Literature Review on Home Automation System

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Abstract: One of the topics which is gaining popularity is Home Automation System because of its innumerable advantages. Home automation refers to the monitoring and controlling of home appliances remotely, with the never-ending growth of the Internet and its applications, there is much potential and scope for remote access and control and monitoring of such network enabled appliances. This paper deals with discussion of different intelligent home automation systems and technologies from a various features standpoint. The effort targeted on the home automation concept of where the controlling and monitoring operations are expediting through smart devices. Wide-ranging home automation systems and technologies considered in review with central controller based (Arduino or Raspberry pi), cloud-based, Bluetooth-based, SMS based, ZigBee based, mobile-based, RF Module based, web based and the Internet with performance.

Keywords: Home Automation, Intelligence, Microcontroller, Sensor System, User-friendly Interface.

I. INTRODUCTION

Automation performs an increasingly vital role in daily experience and global economy. Engineers strive to combine automated devices with mathematical and organizational tools to create complex systems for a rapidly expanding range of applications and human activities.

The concept of home automation has been around since the late 1970s. But with the enhancement of technology and smart services, people’s expectations have changed a lot during the course of time to perfectly turn the traditional house into smart home. and also think that what a home should do or how the services should be provided and accessed at home to become a smart home and so has the idea of home automation systems.

A home automation system means to grant the endusers to manage and handle the electric appliances. If we look at different home automation systems over time, they have always tried to provide efficient, convenient, and safe ways for home inhabitants to access their homes. Regardless of the change in user’s hope, growing technology, or change of time, the appearance of a home automation system has remained the same.

Many existing, well-established home automation systems are based on wired communication such as Arduino based and raspberry pi based home automation systems. This does not pose a problem until the system is planned well in advance and installed during the physical construction of the building. But for already existing buildings the implementation cost goes very high. In contrast, Wireless systems can be of great help for automation systems like Bluetooth, Wi-Fi and IOT based home automation systems. With the advancement of wireless technologies such as Wi-Fi, cloud networks in the recent past, wireless systems are used every day and everywhere.

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

II. LITERATURE SURVEY

1. Bluetooth based home automation system using cell phones:
In Bluetooth based home automation system the home appliances are connected to the Arduino BT board at input output ports using relay. The program of Arduino BT board is based on 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 board and phone for wireless communication. In this system the python script is used and it can install on any of the Symbian OS environment, it is portable. One circuit is designed and implemented for receiving the feedback from the phone, which indicate the status of the device.

2. Zigbee based home automation system using cell phones:
To monitor and control the home appliances the system is designed and implemented using Zigbee. The device performance is record and store by network coordinators.
For this the Wi-Fi network is used, which uses the four switch port standard wireless ADSL modern router. The network SSID and security Wi-Fi parameter are preconfigured. 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 sends 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 the intrusiveness of respective installation of the system Zigbee communication is helpful.

3. **GSM based home automation system using cell phones:**

Because of the mobile phone and GSM technology, the GSM based home automation is lure to research. The SMS based home automation, GPRS based home automation and dual tone multi frequency (DTMF) based home automation, these options we considered mainly for communication in GSM.

In figure shows the logical diagram the work of A. Alheraish, it shows how the home sensors and devices interact with the home network and communicates through GSM and SIM (subscriber identity module). The system use transducer which convert machine function into electrical signals which goes into microcontroller. The sensors of system convert the physical qualities like sound, temperature and humidity into some other quantity like voltage. The microcontroller analysis all signal and convert them into command to understand by GSM module. Select appropriate communication method among SMS, GPRS and DTF based on the command which received GSM module.

4. **Wi-Fi based home automation system using cell phones:**

Wi-Fi based home automation system mainly consist three modules, the server, the hardware interface module, and the software package. The figure shows the system model layout. 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, so remote users can access server web based application through the internet using compatible web browser. Software of the latest home automation system is split to server application software, and Microcontroller (Arduino) firmware. The Arduino software, built using C language, using IDE comes with the microcontroller itself. Arduino software is culpable for gathering events from connected sensors, then applies action to actuators and pre-programed in the server. Another job is to report the and record the history in the server DB. The server application software package for the proposed home automation system, is a web based application built 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 culpable of, maintain the whole home automation system, setup, configuration. Server use database to keep log of home automation system components, we choose to use XML files to save system log.

5. **Home automation using RF module:**

The important goal of Home Automation System is to build a home automation system using a RF controlled remote. Now technology is accelerating so homes are also getting smarter. Modern homes are deliberately relocating from current 1 switches to centralized control system, containing RF controlled switches. Today traditional wall switches situated in various parts of the home makes it laborious for the end user to go near them to control and operate. Even further it turns into more problematic for the old persons or physically handicapped people to do so. Home Automation using remote implements an easier solution with RF technology.

In order to accomplish this, a RF remote is combined to the microcontroller on transmitter side that sends ON/OFF signals to the receiver where devices are connected. By operating the stated remote switch on the transmitter, the loads can be turned ON/OFF globally using wireless technology.

6. **Home automation using Android ADK:**

The devices of home are associate to the ADK and the Connection is established between the Android device and 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 ATmega2560. 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 it also support for the component serves 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 phone or the security system.

7. Cloud Based home automation system:
Home Automation using cloud based system focuses on design and implementation of home gateway to collect data about 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 MapReduce and use to implement a monitoring tasks to Remote user Presently home 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 use the cloud computing as service. The current system consists of three important units: the first part is cloud server, handle and controls the data and information of client and users and the status of devices The hardware interface module is the second part which implement the relevant connection to the actuators and sensing devices which give 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 the data. The current system is cost efficient, reliable and comfortable which also gives a secured home automation system for entire family.

The system is made up of various client modules for various platforms.

1. Cloud server
Cloud Server is a central server aims on implementing services to the other sub modules. Central server serves as the data respiratory system and brain It implements three connections to the three sub modules viz home system, web configuration tool and mobile. The server evaluates 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 gets updated as per the changes done at home end.
2. Embedded Program for Hardware Circuit Microcontroller, and.
3. Internet Client for any desktop or mobile phones.

8. Raspberry pie home automation with wireless sensors using smart phone
Home Automation System has been developed with Raspberry Pi by reading the algorithm and subject of E-mail. Raspberry Pi guarantees to be an efficient platform for implementation powerful, and economic smart home automation. home automation using Raspberry pi is better than any other home automation methods in several ways. For example, DTMF (dual tone multi-frequency) using home automation, the call tariff is a big demerit, which is not the problem in their proposed method. In Home Automation using web server, the design of web server and the memory space required is dismiss by this method, because it just uses the already established web server service given by G-mail. LEDs were used to identify the switching action. This System is efficient and flexible interactive.

**Sending Commands to the Raspberry Pi**
The script running on server side of our laptop or on a web server receives the input commands from the user and appropriately sends it to the client (Raspberry Pi). In this, we will be using those input commands to turn a light ON/OFF. When we give the command to turn ON a light by the server side script, the data and information gets relayed to the Raspberry Pi and its GPIO pin will turns ON a relay. The system can send current updates to the server to detect whether the light is ON/OFF.

**Receiving Data from the Raspberry Pi**
Using PIR motion sensor we can send the data signal to the Raspberry Pi, we just run a script which can reads the sensor by a GPIO pin and transmit the data to overall system through the IoT platform. This can then be look by the IoT console.

9. **Wireless Home Automation system using IoT**

This system uses mobiles or computers to control basic home control and function automatically through internet from anywhere around the world globally, an automated home is sometimes called a smart home. It is meant to save the electric power and human energy. The proposed system is a distributed home automation system, consists of server i.e. Wi-Fi module, sensors. Server controls and monitors the various sensors, and can be easily configured to handle more hardware interface module (sensors). The Arduino board, with built in Wi-Fi module acts as web server. Automation System can be accessed from the web browser of any local PC using server IP, or remotely from any PC or mobile handheld device connected to the internet with appropriate web browser through server real IP (internet IP). Wi-Fi technology is selected to be the network infrastructure that connects server and the sensors. Wi-Fi is chosen to improve system security (by using secure Wi-Fi connection), and to increase system mobility and scalability.

### III. COMPARISON

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<th>Controller</th>
<th>User Interface</th>
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<td>Wi-Fi</td>
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<td>Low cost, Secure, Remotely controlled</td>
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IV. CONCLUSION

Survey of different home automation system shows that there are various kinds of technologies used to implement this type of system. All the proposed systems have been presented and compared in this paper which reveals some merits and demerits of the systems. This review explained different home automation system e.g. Web based, Bluetooth-based, mobile-based, SMS based, ZigBee-based, Arduino microcontroller based, Android app based, IOT based and cloud-based. Due to its performance, simplicity, low cost and reliability home automation system is making its position in global market, that day is not so far when every home will be the smart home.

REFERENCES