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Secured Home Automation using Raspberry Pi based on IoT

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Abstract - Internet of Things has become one of the booming technologies in the recent decades and has a major contribution in making our lives more efficient. This paper aims at automating all the electrical appliances in our house and monitoring their status through an Android device using Raspberry Pi. And also security is provided through a GSM Module. This project uses few IoT related algorithms to monitor the status of electrical appliances and a servo motor which acts as door and is unlocked when the authorized user enter appropriate commands in his Android device..

Keywords- Internet of Things, Automation, Raspberry Pi, GSM Module, Servo motor.

1. INTRODUCTION

People living in Metropolitan cities are supposed to rush into their work places because of their busy schedule leaving all their electrical appliances without any kind of control and monitoring. Certain devices tend to consume a lot of energy when they are left without any monitor and control mechanism. Thus, Home Automation is a technological boon for such people. Home automation is automating all the household tasks. It embraces centralized management of lighting, heating, ventilation and air conditioning and various other system related appliances [9].

Previously, the control of Home automation was provided through landline by dialing the designated number for the particular load from the phone. That was done using the digital logic technology called Dual Tone Multiple Frequency (DTMF).

In the existing systems, Home Automation is done using microcontroller and camera to provide security against the intruders. However the system‟s reliability is not so much appropriate when the camera fails. This would utterly not serves the purpose of Security. This paper describes the approach to Automate homes using Android device and provide an advanced level of security using GSM Module[1].

2. SYSTEM ARCHITECTURE

2.1. Automation

It is the use of control systems and information technology to control equipment, industrial machinery and processes, reducing the need for human intervention. Home automation gives access to control devices in home from a mobile device anywhere in the world .The term may be used for isolated programmable devices ,like thermostats and sprinkler systems ,but home automation more accurately describes homes in which nearly everything – lights, appliances, electrical outlets, heating and cooling systems- are hooked up to a remotely controllable network. In recent times, we can hardly find a house without home automation system which can range from the remote for the television, burglar alarm and hi-tech security gates, to an automated air conditioning system that maintains the temperature at a predefined value.

2.2. GSM based Security

From a home security perspective, this also includes alarm systems, and all of the doors, windows, locks, smoke detector and any other sensors that are linked to it.

GSM based locks are used for better security since the conventional passwords are hardly reliable [4]. The proposed system sends an alert to all the authorized users, to which the user has to respond with „yes‟ or „no‟ and depending upon the command entered the door unlocks or remains locked. Since the message is only received by the registered users which makes this system more secure.

2.3. Raspberry Pi

The **Raspberry Pi** is a low cost, credit-card sized computer which can be expanded by using various modules, such as camera module, touch- screen module etc,. It will act as the control for all electrical appliances (lighting, fans, air, conditioners etc)[13]. There will be no work for the user regarding their appliance. One has to initialize the required settings at

the time of setting up of the system. After that the system will be individual and self sustained.

The leverage obtained by preferring this system over the similar kinds of existing systems is that the alerts and the status sent by the Wi-Fi connected microcontroller managed system can be received by the user on his phone from any distance irrespective of whether his mobile phone is connected to the internet. By ensuring that only the verified users are registered to receive the alert, we can make sure that no one outside from the authorized users can unlock the door which in turn makes the door lock system highly secure.

3. SYSTEM DESIGN

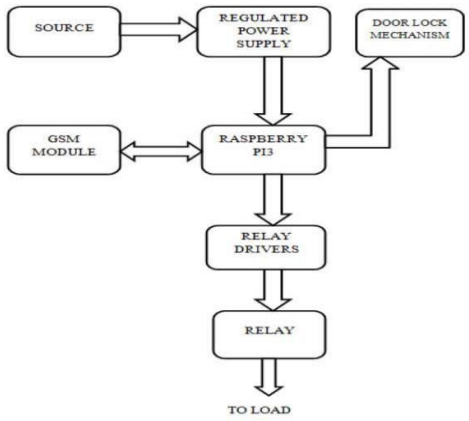

Figure -1: Control flow of Home Automation using IoT and Raspberry Pi

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In the above figure 1, a regulated power supply is used to power all the blocks i.e., Raspberry Pi, Door Lock mechanism block, GSM module and Relay drivers.

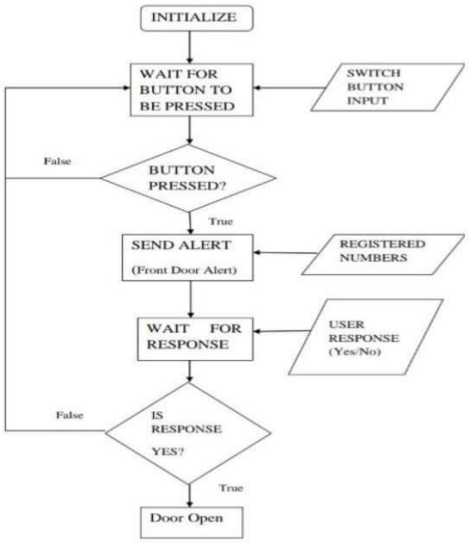

Figure - 2: Control flow of GSM Security model

A GSM module ensures security by giving certain appropriate commands through his Android device when he is notified. The Complete mechanism is explained by Flow Chart.

1. An in-built WIFI module is used to connect to the network to communicate with the peripherals.

2. The Relay drivers act as a current amplifier and is used to control electromagnetic relays.

3. The electromagnetic relay is used for isolation between high voltage devices and low voltage devices.

4. Open when the authenticated user allows him by entering the appropriate command in his android device.

5. The data from sensors, user preferences and system status are stored in the Cloud since the built-in Flash memory of the microcontroller is not sufficient.

4. Result

Low cost system with minimum requirements takes care of both home security as well as home automation. The optional smart phone application takes care of the fact that the user may also wish to control his home appliances without sensors being triggered. Controlling household devices using WIFI or Internet by Android devices and also Reduced Power Consumption due to use of Raspberry Pi module is acquired. And also Security through GSM module alerts the authorized users against intruders. Thus the ultimate product is simple to use, user friendly and supports monitoring and controls of devices from any distant places.

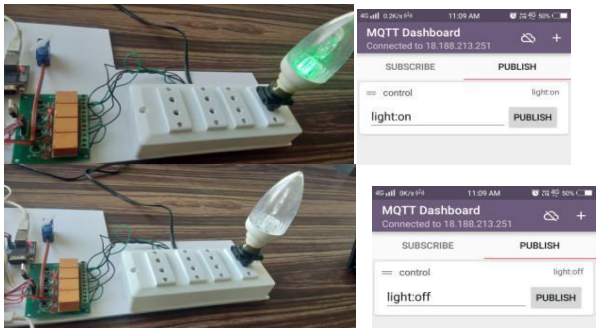

Figure -3: Control of Appliances using IoT

s p e r r y P i

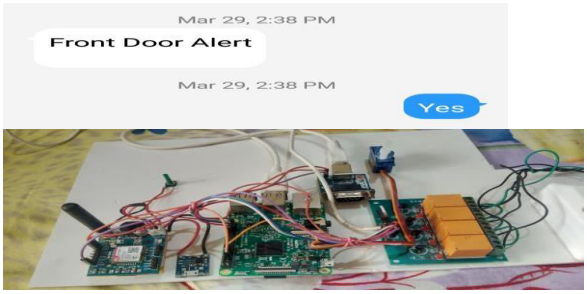

Figure- 4: Door lock mechanism using Servo Motor and GSM

CONCLUSION

This paper presents the design of a low cost secure home automation system using IoT for conventional users. The remarkable feature of this system is that a user can monitor and control the different aspects of the system using smart phones, which are widely popular, from any remote area. Raspberry Pi is a smart and economic platform to implement automation systems. It can be easily programmed and efficiently used. Using Raspberry Pi, which has a

wide range of features, has reduced the size of the system considerably making it more commercial. A person can simply unlock the door at the press of a button and can remain care-free about intruder unlocking it since only authorized users can give the command to unlock the door. The language used to code is Python-a powerful, user friendly language- making the code generic and flexible and hence can be extended for further improvements.

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