RASPBERRY PI BASED WIRELESS HOME APPLIANCES MONITORING AND CONTROL BY ANDROID GSM SMART PHONE

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Abstract- ***In recent years, the home environment has seen a rapid introduction of network enabled digital technology. This technology offers new and exciting opportunities to increase the connectivity of devices within the home for the purpose of home automation. Home automation is being popular due to its numerous benefits, it refers to the control of home appliances There are lots of devices on the market that allow you to monitor your home from a central interface. Thus the already existing methods for the automation of home are Bluetooth, remote control, DTMF, free hand gesture, using radio and internet connection. This paper deals with the idea of implementing raspberry pi based home automation and the controlling this system using gsm (global system for mobile communication) to efficiently control the home appliances loads like light, fan. Through this project we able to monitor our home appliance from any location using sms. This paper deals with the idea of implementing raspberry pi based home automation and the controlling this system using gsm .***

Index terms: Raspberry pi, home automation, GSM, home appliances, efficient controlling

I. INTRODUCTION

The process of automation is becoming popular because of its numerous applications home automation refers to the applications of computer and information technology for control of home applications easily and reducing the power consumption or the power wastage associated with the manual system. Its application varies from a simple remote control of lighting to complex microcontroller based networks involving varying degrees of intelligence and automation. Home automation results inconvenience, energy efficiency, and safety benefits leading to improved quality of life. Nowadays automation plays a crucial role in all places and living homes. Presently automation techniques are implemented either by using Microcontroller or computer. Microcontroller cannot run multiple programs at a time. With the use of microcontroller it is difficult to control the

appliances. Therefore we go for advance technology in order to go for efficiency home automation of raspberry pi Popularity of home automation in the market. The main aim of this paper is to develop an advanced method of home automation with the application of Raspberry Pi (RPi) to control the home appliances in the presence of gsm modem.

II. RASPBERRY PI

The Raspberry Pi is a low cost, credit-card sized computer which plugs into a computer monitor or TV, and requires a standard keyboard and mouse. Raspberry Pi is a dynamic microcontroller and runs with the Python programming language. Raspberry Pi 2 includes a quad-core Cortex A7 processor CPU running at 900MHz and 1GBRAM, Integrated Video core and 4Graphics Processing constituent(GPU) capable of frolicking maximum 1080p Elevated meaning Blu-Ray Quality Video,512Mb SDRAM, The free, flexible and exceedingly, builder approachable Debian, GNU/Linux (RASBIAN) Operating System, 2 USB Ports, HDMI video, Output, RCA, Video Output, 3.5mm Audio Output Jack, 10/100Mb Ethernet Port for Internet access,5V Micro USB Domination Input Jack, Micro SDHC card, MMC, 40 gpio pins , It has capability of a little device that allows a people of all ages to explore computing. It's capable of doing everything you would expect a desktop/computer to do, from browsing the internet and playing high definition video to making spreadsheets, word processing, and playing games. The Raspberry Pi has the ability to interact with outside world, and has been used in a wide array projects like smart home monitoring system, wireless motion sensor activated light and many more application

III. OBJECTIVE

- The main objective of this project is to monitoring the home appliances through the wireless system
- To control the home appliances by means of android gsm smart phone

This project is basically built on the process of wireless communication through the GSM network with the help of raspberry PI and. GSM plays a very important role in the present day life of a person. Each and every person now-a-days has a cell phone with him and GSM network makes the people across the world to communicate with each other. So as technology is increasing so vastly now-a-days, everything in the world is being automated and wireless for the comfort of

man. So here we are building a device based on the Raspberry pi based wireless monitoring of home appliances and GSM network to control the electrical appliances through a cellular phone. Here we are going to design a cell phone based remote control of electrical appliances. This system is designed for controlling arbitrary devices according to the necessity. It includes a cell phone which is connected to the designed system. Basically for the system to work a phone call is made to the designated number or a message is being sent containing a password. As the caller press the specified in terms of the relays

IV. EXISTING SYSTEM

a) **Blue tooth based home automation using cell phone**:

In blue tooth based home **a**utomation system the home appliances are connected to the Arduino BT board at input output ports using relays. The program of Arduino BT board is based on the high level interactive C language of microcontrollers; the connection is made via Bluetooth. The password protection is provided so only authorized user is allowed to access the appliances. The Bluetooth connection is established between Arduino BT boards any of the Symbian OS environments. It is portable.One circuit is designed and implemented for receiving the feedback from the phone, which indicate the status of the device

b) **Zigbee based home automation using cell phones**

To monitor and control the home appliances the system is designed and implemented using Zigbee. The device performance is recorded and store by network coordinators. For this WIFI network is used, which uses the four switch port standard wireless ADSL modem router. The network SSID and security WIFI parameters are pre-configured. The message for security purpose first process by the virtual home algorithm and when it is declared safe it is re-encrypted and forward to the real network device of the home. Over Zigbee network, Zigbee controller sent messages to the end. The safety and security of all messages that are received by the virtual home algorithm. To reduce the expense of the system and intrusiveness of respective installation of the system Zigbee communication is useful.

c) **Wi-Fi based home automation using cell phones**

Wi-Fi based home automation system mainly consist three modules, namely, the server, the hardware interface module, and the software package. Wi-Fi technology is used by server, and hardware interface

module to communicate with each other. The same technology uses to login to the server web based application. The server is connected to the internet, foremost users can access server use based application through the internet using compatible web browser. Software of the latest home automation system is split into server application software and Microcontroller (Arduino) firmware. The Arduino software built, using C language, using IDE comes with the microcontroller itself. Arduino software is capable for gathering events from connected sensors, then applies action to actuators and pre-programmed in the server. Another job is to report and record the history in the server DB. The server application software package for the proposed home automation system is a web based application using asp.net. The server application software can be accessed from internal network or from internet if the server has real IP on the internet using any internet navigator supports asp.net technology. Server application software is capable of maintain the whole home automation, system, setup, configuration. Use database to keep log of home automation system components, we choose to use XML files to save system log another job is to report and record the history in the server DB. The server application software

d) **Home automation using Android ADK**

The devices of home are associate to the ADK and the connection is establishes between the android device and the ADK. The devices of house are link to the input/output ports of the board (EMBEDDED SYSTEM)and their current situation will have passed to the ADK.The microcontroller board (Arduino ADK)is based on the AT mega 2560.It has a USB host connection to associate with Android based phones, and that is based on the MAX3421e IC. The two important features of Android Open Accessory Protocol 2.0(AOAP) are as follows:

It has audio output that is from the Android device to the component and also it supports for the component server as one or more Human Interface Devices (HID) to the Android device. This paper depends upon Android and Arduino platform in which both are FOSS (Free Open Source Software) including motion sensors for safety systems will detect an unauthorized action and it will automatically notice the user through cell phones or the security system

e) **Cloud based home automation system**

Home Automation using cloud based system focuses on design and

implementation of home gateway to collect data from home appliances and then send to the cloud-based data server to get store on Hadoop Distributed file system, it is process using Map Reduce and use to implement a monitoring tasks to Remote users Presently home A automation system is persistently developing its resilience by assimilating the current characteristics which gratify the rising interest of the people. This paper presents the design and development of Home automation system that uses the cloud computing as service. The current system consists of three important units: the first part is the cloud server, handle and controls the data and information of client and users and the status of the devices. The hardware interface module is the second part which implements the relevant connection to the actuators and sensing devices which gave the physical service. Last part is Home Server, which construct the Hardware device and gives the user interface. This paper focus to build the web services using cloud which is need for security and storage and availability of data .The current system is cost efficient, reliable and comfortable which also gives a secured home automation for entire family The system is made up of various client modules for various platforms;

The server evaluated the data it takes from the house, send current status to the mobile device and vice versa. A database is managing by the server and it is status updated as per the changes done at home end. Embedded Program for Hardware Circuit Microcontroller and Internet Client for any desktop or mobile phones.

V. PROPOSED SYSTEM

From the block diagram given below, the first mobile station is used as a transmitting section from which the user sends a code that contains commands and instructions to the second mobile station which is based on a specific area where our control system is located, through GSM network. The MAX232 converts it into digital signal and sends it to the raspberry pi interfaced to it. Then the raspberry pi processes the code and carries out the specific operations. The raspberry pi is used to drive the relay circuits which switches the different appliances connected to the interface. After connecting the circuit properly and assuming all the connections the following steps are to be followed The gsm network sends the commands to the MAX 232 and also receives the command by the cellular phone Then the MAX 232 in involved in converting the signals to digital sends to

Cloud server is a central server aims on impl

raspberry pi, the raspberry give commands to the appliances.

VI. BLOCK DIAGRAM

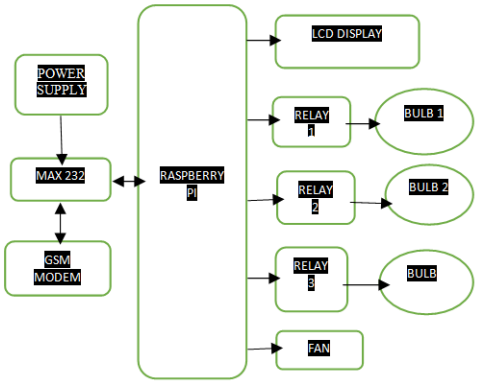

Fig 1: Block Diagram

VII. HARDWARE RESULTS

The hardware used in this system is

- GSM modem
- MAX 232
- Raspberry pi
- LCD display
- Relays
- Loads

A. GSM MODEM

A GSM modem is a specialized type of modem which accepts a SIM card, and operates over a subscription to a mobile operator, just like a mobile phone. From the mobile operator perspective, a GSM modem looks just like a mobile phone.

When a GSM modem is connected to a computer, this allows the computer to use the GSM modem to communicate over the mobile network. While these GSM modems are most frequently used to provide mobile internet connectivity, many of them can also be used for sending and receiving SMS

Fig 2: GSM Modem

B. MAX 232

A popular way to transfer commands and data between a computer and a microcontroller is the use of standard interface which is being described by the protocols MAX 232.It is the one of the widely used technique used to interface external equipments to computers. It uses serial communication where one bit is sent

along a line at a time

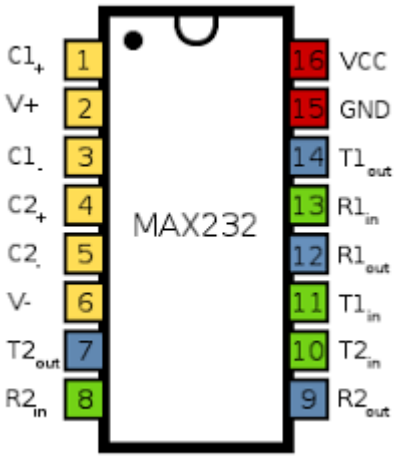

Fig 3: Pin Out of MAX 232

C. RELAYS

A relay is an electrically operated switch. Many relays use an electromagnet to mechanically operate a switch. Relays are used where it is necessary to control a circuit by a separate low-power signal, or where several circuits must be controlled by one signal.

Fig 4: Relay

Relays were used extensively in telephone exchanges and early computers to perform logical operations. A type of relay that can handle the high power required to directly control an electric motor or other loads is called a contractor or SSR. Solid-state relays control power circuits with no moving parts, instead using a semiconductor device to perform switching

D. LCD DISPLAY

A liquid-crystal display (LCD) is a flat-panel display or other electronically modulated optical device that uses the light-modulating properties of liquid crystals. Liquid crystals do not emit light directly, instead using a backlight or reflector to produce images in colour or monochrome. LCDs are available to display arbitrary images or fixed images with low information content, which can be words, digits, and 7-segment displays, as in a digital clock.

E. RASPBERRY PI (B+MODEL)

Model B+: The Model B+ is more expensive than the Model A+ and has more connectors and RAM. It features a single-core 700 MHz ARM processor, 512MBs of RAM, four USB ports and one Ethernet port. Raspberry Pi 2, Model B: The Raspberry Pi 2 Model B is more expensive than the other versions of the Raspberry Pi and has much more RAM and a much faster processor. It features a quad-co 9900MHz ARM processor, 1GB RAM, four USB ports and one Ethernet p: The Raspberry Pi 2 Model B is more expensive than the other version of the Raspberry Pi.

Fig 5: GPIO of Raspberry pi

F. LOADS

There are four loads which have been controlled automatically. The loads which have used in this system are light bulb, fan.

VIII. CONCLUSION

These kinds of home automation system are required because humans can make mistakes when forgot to switch off the appliances when there is no use and in this case they are useful in order to utilise the power effectively and also in a secured manner. It is distance independent and portable. We can avoid unwanted shocks during switching operation of the appliances. It becomes an efficient way of reducing the power supply.

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REFERENCES

1. L.Gopinath and S.Kanimozhi;"Embedded System"

2. Industrial automation using iot raspberry pi from IEEE on june 2015 by the authors"H.K.Merchant and D.D.Ahire"http://www.engpaper.com/raspberry-pi-2017.html

3. IOT based secured home automation by raspberry pi from Internal journal of ethics in engineering and applicationon by on june 2017the authors" R V Prasad Bhookya and Nitesh Gaikwad"

4.Review Paper on Home Automation System using Raspberry PI from International Journal on Recent and Innovation Trends in Computing and Communication by the authors" Chirag Atha, KshitijBaranwal, Varad Desai and Dr Sunil Wankhad"

5. Raspberry Pi Based Interactive Home Automation System through Internet of Things fromInternational Journal for Research in Applied Science & Engineering Technology (IJRASET) ©IJRASET 2015: All Rights are

Reserved 809 Raspberry Pi Based Interactive Home by the authors" Volume 3 Issue III, March 2015"

6. raspberry Pi and GSM survey on home automation by the authors"Shrikrushna Khedkar and G.M. Malwatkar"IEEE *Xplore* Digital Library http://ieeexplore.ieee.org

7.A Smart Home Automation technique with Raspberry Pi using IoT by the authors "VamsikrishnaPatchava,Hari BabuKandala and P Ravi Babu"IEEE *Xplore* Digital Libraryhttp://ieeexplore.ieee.org

8. Raspberry Pi based advanced scheduled home automation system through E-mail by the authors"M. Narender and M. Vijayalakshmi" IEEE *Xplore* Digital Libraryhttp://ieeexplore.ieee.org

9.Multi-functional secured smart home by the authors"MdShariqSuhail,G ViswanathaReddy, G Rambabu" IEEE *Xplore* Digital Libraryhttp://ieeexplore.ieee.org

10. IEEE Robotics & Automation Magazine

11.Home automation by using raspberry Pi and android applicationH. Bharathi; U. Srivani; M D Azharudhin; M. Srikanth; M. Sukumarline2017 International conference of Electronics, Communication and Aerospace Technology (ICECA)

12. Smart Home Automation: A Literature Review Vaishnavi S. Gunge Walchand Institute of Technology Solapur Pratibha S. Yalagi International Journal of Computer Applications (0975 – 8887) National Seminaron Recent Trends in Data Mining (RTDM 2016)

http://research.ijcaonline.org/rtdm2016/number1/rtdm2568.pdf

13. A Review on Home Automation System (Renuka P. Dhage1, S.P.Kharde2) International Journal of Advanced Research in Electrical, Electronics and Instrumentation Engineering

14. Survey on Home Automation Using Raspberry Pi through GSM ShrikrushnaKhedkar, Dr. G. M. Malwatkr International Journal of Science and Research