International Research Journal of Engineering and Technology (IRJET) e-ISSN: 2395 -0056
Volume: 03 Issue: 06 | June-2016 www.irjet.net p-ISSN: 2395-0072

A Review on Home Automation System Using Different Techniques

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Abstract - *In today's world use of Home automation system is increasing due to its numerous advantages,easiness etc. Home automation system is that in which the various appliances within the home are remotely controlled.There are different technologies exist which are used for Home Automation.By using Bluetooth or ZigBee we can remotely control all appliances within home but both of them having area limit or within some specific distance we can operate that devices remotely but by using Internet of Things (IoT) we can control our home appliances from anywhere around the world.The work deals with discussion about various brilliant home automation systems and technologies.In home automation the monitoring and control operations are assist through smart devices installed in residential buildings. Different home automation systems and techniques considered in review with central controller based (Arduino or Raspberry pi), Bluetooth-based, ZigBee based,email based,web based,SMS based,mobile-based,cloud-based, Dual Tone Multi Frequency-based, and the Internet(Wi-Fi) based.*

Key Words: Home-Automation, Micro-controller(Arduino or Raspberry Pi), Sensor System, Bluetooth, ZigBee, IOT and User-friendly Interface

1. INTRODUCTION

The main purpose of Home automation is to save the electricity.In daily routine life sufficient use of electricity is very important.Anyone can remotely control the home or office appliances automatically. Various technologies are reviewed throughout this paper. Introduction of different wireless communication such as GSM, BLUETOOTH WIFI, and ZIGBEE are discussing here. Home automation system saves manpower,time,currency and even electricity. Secured, reliable, flexible, user friendly and inexpensive this are the specification of home automation system.Home automation is a system of operating or controlling a process by electronic devices with reduction in human engagement.In day-by-day life the use of automation system for house,hotels,office etc. is continuously increasing. Automation makes not only an economical but also an efficient use of the electricity and water and reduces much of the wastage.Due to IoT people and things to be connected any-time, anyplace, with anyone, ideally using any network and any service. Automation is an important application of IoT technologies. It is the monitoring of the energy consumption and the Controlling the environment in buildings,hospitals, schools, museums and offices by using different types of sensors and actuators that control lights, temperature,and humidity.

2. Home Automation

The Smart homes are known as Home automation, with the use of new technology, to make the housing activities more easy, accessible, secured and efficient. The important components of home automation systems are as follow:

Important Controller: It is hardware interface that communicates with user interface by controlling home services.

Mode of communication: wired connections (example Ethernet) or Wireless (radio waves, infrared, Bluetooth, GSM) etc.

Electronic Devices:- A bulb, an AC or a heater, which is compatible with the transmission mode, and connected to the Central control system.

User interface: Give orders to control System for example as a monitor, computer, or Phone.

2.1 Features of Home Automation System

Now a days, wireless systems such as Wi-Fi have become more common in home networking. Also in home and city(smart) automation systems, the use of wireless network gives us several advantages over wired network.

1) Installation cost is reduced : In this system no cabling is necessary so installation costs are significantly reduced. Wired systems require cabling, but the material used for wires and the professional laying of cables (e.g. into walls,under ground) is expensive.

2) System is easy to scalable and extent: Due to the use of wireless network,It is easy to extent our network according to changing requirement of the system, instead of wired installations, in which cabling extension is tedious. .

3) Home automation is very flexible: All the operations are combined at a time like switching on the bulb(lights) and they even control the music system. All these operations can be done on a single go. It is highly efficient. It is becoming easier to reduce the electricity bill by using the pro-active based home-automated appliances.

4) It is less time consuming. Home automation makes the work easier in a way that the work will be finished with the less time.

5) It is also called Assistive Domestics: It focuses mainly on making it possible for the elderly and disabled to remain at home, safe and comfortable.

2.2 Challenges of Home Automation System

Home automation systems face some main challenges, these are high cost of ownership, inflexibility,difficulty in achieving security and poor manageability. The main intention of this research is to design and implement a home automation system using IoT that is able to controlling and automating most of the house appliances through an easy possible web interface. By using Wi-Fi technology to interconnect its distributed sensors to home automation server the proposed system has a great flexibility. This will decrease the deployment cost and will increase the ability of upgrading, and system reconfiguration.

3. LITERATURE REVIEW

In this section, we are discussing various Home Automation System with their technology with features, benefit and limitations they have.

3.1 Bluetooth Remote Home Automation System Using Android Application

This paper presents the total design of Home Automation System (HAS) with wireless remote control and low cost . This system is designed to assist and give support in order to fulfill the needs of aged and handicapped peoples in house. The smart home concept in the system increases the standard of living. The main control system use wireless Bluetooth technology to give remote access from PC/laptop or smart phone. The design remains the existing electrical switches and provides more safety control on the electrical switches with low voltage activating method. The status of switches is synchronized in all the control system whereas every user interface indicates the real time existing status of switches. The system supposed to control electrical appliances and devices in house with relatively low cost

design, user-friendly interface and simplicity of installation.

3.2 Bluetooth Based Home Automation and Security System Using ARM9

The main purpose of this paper is to put forwards the design of home automation and security system using ARM7 LPC2148 board. The main design element is a standalone embedded system board ARM7 LPC2148 at house. Home devices are connected to the ARM7and connection is started between the ARM7 and ARM9 with Bluetooth device. Appliances in the house are connected to the IN/OUT ports of the embedded system board and their status is passed to the ARM7. For authorized person to access home appliances we have to develop an authentication to the system . The device with low cost and scalable to less change to the core is much important.

3.3 GSM Based Home Automation System Using App-Inventor for Android Mobile Phone

This paper explains GSM based Device Control System mobile application developed using the App Inventor for Android phones. As a report from the International Data Corporation (IDC) Worldwide Quarterly Mobile Phone Tracker, in global market share Android has maintained its leadership position on highest .The Global System for Mobile Communication (GSM) network is present almost everywhere.The preface of the Global System for Mobile Communication (GSM) and mainly the use of cellular phones got the modernity of distance communication at remote location. Paper makes use of this ability for remote control of device and appliances; consider this example, a person on a drive within his car all of a sudden remembering that he left the Refrigerator, ON actually it should be OFF. The usual condition is to drive back and switch OFF the Refrigerator. But with the Android mobile phone in the hand equipped with GHAS (GSM Home Automation System) Application, he is able to OFF his Refrigerator from his Car.This shows that one can control any appliance at any point, anywhere and at any time without worrying geographical locations.

3.4 Wireless Home Automation System Using Zigbee

This paper gives the overall details of design of a wireless home automation system (WHAS) which has been built and implemented. The high technology centers on recognition of voice commands and uses low-power RF ZigBee wireless communication modules which are relatively of low cost. The home automation system is supposed to control all lights and electrical appliances in a house or office using voice commands. The system has been tested and verified. The verification tests included voice identification response test, indoor ZigBee communication test. The tests involved a mix of 11 male and female subjects with various Indian languages. 7 different voice commands were sent by each person. Thus the test involved sending a total of 77 commands and 80.05% of these commands were recognized correctly.

3.5 Micro controller Based Home Security System with GSM Technology

The main purpose of this paper is to plan and implement a smart home security system based on micro-controller along with GSM for user friendly application. The system is brilliant enough to monitor the secure environment. In addition, the user is informed about the security failure through GSM network that provides a special opportunity whenever the user are away from house. However, Android application is the most stunning feature in order to control the system through a Bluetooth device. Furthermore, the system provides the reliable operation within reasonable cost and removes the system complexity. In this activity, conventional burglar alarm mode, LED lights and LCD are the likely features used to check reliability. The entire system is implemented on a practical home security system which requires considerable attempt to install it. Therefore,

the system is also applicable for commercial purposes due to versatile ways of security and controlling.

COMPARATIV ANALYSIS

By overlooking above surveyed papers, all the home control automation system uses wireless technology. Smart phone plays a very essential role in all these systems. GSM technology is used in two systems. Micro Controller, ARM7(ARM7 LPC2148 board, PIC16F877 (40 pin IC), ARM9,etc. acts as a controller in above home automation system. For driving the relays ULN2003 is used in almost all system. In programming App inventor, embedded C, Keil Compiler, VB.NET etc. this all software's are used and Bluetooth modules LM400 having distance 100 meters, frequencies 2400Hz, speed 3 Mbps.

CONCLUSION

We have studied different techniques for home automation system. Various author gives various techniques with flowchart, block diagram and their explanation with proper layout of successful execution with adequate strengths and imperfection. All systems are planned in this surveyed papers are designed and tested practically. Main purpose of this method of implementation is that all systems are in uncertain condition, henceforth it is useful for old aged and handicapped persons and save electricity, time and money etc.

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