27) In [27] Shih-Pang Tseng proposed a model of remote monitoring system which employs ZigBee technology to communicate data over a secured connection, they are using a smart socket for the communication with Zigbee module. For the storing of sensed data by the sensors Virtual machines in the cloud are being used.
- 28) In [28] Jan Gebhardt, Michael Massoth, Stefan Weber and Torsten Wiens describes a prototype model for the Raspberry pi KNX based remote monitoring model. There are multiple actors(users) profiles for a home and accordingly privileges are given to individuals for example guest privileges, home owner privileges etc. Also the other focus of the model is to minimize the overall energy consumption of the house.
- 29) In [29] the author describes a system which is controlled using PIC16F887 IC microcontroller and GSM Module for remote monitoring, the main advantage of the

system is scalability, high range and secured connection, the only disadvantage of the system is cost overhead of the SMS.

- 30) In [30] Colak Ilhami designed a prototype model for heat ventilation AC system. The system monitoring is done using internet. The system can be described as a combination of three different modules namely web based controller manager, a remote (can be a smartphone) and the microcontroller. Specifically, the IC used is PIC16F877 microcontroller. The internet connectivity is based on the use of DAQ board integrated with PCI bus server. The user first has to verify credentials in order access the features.

3.1 Comparison with existing technology

1. GSM based Remote Monitoring System

The most commonly used system is based on GSM module. The real time monitoring has been the important feature of this system where any change in the status of appliances is transmitted to the user in the form of SMS. The GSM module is used as a communication method between the system and the user. The server uses AT commands to communicate with the GSM. This system is SMS based system. The control of home appliances is done through SMS codes. This system however includes additional cost for the SMS and there is no UI that a user can use to control the devices. One more drawback for this system is that this system is not able to program the devices. Also, the delivery of the message can be delayed. The system doesn't take care about the state of the devices and expects the user to have track of it. Since, PC is used to decode the SMS in this system its becomes essential to keep the PC on all the time. Also, security of the system is not that much good since passwords are sent freely over the network.

2. Bluetooth Based Remote monitoring

Other commonly used home automation systems are Bluetooth based which is more secure than GSM based system since Bluetooth is password protected and prevents any misuse by intruders. It is also fast and cost effective system. A feedback module is also included in this system which will provide the status of every device after every signal toggle. The main drawback with Bluetooth is that it takes a too much time to discover and access devices in its vicinity. Real time access cannot be achieved. And the user cannot control the devices from anywhere, the access is limited to the Bluetooth range i.e. 10 to 100 meters.

3. ZigBee Based Remote monitoring

ZigBee based Home Automation systems are popular because it provides voice recognition system which is used to control the appliances. This

system uses ZigBee wireless communication technology and PIC microcontroller. The voice commands are taken from the microphone then it is processed and compared with already stored voice commands. The drawback for this system is that ZigBee is a low range communication medium. So remote access is not possible from faraway locations. Also, the voice recognition module could become unwieldy.

4. Wi-Fi based remote monitoring

Wireless Control Systems can be used to link up standalone appliances that are present at home or in office and integrates them to form a co-operating network. This system uses Open Service Gateway Interface (OSGi). Speech based commands can also include in this system along with some advance features such as device discovery and device connection. The system uses android smart phone application to communicate with the PC which serves as a Server through internet, because of this reason the PC needs to be left on all the time. One more disadvantage of this system is it require Internet connection for sending commands to the controller which might not be available to all the places.

Table 1. Comparison

Sr No.	System	Communication Interface	Controller	User Interface	Applications	Benefits
1.	Wi-Fi based using Arduino Microcontroller	Wireless LAN and Wi-Fi shield	Hardware interface module	web based Application.	Temperature and humidity, Motion detection, Fire detection, Door status, Light level ,Video monitoring, Controlling appliances	Low cost, Secure, Ubiquitously accessible, Auto-configurable, Remotely controlled
2.	Web service and android app Based using Raspberry pi	Web server and interface card	Raspberry pi	Android application	Controlling shutter of window	Autonomous, and Quite scalable
3.	Cloud Based Using Hadoop System	Cloud based data server uses Hadoop Technology	Home gateway and Router	Smart device	Monitoring and Controlling Home Appliances	Effectively manage Semi structured and unstructured data, Reduce computational burden of smart devices
4.	Email Based using Raspberry pi	Internet Modem	Raspberry pi	E-mail	Switching LED	Smart, Economic and Efficient

5.	Cloud Based Using Zig Bee Microcontroller	Zig bee wireless Network	Smart Socket	PC or Android Phone	entrance control management, monitoring the power consumption, temperature and humidity	Convenience, safety, and Power-saving
6.	Smart Task Scheduling Based using Arduino and Android	Wired X10 and Wireless Zig bee	Arduino	Android Application	Energy Management and task scheduling with power and cost	Energy-efficient and Highly scalable
7.	Wireless Sensors Based with mobile Technology	cloud-based data server	PCB circuits	Mobile Application	monitor the home conditions and power consumption of appliance	Low power consumption And system cost efficiency.
8.	Android based using Arduino	Micro Web Server	Arduino Mega 2560 and the Arduino Ethernet shield	Android App	Light switches, Temperature, Humidity sensors, Intrusion detection,, Smoke/Gas sensor	Feasibility and Effectiveness
9.	Konnex-Bus based using raspberry pi	SIP Provider	Raspberry pi and Konnex Bus	Mobile App	Lights Control, Temperature Monitoring	Performance improved ,energy-consumption could be Reduced.
10.	By Using DTMF	DTMF Receiver	Logical Controller with I/O interface	Computer	Authentication of user by ringing line	Secure and allow International Standard

3.2 Limitations of the existing system

There are many different systems that are available in the market for home automation which uses different methods and technologies to control the home appliances, out of which the most commonly used systems are based on GSM module, Bluetooth module, Wi-Fi module and ZigBee. The major problems of using these systems are- they are unreliable, require additional cost, having low working range and inefficient in terms of power consumption. GSM based system requires SMS transmission for controlling the home appliances, which causes additional cost and along with that, the system relies on the delivery of SMS which can be delayed due to some communication network problem. Bluetooth based systems doesn't require SMS delivery to control appliances but it can control only those appliances which are present in its vicinity. Similarly, ZigBee based home automation systems also have the same drawback of low range which restricts the user to control only those devices which are present nearby to the system. By using the Wi-Fi based home automation system the user can remotely control the devices using the Internet connectivity, but the problem is Internet may not be available at all the places therefore the system won't work in the absence of Internet connection. Therefore, we need to design a system which can overcome the limitation of short range and dependence on Internet connectivity for controlling the appliances.

3.2 Problem statement

Although there are many different types of home automation system are commercially available in the market but they all suffered from the problem of providing the costeffective control over the home appliances not only from within the house but also remotely from anywhere in the world. Most commonly used systems are based on GSM module, Bluetooth module, Wi-Fi module and ZigBee. The major problems of using these systems are- they are unreliable, require additional cost, having low working range and they are inefficient in terms of power consumption.

4. Proposed System Design

The android application “alpha-omega” controls the various devices that connected to Arduino. In the app interface we have designed buttons to control corresponding devices which when pressed, necessary Bluetooth signals are sent from the android smartphone to the Bluetooth module which is connected to the Arduino. The Arduino checks which signal was sent and compares it to the predefined signals allocated for each appliance. When the user sends the command through the android app, the Arduino turns ON the corresponding devices by making Voltage High on corresponding pin. This system can be connected to normal switch board found in our house by using relays. Bluetooth Module send Bluetooth signal to the Arduino, where these commands are compared with the predefined values using “if” statement. If there is a match with the value, the system will activate the relay. The DigitalWrite “PIN HIGH” command is used to pass 5 Volts to the Arduino digital pin.

The system also includes various sensors such as LDR and LM35 for sensing the temperature and light of the surrounding environment. These sensors will assist the user in controlling the devices effectively and also help them in reducing the overall energy consumption by these devices. The system will decide when to switch on or off the lights and fans based on the sensed physical parameter of surrounding environment. For example, if the LDR senses that sufficient daylight is present in the room the system will automatically switch off the lights. Similarly, if the room temperature drops down below the user specified comfortable temperature value than the system will automatically switches off the air conditioners or the fans.

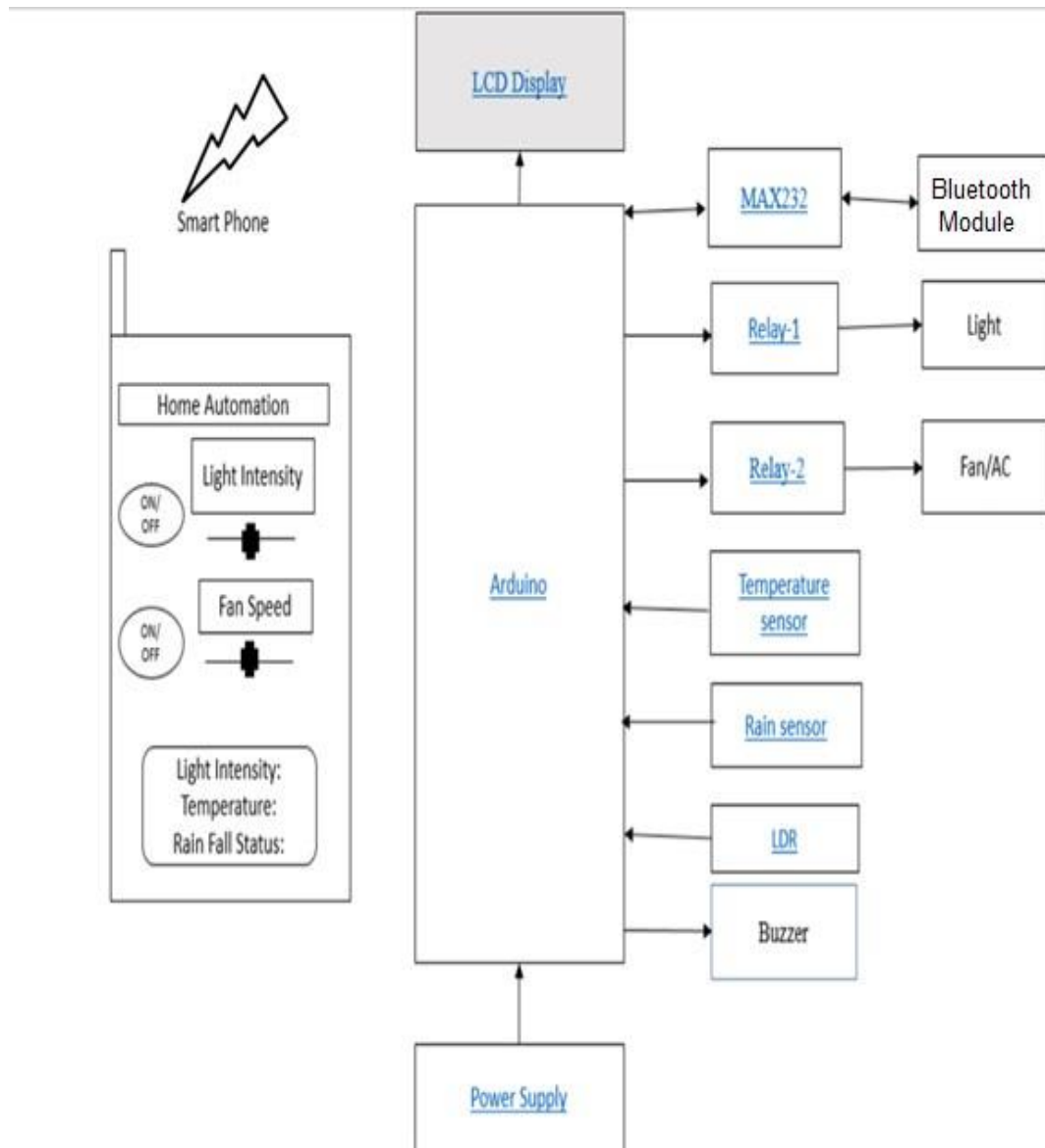


Figure 1: Block Diagram of Home Automation System

Voice based Android App

For the people who are able to see, we have designed a Voice Command based android app which will control the devices of the home through the user voice. There are various commands like 'Light ON', 'Light OFF', 'Fan ON', 'Fan OFF' etc. which have been included in this system to control the appropriate device.

Along with that the system also include various sensors which will provide a lot of convenience to the user. LDR and LMR sensor will maintain the optimal light and temperature in the house. A fire detecting system has also been included in the system to alert the user through a SMS whenever the temperature goes above 60 degrees Celsius.

4.1 Module Description

4.1.1 Module 1: Android App based on Buttons

App Development: We have created android application which have following functionalities.

- a) Control of lights via Bluetooth connection.
- b) Fan on/off via Bluetooth connection
- c) A.C control via Bluetooth connection
- d) Door opening and closing by sending signals via Bluetooth
- e) T.V power on/off via Bluetooth connection

Input/Output:

When presses a specific button, the touch is considered as the input to the function `setOnTouchListener()`, this function listens the touch and responds by giving an output which is then transmitted to Arduino via Bluetooth module.

Table 1. Input and corresponding output value for android App(button based).

Function	Input	Output
<code>setOnTouchListener()</code>	Light button “ON”	49
<code>setOnTouchListener()</code>	Light button “OFF”	50
<code>setOnTouchListener()</code>	Fan button “ON”	51
<code>setOnTouchListener()</code>	Fan button “OFF”	52
<code>setOnTouchListener()</code>	TV button “ON”	53
<code>setOnTouchListener()</code>	TV button “OFF”	54
<code>setOnTouchListener()</code>	A.C button “ON”	55
<code>setOnTouchListener()</code>	A.C button “OFF”	56

4.1.2 Module 2: Arduino

Arduino is a programmable micro-controller which can send and receive data over Bluetooth module HC-06 and based on the received signal it will control the corresponding device.

Input/Output:

Arduino uses serial library to read the received bytes from the Bluetooth module using `Serial.read()` function and outputs a digital “HIGH” signal on the corresponding pins **Table 2.** Input from App and corresponding output in the circuit.

Function	Input	Output
<code>Serial.read()</code>	49	HIGH
<code>Serial.read()</code>	50	LOW
<code>Serial.read()</code>	51	HIGH
<code>Serial.read()</code>	52	LOW
<code>Serial.read()</code>	53	HIGH

Serial.read()	54	LOW
Serial.read()	55	HIGH
Serial.read()	56	LOW

4.1.3 Module 3: Android App Based on the Voice

Table 3. Input voice commands and corresponding output.

Input	Output
'ALL OFF'	LOW
'ALL ON'	HIGH
'A.C. OFF'	LOW
'A.C. ON'	HIGH
'LIGHT OFF'	LOW
'LIGHT ON'	HIGH
'FAN ON'	HIGH
'FAN OFF'	LOW

4.1.4 Module 3: Sensors

We are using 4 sensors LM-35 and LDR

- a) LM-35: Under default condition LM-35 will remain activated and maintain the optimal temperature of the home. The default range is set between 20 and 50 Celsius if the temperature of the room lies within in this range the A.C. and Fan of the room turns on.
- b) LDR: Under default condition LDR will remain activated and maintain the optimal light of the home. The threshold value is fixed in the code if the sensor sense intensity below that value the lights will automatically get turn on
- c) Ultra-sonic: The sensor is used to automatically turn on the lights of the bathroom when the user approach washroom.

Input/Output:

The sensors will sense the physical parameter of the surrounding environment and this will serve as input for the module and the output will be the respective analog voltage the Arduino.

5. RESULT AND ANALYSIS

5.1 Screenshot of the working app



Figure 2. Login Screen for button based App

The user has to login in the app with the registered ID and Password to control the Home Appliances.

5.2 Home screen of app

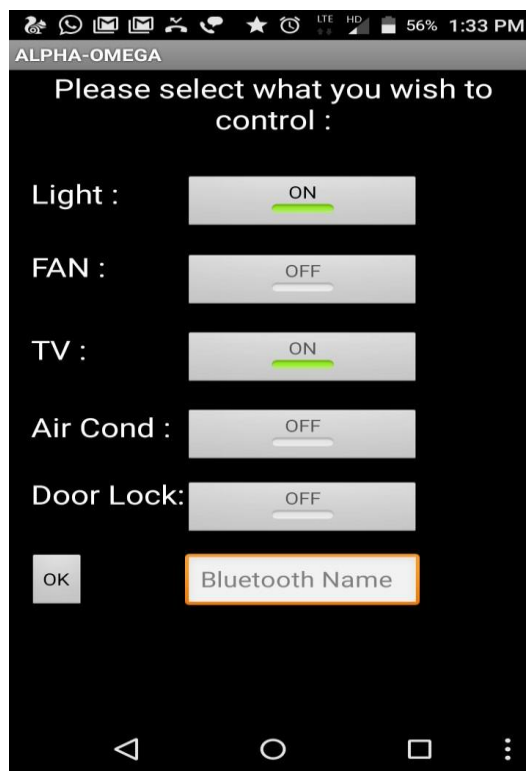


Figure 3. Home Screen of the Button Based App

The snapshot displays the GUI designed for this system. The buttons are used to control the home appliances.

5.3 Android App based on Voice

The user has to press the voice button and hold it till the end of the command the app will recognize the command and send the appropriate signal to the Arduino which will then turn on/off the house appliances.

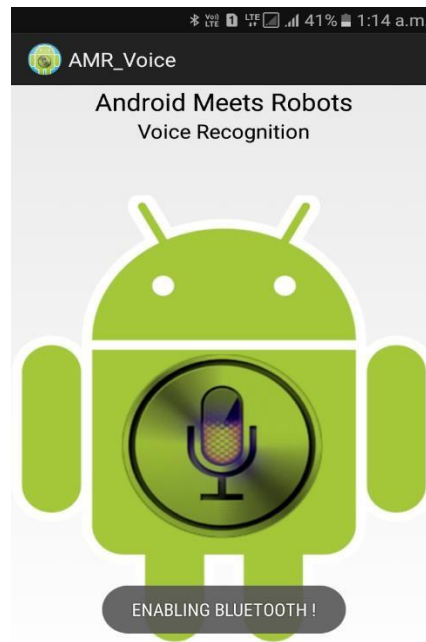


Figure 4. Home Screen for Voice Recognition Based App 5.4

Working Model

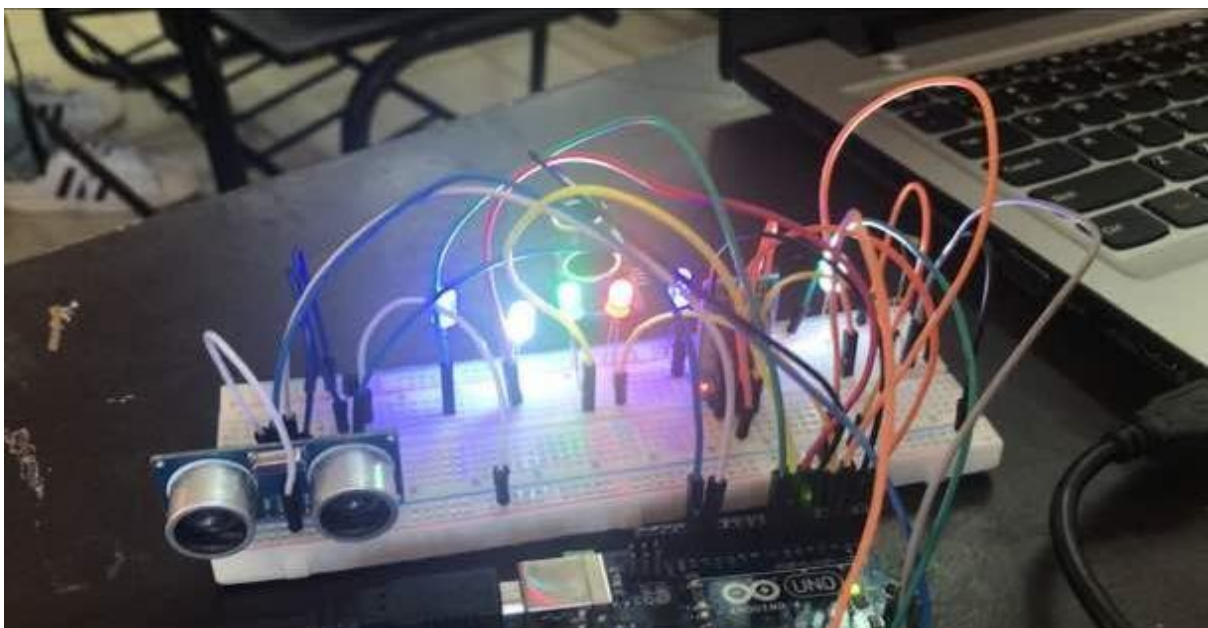


Figure 5. Snapshot of the Working Model

The above screenshot depicts the working of whole system. It includes the microcontroller and the Bluetooth module. The LED is controlled by the user through the Mobile App by sending commands using the Bluetooth Module HC-06.

6. CONCLUSION AND FUTURE SCOPE

6.1 Conclusion

The designed proposed in this paper is novel and it has achieved the aim to provide a cost effective, secure and completely automated system The system is able to controlled the home appliances remotely from within the house using Bluetooth technology. Hence we can conclude that the limitations that are present in the existing system can be overcome by our proposed design. The architecture and the design discussed in this paper along with the prototype of the system displays the basic concept of home automation system by controlling and monitoring the home appliances. The fact the system can be connected to the normal switch board present in our homes make our system flexible and scalable.

6.2 Future Scope

This system can be further developed by integrating it with the internet using the Wi-Fi module which will help the user to control and monitor the appliances remotely from anywhere in the world.

Along with the light and temperature sensors, a video camera with a motion detector sensor can also be included in the system this will allow the user to keep an eye on his home while sitting far away from the house. This will improve the security level.

Infrared technology can also be used in this system to perform complicated tasks such as changing the temperature of Air Conditioner or changing the channels of television.

Additionally, voice to text feature can also be used in this system this will prove really helpful for the blind people in controlling the appliances through their voice.

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