Comparison on approaches of Home automation

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ABSTRACT

Due to the proliferation of modern technology, these days, the world is increasingly experienced the use of wireless devices. The devices such as remote control and GSM phone could provide means for monitoring and controlling home appliances in a more convenient way. This project has explored the concept of home automation and ZigBee technology. A home automated system based on Arduino and ZigBee are developed which is tried to be integrated with Android application through Home Gateway for network interoperability. To show the effectiveness and feasibility of this proposed system, a remote control, indoor control and outdoor control systems have been developed and evaluated. However, integrating the system with android application remains unsuccessful.

Keyword: - *Zigbee, Arduino, Home appliances, gateway , remote control.*

1. INTRODUCTION

Home automation is the control of any or all electrical devices in our home or office. [1] There are many different types of home automation system available. These systems are typically designed and purchased for different purposes. In fact, one of the major problems in the area is that these different systems are neither interoperable nor interconnected. [2] There are number of issues involve when designing a home automation system. It should also provide a user friendly interface on the host side, so that the devices can be easily setup, monitored and controlled. [3] In smart home systems, the internet is also use to ensure remote control. For years, the internet has been widely use for the processes such as surfing on the pages, searching information, chatting, downloading and installation. By the rapid developments of new technologies, monitoring, controlling services have been started to be served along with internet as an instrument providing interaction with machinery and devices. [4] The system can be use in several places like banks, hospital, labs and other sophisticated automated system, which dramatically reduced the hazards of unauthorized entry.[3] The main reason to develop this system is to save time and man power along with maintaining security and convenience.[1]

There are many methods by which we can implement home automation system .Some of the method are listed below:

- Home Appliances Control Using A Remote Control
- Home Appliances Control Using DTMF
- Home Appliance Control Using Free Hand Gesture
- Home Appliance Control Using Internet And Radio Connection
- Wireless Browser Based Device Control Using Raspberry Pi

Home Appliances Control using a Remote Control:

The lights, fans can be automatically turned on/off with the help of a remote where there will be a sensor instead of going near to a switch board and putting on/off the switch. Companies like Legrand and Gold Medal already started these kinds of control system and they are at present available in the market.

Home Appliances Control using DTMF:

In this method, the control of home appliances can be done even though when we are elsewhere just by using the DTMF tone generated when the user pushes mobile phone keypad buttons or when connected to a remote mobile.

Home Appliance Control Using Free Hand Gesture:

This is a type of home appliance control system where the person must be present in sight to the appliance that is needed to be controlled and a predefined gesture must be used to turn on the device and another gesture must be used by us to turn off the device. The performance of the proposed system is done with a hardware embedded in that particular device.

Home Appliance Control Using Internet and Radio Connection:

In this system, the control of home appliances can be done from a remote are with an option from a local server, using the Internet and radio connection. This system is accomplished by personal computers, interface cards, radio transmitters and receivers, microprocessors, ac phase control circuits, along with window -type software and microprocessor control software.

Wireless Browser Based Device Control Using Raspberry Pi:

We can observe this research paper that the appliances controlling through the web browser integrated with the ARM11 microcontroller. The Raspberry Pi is a credit-card-sized single-board computer developed in the UK by the Raspberry Pi Foundation with the intention of promoting the teaching of basic computer science in schools. The Raspberry Pi has a Broadcom BCM2835 system on a chip, which includes an ARM1176JZF-S 700 MHz, Video Core IV GPU, and was originally shipped with 256 megabytes of RAM, later upgraded to 512 MB. It does not include a built-in hard disk or solid-state drive, but uses an SD card for booting and long term storage. In this system, we use the raspberry Pi model as a controller. The Raspberry is a credit card sized minicomputer. There are different types of raspberry pi model available in the market, Such as Model A, Model B, Model B+ out of which we uses Model B+.

2. Types of Homo-Automation System

2.1 GSM Based Home Automation System:

This system presents a completely unique, stand alone, cheap and versatile GSM ZigBee primarily based home automation system. The complete system depends on an eight bit microcontroller named PIC (Peripheral Interface Controller) during this work. The information instrumentation designed around this Microcontroller and a GSM controller facilitates the guts of the system. This device is connected to a ZigBee Transceiver and it communicates with every and each node gift within our home. The GSM Controller facilitate for the information follow between user and microcontroller. The GSM Controller uses portable technology to speak. From the portable, command will be send via SMS to the Controller that successively interprets the command so activates the specified „switch‟ to regulate the electrical item. As long as there\'s GSM portable signal coverage, it\'s attainable to regulate all electrical things from anyplace within the world. The system is straightforward to work, and is secure in this solely pre-determined mobile numbers will Operate the GSM Controller. The installation of the GSM Controller is comparatively straight forward and may be tailored for any existing home system .Management of lights and geyser area unit done via the electrical distribution board (circuit breakers).

2.2 SMS Based Home Automation System:

This system presents style and model implementation of a basic home automation system based on SMS technology. The automation system consists of 2 main components; the GSM electronic equipment, which is that the communication interface between the house automation system and therefore the user. GSM electronic equipment uses SMS technology to exchange information, and signaling between users and residential automation system. The second module is the microcontroller, that is that the core of the house automation system, and acts because the bridge between the GSM network (the user) and sensors and actuators of home automation system. Sensors and actuators are directly connected to hardware small controller through appropriate interface. System supports a good vary of home automation devices; power management components, security, transmission applications, and telecommunication devices. System security supported user authentication of every SMS being exchange, as each SMS contains user name and Arcanum. User will simply tack together home automation System setting through RS232 protocol employing a user Friendly interface.

3. Literature Survey on Raspberry pi

Smart home is not a new term for science society, it is been used from decades. As electronic technologies are advancing, the field of home automation is expanding fastly. There were various smart systems have been proposed where the control is via Bluetooth [7], internet etc. Bluetooth capabilities are good and most of current laptop/desktops, tablets, notebooks and cell phones have built-in adaptor that will indirectly reduce the cost of the system. But it limits the control to within the Bluetooth range of the environment while most other systems are not so feasible to be implemented as low cost solution. In Wi-Fi based home automation system is presented. It uses a PC (with built in Wi-Fi card) based web server that manages the connected home devices. The system supports a wide range of home automation devices like fans, lights, other home appliances. A similar architecture is proposed in where the actions are coordinated by the home agent running on a PC. Other papers such as also presented internet controlled systems consisting of a web server, database and a web page of websites for interconnecting and handling the devices.

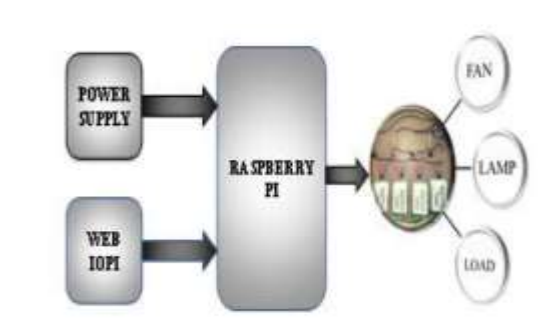


Fig 1. Block diagram

4. PROBLEM STATEMENT FROM LITERATURE SURVEY

The focus of my project is on helping users to operate home appliances with their own smartphones and to help elderly or handicapped people live a more independent life as long as possible. The objective of our system is to take care of several domestic systems that may normally be difficult for those who are handicap or elderly to take care of. The proposed idea will allow a user with any android enabled device to run a piece of downloadable software on any mobile device such as a smartphones. This application will allow the user to control a device that is connected to any home appliance that is Pi enabled. The focus of this application will be to direct a security system with webcam surveillance, door sensor notification and a light control system. Sensors will be connected to the home appliances with Pi so that they can be monitored and controlled.

Suppose an employee who has gone to work and during this period a thief sneaks up into the housebreaking through a window. The proposed system would enable the client to monitor his home when a door or a window sensor triggers the alarm. Client monitors his home with webcam and could immediately inform local authority or a policeman.

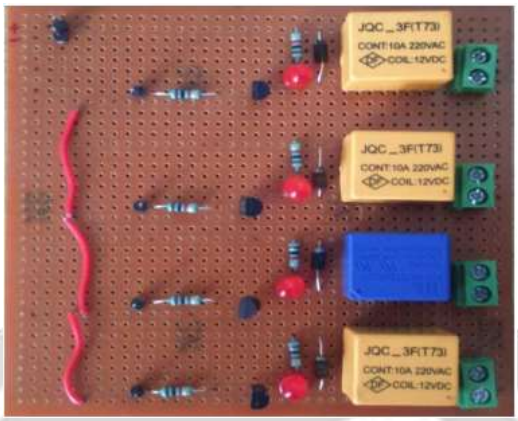
The Client could also check the status of the outside light and turn on and off the light without the need to Get out of bed. These devices would also benefit users with limited mobility that may have a difficult time getting to or even reaching their light switch. These objectives require a large amount of technology. The user interface must Be as simple and powerful as possible and operate in a self organized way.

5. Working

With the help of this system we can monitored and controlled the various equipment that are connected to the relay circuit via the input from raspberry pi model as well as from the WEBIOPI. Whenever the system is turned on, the current lighting data of the home are read and written to the data base and then transferred to the user interface. So, one can easily know the current situation of rooms and change in the state of the lights.

6. Hardware Description

1. Relay circuit



A Relay is electrically operated switches, which allow low power circuits to switch a relatively high voltage or current on/off. For a relay to operate a suitable pull in and holding current should be passed through its coil. Relay coils are designed to operate from a particular voltage often its 5V or 12V. The function of relay driver circuit is to

ADVANTAGES

- Low cost and expandable allowing a variety of devices to be controlled
- Saves money and energy
- All in one user friendly system
- This system contain Raspberry pi as a controller so the system contain all the advantages of it.
- This is noise free system.

7. CONCLUSIONS

These days, there were increasing used of wireless devices. The devices such as remote control and GSM phone provide means for monitoring and controlling home appliances (for example doors, lights and the rest). Integrating mobile phone to control and monitor home devices provide a more convenient way to alert users of the possible intrusion as well as avoiding user to be moving with additional equipment as almost every person use mobile phone. The home automation developed for this project remote control device, inner control device and outer control device communicated with some delay issues. But integrating it with android application has turned unsuccessful. Therefore, this remains the great limitation for further work.

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