Bluetooth Remote Home Automation System using Internet of Things

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ABSTRACT: This paper focused on executing automation applying the popularly used mobile operating system ANDROID i.e., android operating system. The electrical as well as house appliances can be regulated using the android based mobile phones and Bluetooth Wireless Communication Protocol even if you are outside home and not remembered to turn off the appliances. However the case of any fire accident or when any stranger enter the house same can be controlled using this system. It could also be executed at workplaces. It is computerization of the home, housework or household activity. The key control unit implements wireless Bluetooth applications to give remote access from PC/laptop or smart phone. The design remains the same electrical switches and gives extra security control over switches with less power consumption. Here switches are synchronized with the control system and provides real time monitoring. The system is designed to control electrical equipments and machines with target of comparatively less cost, easy to install and with user-friendly interface.

KEYWORDS: Android; Bluetooth; Home Automation; Home Appliances; Smart Phone.

I. INTRODUCTION

The "Home Automation" idea has lived for multiple years. The words "Smart Home", "Intelligent Home" followed and has been used to present the idea of web based equipments and machines in the home. Home automation Systems (HASs) outlines a important research opportunity in creating recent study in engineering, architecture and computing. HASs growing trendy now a days and jumped promptly into rising market. Still, end users, particularly the disabled and elderly don't accept these systems because of their cost and complexity. Due to the rapid progress in wireless technology, there are various type of links are brought in like Bluetooth, GSM, ZIGBEE, and Wi-Fi. Every link has very own peerless specifications and applications. Out of the four well known wireless connections that frequently implemented in HAS design, Bluetooth is being preferred due to its appropriate capability [1]. Bluetooth with everywhere accessible frequencies of 2400Hz is easy to accommodate connectivity up to 100 meters at rate of up to 3Mbps count on the Bluetooth instrument category.

The capabilities of Bluetooth are greater than sufficient to be implemented in the design. Further, all of the present laptop/notebook or cell phones are produced included Bluetooth adapter. It will indirectly decrease the expense of this system. Depend on the research of HAS project accomplished by researchers and developers, Microcontroller are applied in wireless HAS. In wireless connection, the system applies a FM transmitter and receiver to establish a RF connection. The simplex connection among control board and controller restricted to only one type of input (voice) to the system. Apply GSM, Internet and voice as wireless HAS. The system implemented microprocessor and GSM SMS control pattern by a GSM modem.

This system is implemented on a Bluetooth Arduino board with mobile remote control. HAS system is low cost but the cost of Arduino BT board is not low, hence not cost effective solution. Further, the mobile control is implemented by Android OS application. Here, Bluetooth connection is fixed by Bluetooth module that straightforwardly receives/sends instructions from/too smart phone or laptop/PC. For the GUI, Window OS on laptop/PC and Android OS on Smart Phone are picked based on the large user allocation in current market [2]. By considering the flexibility, the main control board is designed with wired and wireless connection. USB HID as secondary link to the control board performs the wired connection. For the wireless connection, the main control board can be linked to either one of the laptop/PC or Smart Phone. Besides, the switches modes on the board are synchronized in actual time to all the linked GUI controllers.

II. SYSTEM OVERVIEW

The figure 1 given below shows the comprehensive command function of the Home Automation system. The Bluetooth wireless links are enabled such that the system transmits with graphical user interface (GUI) or the Bluetooth module on smart phone wirelessly. The aimed house equipments are managed by the system Main Control Board. To upgrade the quality of living in house, this system gives manual control techniques to the Main Control Board. The manual control technique is finished by Android GUI/ Bluetooth module installed in Smart Phone. The user cans comfortably touch on the screen of the phone to control the house equipments. This easily transportable technique is adequate to help the disabled person who has trouble with locomotion difficulty [3].

Different types of sensors are used for Home Automation Systems(HASs) and they are the Passive Infrared Receivers(PIRs) , Light Dependant Resistors(LDRs), Fire Sensors and the Ultrasonic Sensors which are linked to the main control board is used to calculate or detect the Infrared motion in the body to an angle of 160º and up to 10-15m, intensity of the light i.e., matches the intensity of artificial light to light from that of a natural source, distance of the stranger from the sensor in the room/house and chances of fire accidents. The clue from the sensor is able to warn the user to turn on/off the electrical devices in the home. The house equipments on/off mode are synchronized to the GUIs/ Bluetooth modules on smart phone. The switches footing and sensor reading are done on live basis by the main control board. Any alteration on the footing or reading will be communicated to the module [4].
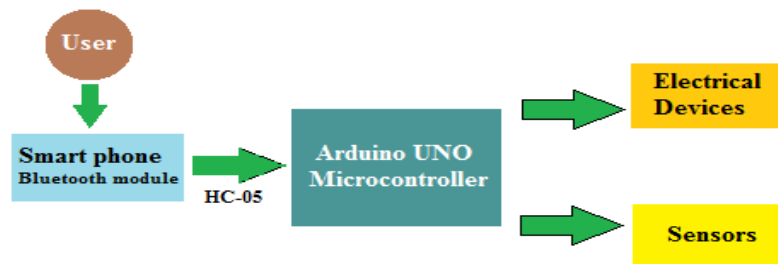

Fig.1: Control Functions of HAS.

After the smart phones Bluetooth links are linked to individual machines, the Window GUI will play as a server to forward or communicate any information from/to the smart phone and main control board. Few links of the system are created with two connections (Primary and Secondary) to the system. If any problem occurs on individual computer or laptop, smart phone can directly link to the main board. When Bluetooth connection problem happens among individual computer/laptop and control board, individual computer/laptop would be linked to the board by wired USB connection and secondary link will act as backup to the system.

III. CHALLENGES IN HOME AUTOMATION SYSTEM

Here, we talk about several threats experienced by home automation systems as they are appealing object for an intruder. A house owner or the system manager may not be enthusiastic to do the essential improvements needed to maintain the system functioning correctly is the prime concern. House safety and automation system are assembled using the various devices from different makers which constitute it susceptible to failures. Mainly, house owner who is not a master in advanced technology may attempt to reconfigure the system which may happen in total failure of system. And, the extremely important aspect is that, average customer usually consider the cost of buying and swatting up of system. As a result of it, they may buy an improper system owing to their unknowingness, misinformation or lack of interest towards several security problems. Another relevant barrier is that, all guests can't be familiar about security and may also feel insulted if the house entry is barred to them at any point. Similarly, senior citizen's short technological knowledge may be a bigger obstruction [5].

IV. SECURITY CONCERNS IN HOME AUTOMATION SYSTEM

A. *Based on Bluetooth*

Bluetooth has a highest transmission distance of 100m in perfect conditions. Higher may be required in a house environment. Bluetooth communication has relatively high energy utilization, so the batteries of devices need to be repeatedly revived or renewed. Bluetooth technology has advanced and upgraded to Bluetooth Low Energy (BTLE), which gives the same distance of communication. Bluetooth communication should only be used on moments where there is a need for speedy short-lived network transmission with little concern for safety. It is inexpensive, easy, and quick to set up. Bluetooth communication is quickly usable and it also renders the essential bandwidth for the operation in a house [3].

B. *Based on GSM and Mobile*

Mobile-based home automation is drawing attention to researchers due to the popularity of mobile phones and GSM technology. We generally consider three alternates for communication in GSM that are SMS-based home automation, GPRS-based home automation, and Dual Tone Multi Frequency (DTMF)-based home automation. The system changes the machine functions into electrical signals via a transducer, which goes into a microcontroller. A transducer changes physical quantities such as sound, temperature, and humidity into some other quantity such as voltage; here, a sensor does that role. For electronic tools, their reading goes straight into the microcontroller. The microcontroller determines these signals and changes them into commands that can be assumed by the GSM module. Based on the received commands, the GSM module chooses the suitable communication technique [3].

V. SOFTWARE DESIGN AND IMPLEMENTATION

Software design section involves the principle functions of the system designed in the Arduino UNO microcontroller and the Bluetooth module (Android application). Figure 2 below demonstrate the process of the sensors in the system. The sensors detection function is carried out by the microcontroller. The activating sensors are designed by push buttons. Any input switch is pressed; it will interrupt the main function loop of the microcontroller. UNO controller also communicates the change of switch mode to all the modules that are linked to the main board [6].
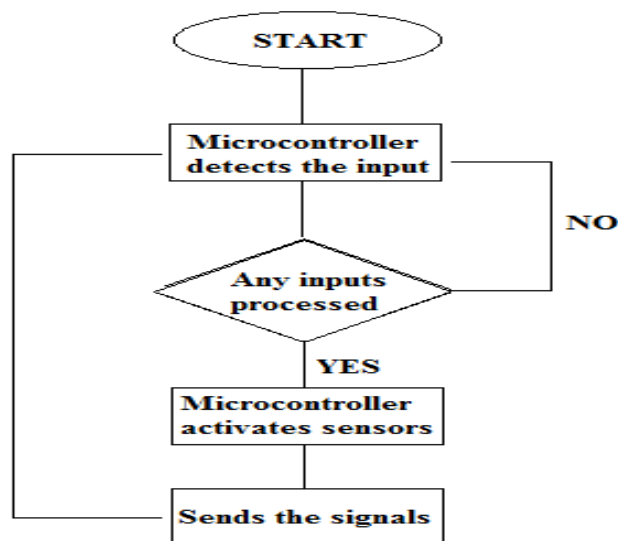

Fig.2: Sensor Flow in Home Automation System Design.

The four bulbs pointed the equipments status that linked to the system. User can simply click on the bulb to switch on/off the equipment. Control board „Connect‟ button is carried out to set up links to main control board by Bluetooth or USB. Phone "Connect" button is performed to set up link among Android GUI. When the both connections are

established, Window GUI acts as the server between main board and phone. All the data received from main board will be forwarded to the phone. Also, the data sent from phone will be forwarded to main board.

VI. CONCLUSION

This paper is based on the meaning of smart phones and all the details of smart home elements projects and challenges main objectives is to give a survey on smart phone research. Many new technologies are exploring more and more and day by day. Smart is the good and beneficial who is very much easy with their professional life and also for those who are about security and comfort but they want to save their electrical energy that is wasted by many people in regular span of time. With the introduction of smart home people are living and will obviously live more comfortable life. All the time home can be saved from automation so that we will have much more time work on the other things or pursuits.

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BIOGRAPHY

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