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Home Automation Using Arduino

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Abstract: ***Technology is a never-ending process. In this project we have developed a low cost but flexible and secure smartphone-based Home Automation System This project aim is to develop and design a home automation system using Arduino with Bluetoothmodule.***
The communication between the smartphone and the Arduino board is wireless. Password protectionis also used nowadays to allow authorized users from accessing the appliances at home. Home Automation system using the latest and new technology provides more convenience, security and safety. Nowadays, people have less time to handle any work so automationis simple way to handle any device automatically.
Manyhome appliances like fan, bulb, automatic door locks arecontrolled by home automation system. The projectmainly focuses on the control of smart home by Smartphone and tries to provide a security based smart home, when the people are not present at home. The motive of this project is to control home appliances in smart home with user friendly design at low cost and simple installation by using Bluetooth technology.
Keywords: Technology, Automation, Bluetooth,communication, security.

I. INTRODUCTION

Home automation system is described as use of automatic technologies that aims to reduce the human labour. Due to quick growth in technologies, there is need to use smartphones to remotely control the home appliances. An automated devices is capable of workingwith adaptability and with low error rate.

A remotely available environment is well-defined as an environment where each appliance or device can be remotely accessed and controlled using software which includes an Android and a Web application. Such remotely accessible systems are already present in the market, but they contain various drawbacks.

So, Home automation systems are designed to increase user accessibility to control the daily used appliances via wired or wireless communication.

Here, the word “wired” suggests that appliances are actually connectedto a central controller of the home automation system, while “wireless” means that home appliances are connected wirelessly to central controller or remote- control unit. Some appliances such as TVs, DVD players, air conditioning already have their respective remote-control units. While installing a home automation, at least one remote controlled unit is added.

Automation system decreases the human labour and alsosaves the time and energy. Earlier home automation systems were used only in labour saving machines but nowadays its main objective is to provide facilities to elderly, handicapped and disabled people to switch ON or OFF any electrical appliance remotely.

A Bluetooth and smartphone based wireless home automation systemcan be implemented with a low cost and it is easy to install in an existing home. In a research work it was proved that Bluetooth based systems are faster than wireless and GSM based systems. Bluetooth based technology has ability to transmit data within a range of10m to 100m depending on the type of Bluetooth device being used.

The main components used in designing theproject are Arduino UNO board, HC-05 Bluetooth module, smartphone application and software tool named as Arduino IDE software which is free to use. Home appliances are connected to the Arduino board viaa relay, and a Bluetooth module called HC-05 is interfaced with the Arduino board. For serial communication between a smartphone and a Bluetooth module, a smartphone application called Arduino Bluetooth Control Device is used. Then all other appliances are connected to relay board and furtherconnections are made.

The elderly people can learn the use easily and small children can also use the system without any physical contact.

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II. LITERATURE REVIEW

As a part of literature review, we had gone through many research papers relevant to our project. Pinki Vishwakarma et.al.[1] developed the system based on additional things like antitheft alarm System, alarm for gas leakage in home, and smoke detection, if smoke is detected it will forward a message to user about smoke traced in home, but the system uses ZigBee as the connection device which has a limited range.

Vishal Jain [2] suggested the system that offers three ways to operate the house: via the Internet, the GSM network, and voice commands.

A GSM network has been identified as a potential possibility. However, in order to enable internet connection, the GSM data channel must be employed. Only the Internet can guarantee that access is always available.

Another good attempt was by Shafiq ur Rehman et.al. [3]. The system proposed in the paper works on a firewall that protects our smart home from getting hacked and corrupted. The firewall also protects us from internet threats. The overall project focuses on developing trustworthiness for using smart homes technology. Systems using IOT interface can bebenefitted by the model rest using Bluetooth or WIFI connectivity have no effect.

Satyendra K. Vishwakarma [4]. The detailed process ofthe smart home automation controller unit was describedin this study. Home appliances can be controlled with the design control unit.

IoT is used to transform a deviceinto a smart and intelligent one. The three bulbs were connected to demonstrate experimentally how the proposed concept operated.

III. METHODOLOGY

A. *Components*

1) *Hardware Components:* The designed Home Automation system contains three main hardware components Arduino UNO board, 4- Channel 5V relay Module and HC-05 Bluetooth module. Smartphone is used to provide communication between Arduino UNO board and Bluetooth module using asmartphone application named as Arduino Bluetooth Control Device. In this project Bluetooth module HC-05and Arduino Uno board are used for hardware implementation. It communicates with the microcontrollers using serial communication (USART), it has a frequency of 2.45GHz. Relay are the switch that operates on electricity. It is based on electromagnetism. The switches opens and closes the circuits by receiving electrical signals from outside sources, as soon as the relay will receive a signal from Arduino it will turn on the respective circuit. Other devices include simple jumper wires, bulb, etc. The software application is built for the master device which will control the overall devices that are needed to be connected to relay and microcontroller. User can try for manual buttons that are available at the main screen of application. The number of devices to be connected depends on the number of modules in relay the more the modules the more the device connections.

2) *Software Components:* In this study, two pieces of software—the Bluetooth terminal application and the Arduino Integrated Development Environment (IDE)—are employed.

a) *Arduino IDE:* The term "Integrated Development Environment" (IDE)refers to the software used for this entire programming process, which is known as the Arduino IDE tool. Nearly9600 bits per second is the baud rate for serial communication between an Arduino board and a smartphone. how to retrieve serial data from a smartphone using code. A state variable is used to store the value of a received byte, which is subsequently utilised to conduct a specified operation after being compared to various conditions. Below is a screenshot of the Arduino IDE code for turning on and off a light.

b) *MIT App Inventor:* The Massachusetts Institute of Technology now manages MIT App Inventor, an integrated development environment for online applications that was first made available by Google. It enables those who are new to computer programming to produce application software for the Android and iOS operating systems, which, as of Final beta testing is taking place on July 8, 2019. It isdual-licensed software that is both free and open-source.

c) *App Development:* When we will connect our smartphone with HC-05 Bluetooth module through the above app we would automatically get connected to the app and we will be able to see number of buttons named as ON and OFF of. And for connecting app with Bluetooth device, wecould see one button at the bottom and for moving outof the app we can click on exit button. Hence, home appliances can be automatically controlled through this Arduino Bluetooth Control device. And also, we will be able to control eight devices through this single android application. It is user friendly and easyto use.

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Fig.1 Arduino Bluetooth Control Device

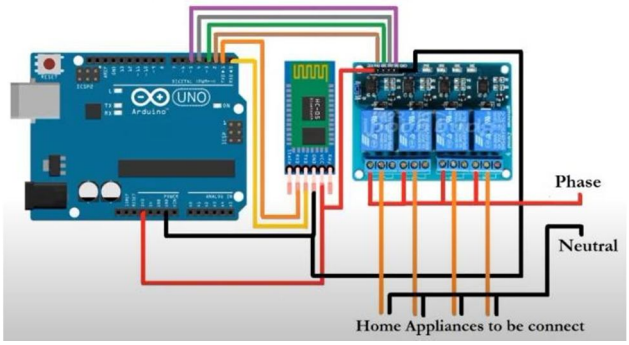


Fig. 2. Circuit Diagram

IV. RESULTS AND DISCUSSIONS

It will be a great option for home automation because of its simplicity, convenience, and cost-effectiveness. It is easier to work with a good range thanks to the Bluetooth communication module that is now being used and is available in every phone. It is quite convenient that all of the operational parts can be turned on or off simultaneously. With the help of this feature, management in classrooms may be greatly simplified and a great deal of energy can be saved. This can be used in large malls, event halls, and many other locations in addition to classrooms and colleges.

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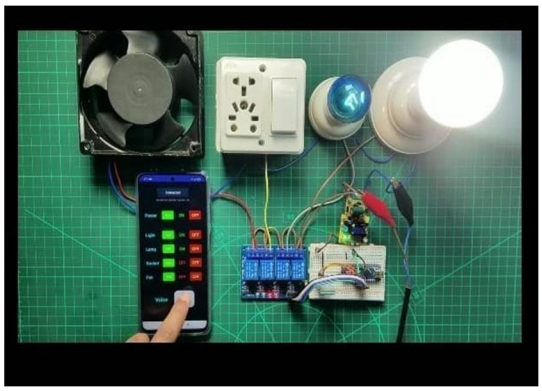


Fig. 3. Home Automation Using Arduino

V. FUTURE SCOPE

This Home Automation project can be further developed by designing it with the internet to control home while sitting in a remote and inaccessible zone. Through a mobile device, PC, or laptop with internet access, one can monitor their home. Passwords can be set so that only user can have access to his device and automation system. In future whole school can be automated. Automated attendance system can be installed and many more development could be done. IOT-based wireless technology can take the place of Bluetooth, allowing for remote control from anywherein the world. Additionally, the software that controls the entire system needs to include additional features like an alert system, graphs showing how electricity is optimised, and data on how each component is used sothat it may provide practical ways to limit those additional costs.

VI. CONCLUSION

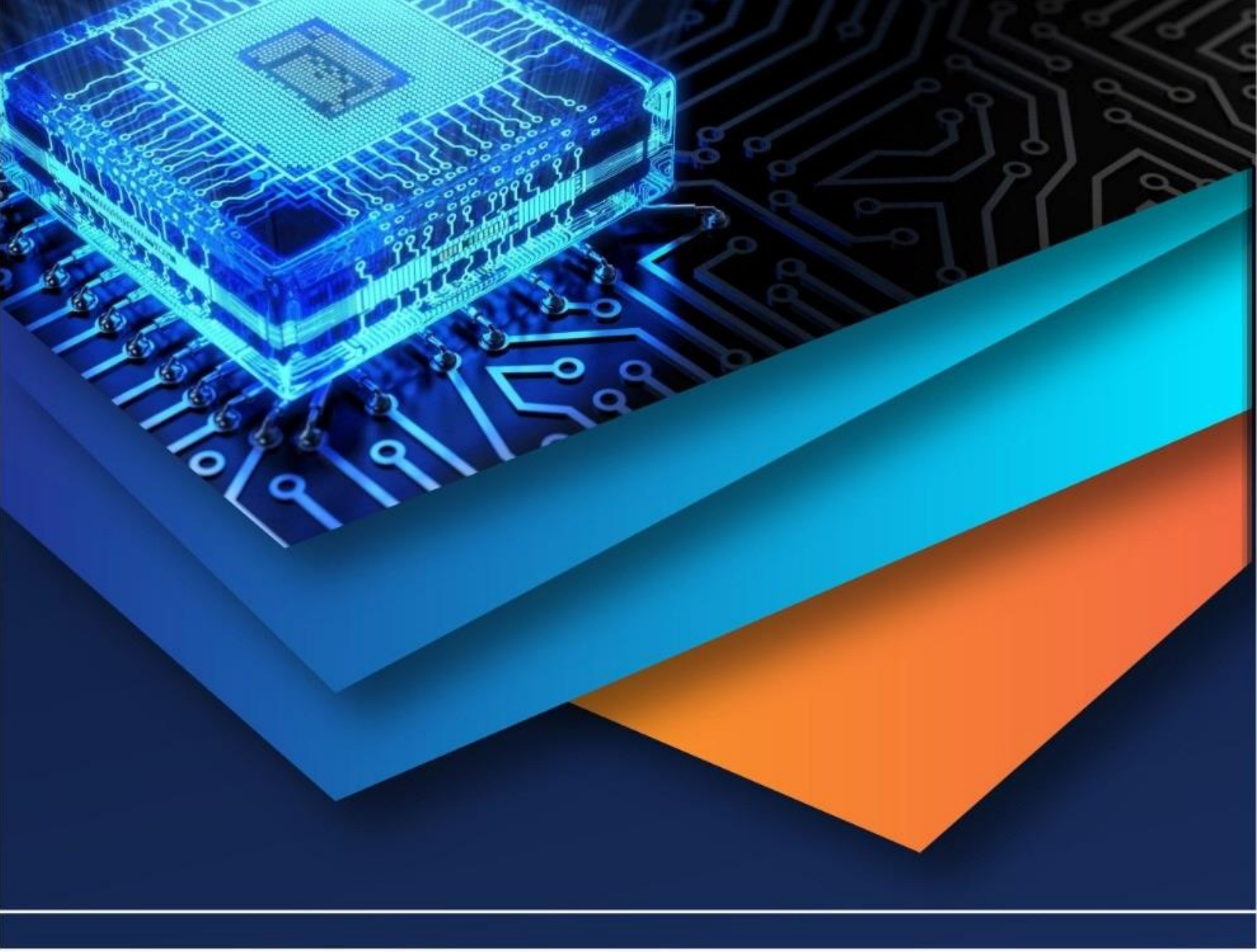
In this proposed system we have designed low cost, wireless and Flexible home automation. This system provides security for accessing from any user. The onlything user need to pair password for the Arduino boardand the smartphone in order to access the home appliances, this provides the protection from unauthorized or fraud users. Any equipment that needsto turn ON/OFF apps without use of internet connection can be tested using this approach. The wireless communication between the smartphone and Arduino board was tested to ensure that the home automation system was fully functional and it was discovered that its range was only 50 metres in a house and 100 metres in an open area. For further work, it is advised to create a GUI application for the smartphone that is built in Java so that it may be supported by the majority of the devices that are currently on the market.

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REFERENCES

[1] Vishakha D. Vaidya, Pinki Vishwakarma. “A Comparative Analysis on Smart Home System to Control, Monitor and Secure Home, based on technologies like GSM, IOT, Bluetooth and PICMicrocontroller with ZigBee Modulation”,2018 International Conference on Smart City and Emerging Technology (ICSCET), 2019, pp.1724- 1730.
[2] Ravi Kishore Kodali, Vishal Jain, Suvadeep Bose. "IOT based Smart security and home Automation System”,2016 International Conference onComputing, Communication andAutomation(ICCCA), 2016, pp.234-250.
[3] Shafiq ur Rehman, Volker Gruhn, “An Approach to secure Smart Homes in Cyber Physical Systems/Internet-of-Things”, 2018 Fifth International Conference on Software Defined Systems (SDS), 2018.
[4] Satyendra K. Vishwakarma, Prashant Upadhyaya, Babita Kumari, Arun Kumar Mishra, “Smart Energy Home Automation System using IOT”,2019 4th International Conference on Internet of Things: Smart Innovation and Usages(IOT-SIU), 2019, pp.266-267.
[5] S. M. Shabber, M. Bansal, P. M. Devi and P. Jain, "An Intelligent Home Automation Based System forSmart City," 2021 IEEE International Symposium on Smart Electronic Systems (iSES), 2021, pp. 48-52, doi: 10.1109/iSES52644.2021.00023.
[6] K. Agarwal, A. Agarwal and G. Misra, "Review and Performance Analysis on Wireless Smart Home and Home Automation using IoT," 2019 Third International conference on I-SMAC (IoT in Social, Mobile, Analytics and Cloud) (I SMAC), 2019, pp.629-633, doi: 10.1109/ISMAC47947.2019.9032629.



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