Home Automation with Home Security

Jayashankara Naga Venkata Avinash Amudala
Electronics and communication Engineering
Amrita School of Engineering
Coimbatore
avinashamudala@gmail.com

Meghana Chagarlamudi
Electronics and communication Engineering
Amrita School of Engineering
Coimbatore
meghanach12@gmail.com

Sahithi Polavarapu
Electronics and communication Engineering
Amrita School of Engineering
Coimbatore
p.sahithi2000@gmail.com

Swetha Sajjala
Electronics and communication Engineering
Amrita School of Engineering
Coimbatore
swethasajjala1357@gmail.com

***Abstract*— Development in the Internet-of-Things (IoT) technology have laid a strong foundation for the novel applications in countless industrial domains of healthcare, logistics, and agriculture. With IoT as the key, the advanced industry is led on a path of maximizing automation and productive enhancement. In this article, An Internet of Things (IoT) based home automation addition with RFID security door system for home has been designed and implemented. A user-controlled home automation system (IoT Light/Fan) with help of mobile application has been developed. Security door which allows the people who are having RFID identification only has also been implemented to keep in track of the house. Arduino is connected with nodemcu (esp8266) and RFID to record the tracking. Connect the esp8266 as WIFI module with server, server output will be taken as the input to the operating mobile application. It has user friendly interface, which keeps the users updated on home details through various modes like cell phone, and web portal. By implementing this system, it is possible to explore a variety of different engineering challenges, including software programming, WIEL, TCP/IP protocols, Web Server logic design, and other aspects. This automation system creates a bridge between the challenges of home security and home automation.**

Keywords*— *Internet of Things (IoT), home automation, RFID, Security, Arduino uno, Bluetooth, WIFI SoC

I. INTRODUCTION

Today the technological worlds centralize principle is to automate each conceivable thing for simplicity in life, providing security, saving electricity and time.[1] In that home automation is one of the prior things to automatically on and off the home appliances. Home automation can be characterized as a method for doing something without human inclusion. In present days most of the automation systems utilize the combination of hard-wired and wireless systems for controlling the appliances. It should have both equipment and programming set up for proficient systems. The popularity of home automation has been expanding incredibly because of much higher reasonableness and straightforwardness through Smartphones and wireless networks. Internet of Things is interlinked through these networks; because of the popularity of the home automation is improved by the quality of service provided by the devices. In this era of digitization and automation, the life of human beings is getting simpler as almost everything is automatic replacing the old manual systems.[2] Nowadays humans have made internet an integral part of their everyday life without which they are helpless. Internet of things (IoT) provides a platform that allows devices to connect, sensed and controlled remotely across a network infrastructure. With the evolution of Internet of Things (IOT) all these manually controlled electrical and electronic devices can be controlled automatically. Today's houses are gradually transferring from ordinary/human's input-based appliances to smart/IOT enabled appliances to be controlled remotely. So, people feels that their home is secured with the help of IoT devices. [3] The home automation industry is gaining popularity and great demand day by day because of large advantages. The reason for this surge demand of network-enabled home automation systems is reaching the zenith in recent days for its simplicity and comparable affordability. One can achieve home automation by simply connecting the home appliance and electrical devices to the internet or cloud storage. Platforms based on cloud computing help to connect to the things so that one can find it easy to access anything and everything at one place at any time.

The main concept of IOT is it can create a virtual connection between a network and electronic and electrical objects.[4] This virtual connection helps to control, locate, and track down these connected objects. On the basis of device-to-device connectivity concept the development of smart sensor together with communication technologies such as Wi-Fi, Bluetooth, RFID etc. and supported by cloud computing technologies, IOT has become reality and it's goal is to make devices more aware, interactive and efficient for a better and safer world. This whole system using Internet of Things (IoT) will allow mobile devices and computers to remotely control all the functions and features of home appliances from anywhere around the world using the internet connection. The system designed is economical and can be expanded as It allows connection and controlling of a number of different devices. As far as this paper is concerned, NodeMCU (ESP8266) microcontroller along with Relays is used to control electrical switches remotely from the server which is built on Node.js. User can control switches using a Web Application after authenticating.

II. PROPOSED SYSTEM DIAGRAM

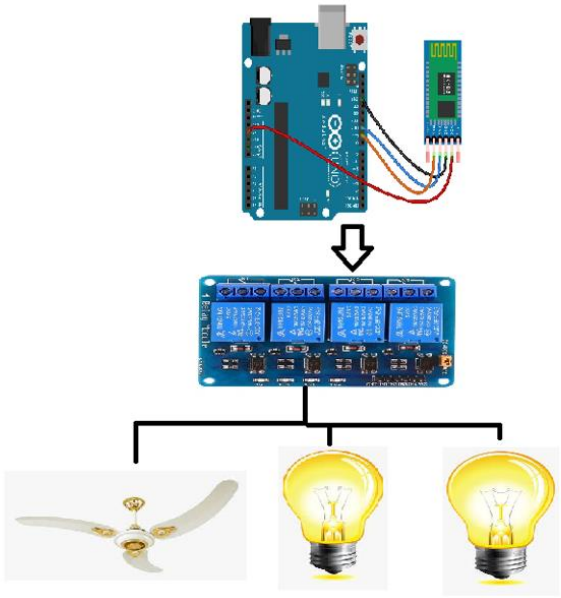

Fig 1: Outline of Home Automation

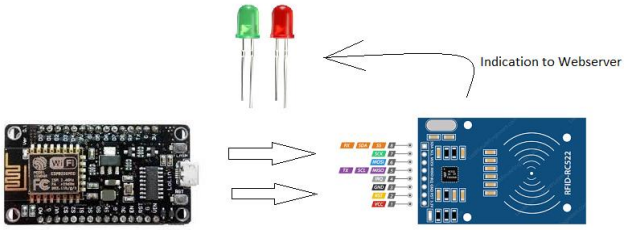

Fig 2: Outline of RFID Security door

III. LITERATURE REVIEW

Advancement of technology in IoT, many studies have been implemented different home automations according to the modern lives. In [5], IoT is applied to modernize our daily lives. Rajeev Piyare [5] home control and monitoring system using an embedded micro-web server, with IP connectivity for accessing and controlling devices and appliances remotely using Android based Smart phone app. In this architecture IP enabled WIFI and REST web services are used for communicating between the remote user and home devices. However, the proposed system does not consider RFID/NFC tags for the security home door in terms of home security. In addition, The Smart phone app consists of the following functionalities to the user: 1) Remote connection to the Home Gateway. 2) Device control. 3) Device Monitoring. 4) Managing schedule.

The smart house technology is one of the realizations of home automation ideals using a specific set of technologies. A sample house environment monitors and control system, a branch of the Smart home system, based on the LabVIEW software has been developed in which the system can act as a security guard of the home. [6] The system, with the help of LabVIEW software, can monitor the temperature, humidity, lighting, fire & burglar alarm, gas density of the house and have infrared sensor to guarantees the family security. In this proposed paper, the complexity of the LabVIEW software for the building the interface has the difficulty in learning the software. In [6], Remote control, used as an interface in this system is divided into 3 components: 1. Transmitter unit 2. Central Receiver unit and 3. Room receiver unit.

In [7], inderpreet kaur said that the future is full of automation and every product will be a smart device which will be controlled through a smart chip called microcontroller. All the appliances will be controlled either by PC or hand-held devices like PDA or mobile handsets and that is why this project looks into construction and implementation of a system involving hardware to control a variety of electrical and electronics system. The features of this projects include password based locking system, temperature-controlled cooling system and counter dependent automatic switching system of room. The main drawbacks of using microcontrollers are learning to use a complex system effectively, it may take a lot of time and extensive training. Also, control system security may be difficult and costly to maintain, especially if the control system extends beyond the home.

The need for the Internet of Things (IOT)technologies for home automation system have increased due to the increase in the demand of communication between the home and the outside world A virtual connection is created by developing a point-tot-point web socket (PHP) and web application for the communication with IOT device and connected to Amazon cloud Server. However, NFC/RFID concepts are not considered for the security door system in this article. For the authentication purpose, the user needs to login and after the login, the user can control all the electrical and electronic devices connected with the system. [8] Raspberry pi is used as a main controlling unit and the system includes a blue-tooth module to connect android and other devices. For more security, two PIR sensors are used to detect motion and support the efficiency of the sensors and relay board is used to control electrical home appliances.

In [9], Sirsath N.S illustrated that home automation will allow the user to control appliances and lights in their home from a Mobile Device and PC from anywhere in the world through an internet connection. It will also allow the user to control their device units within their home from home server using GUI. The home server GUI will control over the system; if neither the Mobile nor PC will be able to control the device units in the home. Another feature provided is auto control. This feature allows the user to control their home units without any internet connection or without using the homes server. Also, the system will turn appliances on and off such as: fan and television or any other home appliances. The system will refresh on the Mobile and PC every time the user chooses an option to control or monitor a specific unit. The drawback of home automation system using Bluetooth or GPRS needs a separate hardware and software environment to be installed in each home. Moreover, such systems provide the user with limited access as the access area is restricted only within a specific range.

IV. TOOLS USED

1. ARDUINO R3
2. SOIL MOISTURE SENSOR
3. RELAY BOARD
4. BLUETOOTH MODULE
5. RFID READER

V. RESULTS AND DISCUSSIONS

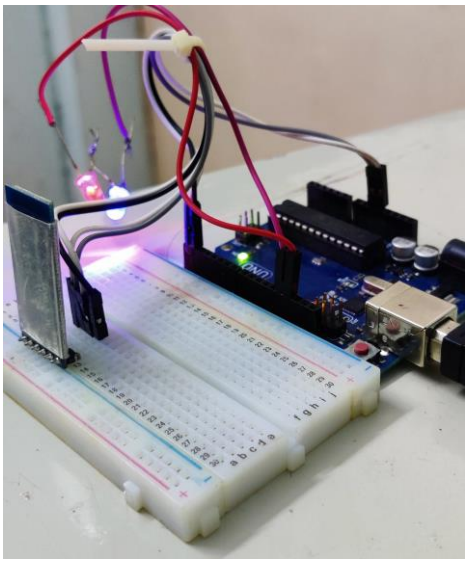

Fig 3: Home Automation

Bluetooth is connected to the mobile application to control the devices. And automated soil moisture detection is designed in home. Mobile application is developed using MIT app inventor. In Fig 4, application has developed for home automation. Firstly, it lists out the Bluetooth devices available to connect. We need to connect it to our Bluetooth module. So that we can control our devices, which is connected to the Arduino.

Fig 4: Application for Home Automation

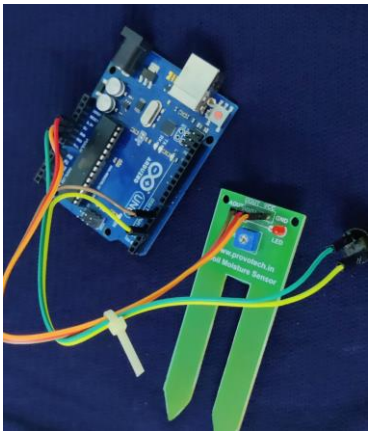

Fig 5: Soil Moisture detection

In Fig 5, When soil moisture level is low then buzzer will starts ringing. And it also shows the values of the soil moisture in percentage. The output of the soil moisture sensor changes in the range of ADC value from 0 to 1023. This can be represented as moisture value in terms of percentage using formula

Moisture in % = 100 – (Analog output*100)

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Put your card to the reader...

UID tag : 43 8A 90 3E
Message : Authorized access

UID tag : 53 BC 97 14
Message :  Access denied
UID tag : 53 BC 97 14
Message :  Access denied
UID tag : 43 8A 90 3E
Message : Authorized access

UID tag : 43 8A 90 3E
Message : Authorized access

UID tag : 53 BC 97 14
Message :  Access denied
UID tag : 53 BC 97 14
Message :  Access denied
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Fig 6: RFID Authorization check

For RFID security door system is developed by using Arduino IDE. That is to check whether the person is authorized or not. We used RFID cards to unlock the door. Hence, developed home automation with the security door in the Arduino IDE. Every RFID card or keychain has its unique code, in fig 5, based on that code we will check authorization.

VI. CONCLUSIONS

The RFID plays a key role in home security system by restricting people having respective Identity only, to enter the house. Bluetooth module helps in the controlling of home appliances remotely using a mobile application. Wi-Fi module approach to this home-automation will have a

greater impact as it provides more security when compared to Bluetooth. The technologies of Internet of things such as RFID and Sensors make our life become better and more comfortable. The home automation using Internet of Things has been experimentally proven to work satisfactorily by connecting simple appliances to it and the appliances were successfully controlled remotely through internet.

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