

RESEARCH PAPER ON BLUETOOTH BASED HOME AUTOMATION SYSTEM

Mr. Rishabh Yadav¹, Mr. Aryan Singh²

¹Raj Kumar Goel Institute of Technology Ghaziabad, India

²Computer Science & Engineering

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Abstract: Smart Home is a house that uses information technology to monitor the environment, control the electric appliance and communicates with the outer world. Smart Home is a complex technology, at the same time it is developing. A sample house environment monitors and control system that is one branch of the Smart Home is addressed in this paper. The system is based on the embedded system and can act as a security guard of the home. The system can monitor the temperature, humidity, gas density, water immersion of the house.

The whole system is a cheaper one, but it provides the full-scale home device monitor and control function. By using the embedded system technique, it is convenient to use and allows simple installation in existing homes, it provide a safe, convenient home to us. The shortage of the system is only can turn on/off the electric appliances and the lack of the wireless function. With the Development of the smart electric appliances, the system must make much progress.

This Project is used to control the home appliances controlled according to the user and it also indicates the temperature. The system will get the temperature from the Temperature sensor and microcontroller. Technology is a never-ending process. To be able to design a product using the current technology that will be beneficial to the lives of others is a huge contribution to the community. This paper presents the design and implementation of a low cost but yet flexible and secure cell phone-based home automation system. The design is based on a standalone Arduino BT board and the home appliances are connected to the input/ output ports of this board via relays. The communication between the cell phone and the Arduino BT board is wireless. This system is designed to be low cost and scalable allowing variety of devices to be controlled with minimum changes to its core. Password protection is being used to only allow authorized users from accessing the appliances at home.

Keywords: - Home Automation, Wireless, Android, Bluetooth, Relays, Smart Home, Security etc.

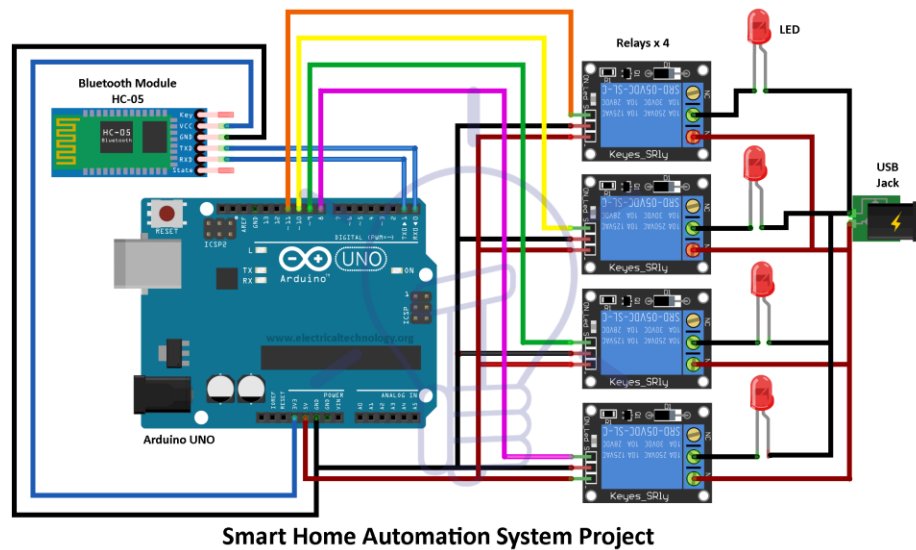
1. INTRODUCTION

A home automation system can involve switching off electrical appliances like air-conditioners or refrigerators when a desired temperature has been reached, then switching on again when the temperature has crossed a certain value. A home automation system can also be used to secure a house from burglars by sending alerts to the nearest police station and the homeowner in case a trespasser is sensed.

“Home automation” refers to the automatic and electronic control of household features, activity, and appliances. In simple terms, it means you can easily control the utilities and features of your home via the Internet to make life more convenient and secure, and even spend less on household bills. Home automation is a network of hardware, communication, and electronic interfaces that work to integrate everyday devices with one another via the Internet. Each device has sensors and is connected through Wi-Fi, so you can manage them from your smartphone or tablet whether you’re at home, or miles away. This allows you to turn on the lights, lock the front door, or even turn down the heat, no matter where you are.

2. Methodology

According to the proposed system, we have designed the system structure shown in the block diagram. We have designed the model in such a way that it can be kept at a safe place inside the house. All programming and components installation are done and tested inside the laboratory and in home. There are a lot of components and wires that we have used for the system. This is done in the easiest and lowest cost possible. However, the system is flexible and can be customized by the user. Changing one of the components setups has to be compatible with the right software available. Every component used in this system was programmed and tested separately for safety measures and matching with the right driver. Each component was programmed separately with both Arduino Mega and Arduino UNO using different Arduino IDE. Also, they were run in different computers. Later on, all were combined in a single Arduino IDE. It is not possible to run the system without the Wi-Fi and mobile. This project is divided into two parts: hardware implementation and software implementation.



Fig(a)- Circuit diagram of home automation system.

Most of the contemporary phones, TVs, tablets, and set boxes use Android. Android has been in business since 2008, and there is a likelihood that it will soon penetrate the motor vehicle industry and other industries that use entertainment. Andy Rubin developed the Android system for phones, and he was later made the director of mobile platforms when Google acquired the Android Inc. All Android phones come with an application known as play store (initially known as Android market) and it is used to download Android applications. Play store contains numerous Android applications which can be used to execute various functions as required by a user.

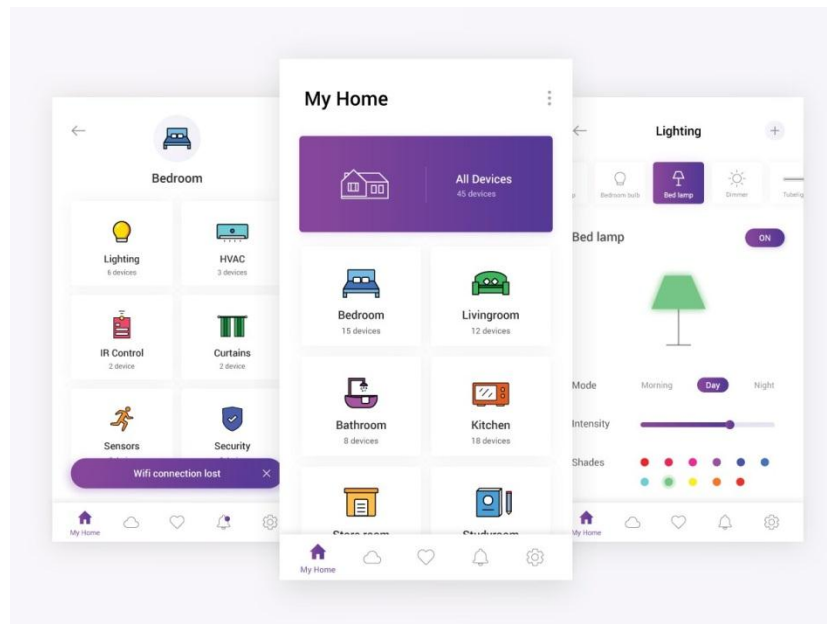


Fig 3(a): - Android Application Prototype

Description of Hardware

1. Arduino Uno: -

Arduino is a physical processing device based on a microcontroller board and an integrated development environment for the programming of the board. Arduino is open source hardware technology one of the best platforms out there that can be used to build home automation system. This technology can be used to control such applications as lights and sensors through reading them as inputs and turning them as outputs like activating a motor, switching on lights or online publishing of something. It is possible to tell the board what needs to be done through sending a set of instructions to the microcontroller. To effectively achieve this the programming language of Arduino which is based on wiring and the Arduino software (IDE) which is based on processing must be used. The program forming Arduino can run on various operating systems such as Windows, Macintosh, and Linux.



Fig 4(a); - Arduino Uno Board

2. Bluetooth Module: -

Bluetooth has turned out to be an ideal solution for home automation. It is easy to control temperature and other electronic devices using Bluetooth although to a greater extent a computer may be involved. It is possible to use a remote mobile with a host controller to communicate to several home appliances using Bluetooth as a wireless device. This involves use of a wireless network. Client module and the host controller communicate through enabled Bluetooth in a smartphone. Bluetooth module is important in connecting the Arduino-UNO board and an Android device. The hc-06 module of Bluetooth is more compatible as it consists of a serial interface and a Bluetooth adapter. The module is user-friendly as it does not require any setting after purchase apart its AT mode which is used to switch between master and slave mode. In this project, however, the slave mode was used.

3. Relay Module:

All the components are with the relay. The relay is on after all the sensors and modules are high. In case of door unlocking, when the fingerprint matches the relay is on and the door opens by servo motor. In case of all sensors, when they are high the relay turns on to send text message to the phone. Relay, obviously as a switch is connected with all the home appliances. Also controlling of relay is possible through the GSM. We have also controlled the room curtains with the help of relay and servo motor. The connection is done according to the schematic diagram.



Fig 4(c): - 4-Channel relay module

V. Advantage

- Everything is automated so it is easy to use.
- It is control by mobile application so no extra training is required.
- We can change controlling system as our requirement.
- It works on Arduino based system so we can easily understand how it works.
- It saves our time.
- Every home appliance can control by one android application.
- Easy installation and user friendly.

VI. Result

Machines-to-machine communication, and you understand you're not the most tech-savvy consumer, it's impossible that you've missed the abundance of home automation products filling the shelves and ads of every home improvement store. Suddenly an ordinary errand for light bulbs will leave you wondering if your lamp could send you a message alerting you that the light bulb needs to be replaced. Furthermore, if your lamp is talking to you, could your refrigerator and sprinkler system be too? Experts say: Yes, the possibilities are endless. If that's the case, where do you begin. Home automation system brings a new ray of hope for the ease of users to control all of their appliances remotely.

VII. Conclusion

Throughout the project many problems arose that could not be solved during the designated time period. Two major issues relate to the ability to detect whether the door is locked/unlocked. These issues arise either when using a key or using the turning knob. Such an action is independent of the motor; therefore, the system is unable to recognize that the door is unlocked if done with a key. Another case would be that the maximum rotation of the locking pin, where the time interval specified may not be enough to lock/unlock the door using the motor. These issues could be solved with the use a sensor, but as mentioned earlier, this was not possible throughout the project.

VIII. References

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