# Abstract

The home automation improves the lifestyle of the control of home devices. Technology advancements have made the implementation of embedded systems within home appliances. The abilities and benefits are increased by the home automation. The value of our lives can be improved by automating various instruments or electrical appliances. There is always a stipulation for home automation through mobile phones. Our main objectives are to help old aged people and handicapped and to control the home appliances from remote places. Our major focus is on controlling the home appliances from both indoor and outdoor. The mobile application is created and interfaced with the device to control home appliances through Bluetooth and GSM for indoor and outdoor controlling respectively.
1. Introduction
Home automation is automation of the home. Home automation can provide increased quality of life for persons who might otherwise require caregivers. It can also provide a remote interface to home appliances. This paper describes the implementation of controlling various home appliances with Android phone.

In our project, we use both Bluetooth and GSM to control the appliances. Due to the wireless technology, there are several connections introduced like Bluetooth, FPGA, and ZigBee. Each of the connections has their unique specifications and applications. Among the four wireless connections, Bluetooth is chosen with its suitable ability to control appliances from indoor and GSM for outdoor. Also, most of the current laptop or cell phones are come with built-in Bluetooth adapter. It will reduce the cost of this system. Through GSM, the user can effectively control and monitor the appliances from remote places by sending SMS. The concept behind this is to receiving the sent SMS and processing it further as required to perform several operations. This type of operation to be performed depends on the nature of the SMS sent.

2. System Analysis
In the last decade, technology has advanced life more efficient and comfortable. The control of the home appliances from remote places has become crucial and we can save a lot of time and effort by this. It increases the need for doing in such a systematic manner that we have implemented our system. Our proposed system is an expanded method for home automating system. With the adoption of our system, we can get the control over some important things that required continuous attention.

The application of our system is very useful when people who forget to do simple things such as turn ON or OFF devices at their home or in their office, they can do that without their presence by pressing the particular button in our application from their mobile phone. And our system can be very convenient to old age people and handicapped people. We believe that this development will ultimately save a lot of time especially when people don’t have to come back for simple things such as to turn ON/OFF switches at their home or at their office once they set out for their respective work and will be very useful for old age people when they want to turn ON/OFF the light, they needn’t call others to help or they needn’t walk near the switch.

The objective of this project is to develop a device that allows for a user to control multiple home appliances from both indoor and outdoor using an Android mobile phone. This system can be served as a flexible and powerful tool that can provide the service at any time and anywhere. The various possible appliances include the lights, climate control system and security systems but they are not limited to within these devices. Our proposed approach to design the system is to implement a microcontroller based control module that receives the instructions and command from the user through a mobile phone over the Bluetooth and GSM network. Then the microcontroller will carry out the given commands and then control the devices.

3. Block Diagram
The figure 1 is the simple block diagram of our project. It shows a simple sketch of the implementation of our project and the various parts involved in it. The Microcontroller Device is the device through which application interacts with home appliances. Mode is used for selecting either Bluetooth or GSM through which to control the appliances. The commands will be received based on the mode selection by the appropriate device from the Android application.
Figure 1: Block Diagram for home automation

Figure 2: Circuit Diagram for home automation
The LCD display is used to denote the command sent by the android application. Microcontroller will read the command and give input to relay control unit which is used to control the appliances. The relay unit will amplify the power to turn on or off the particular device based on the input from the microcontroller. The circuit diagram of our project is shown in figure 2. It shows all the required connections made between the kits and appliances.

The main power supply is connected with the step down transformer. It will convert the alternate current into direct current which can be used for the various kits. From the step down transformer the voltage is passed to the pic microcontroller. From the microcontroller the voltage is passed to all the other kits. The Bluetooth and GSM modem are connected with the pic controller. The relay circuit will indicate the ON/OFF of the various appliances. The variac circuit is used to control the fan and the auto coupler in variac circuit is used to avoid the feedback current. The appliances are directly connected to the power supply.

4. System Implementation

The various modules used in our project are communication module, messaging module, user interface module and display module. The communication module describes how the connections are made with the pic microcontroller for Bluetooth communications.

For Smart Living concept, Bluetooth technology has been one of the major technologies. It is a wireless technology developed to replace cables on devices like mobile phones and PCs. By using Bluetooth, wireless devices are able to communicate with each other within range. Nowadays lots and lots of Smart Living applications have been developed which are based on Android and Bluetooth. Android system provides SDK and APIs for developers to build new applications. Many Smart Living systems are constructed under Android system with Bluetooth integrated into Android system.

Receiving the SMS send from the android application and understanding and sending the commands to relay unit is described by messaging module. The android application is act as a user interface, through which the user can easily control the devices. Figure 3 is the sample snapshots of our application.

![Output snapshots of our android application](image_url)

**Figure 3: Output snapshots of our android application**

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android application i.e. user interface module. The Liquid crystal display is used to denote the commands sent by the android application.

In figure 3, the choose mode is used to select either indoor or outdoor. The window in figure 4 shows the Bluetooth page. The GSM button at the top right corner is to switch to GSM mode. Similarly in figure 5, BT button is used to switch to Bluetooth mode. The ON/OFF commands near the devices will turn ON/OFF the particular device. We can also turn ON/OFF all the devices at the same time by pressing all devices ON/OFF button.

5. Future Work

For future work, the appliances as refrigerator, air-cooler, television, water heater etc. are controlled through the application; the GUI Window will be implemented with the status of the appliances and speech recognition voice control. The capacitive sensing switches can be used to replace the push buttons implemented in low voltage activating switches. Apart from controlling the home appliances through mobile phone, in our future work we are planning to monitor the activities around the home also. By expanding the automation of all other home appliances, we can remove the limitation for controlling only few devices. To monitor the activities around the home, Security cameras can be installed and controlled by the user. And these security systems can also include the motion sensors which are used to detect any kind of unauthorized movement and it will notify the user about that event.

6. Conclusion

The design and implementation of the Smart Home Automation Controller using Bluetooth and GSM for Android mobile phone has been discussed. The purpose of this is to use mobile phone’s inbuilt Bluetooth, SMS facility and Bluetooth serial module and GSM Modem for automation of Home Appliances. The different hardware and software section of our system is described. The android application software has been designed using Eclipse and Mplab software is used to write and burn the C program into microcontroller. The application program is tested on various Android mobile phones which are quite satisfactory and responses received from the community in general are encouraging.

7. References

[4]. Anindya Maiti, "Home automation as a service”, june 2012