Smart Home System using Android Application

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Abstract

Smart Home System Using Android Application (SHSUAA) is a technology used by which the various electrical appliances can not only be controlled manually; but can also be controlled automatically. SHS can be developed by using electronics and computer knowledge. This would not only increase the standard of living of people but would also provide a help to physical handicap and elderly person. In this paper we will present to you, the existing systems, our proposed system, the working of system, its results and its advantages over existing systems. To do this we will use standard Bluetooth module and an android application mainly.

Keywords: Smart Home System Using Android Application (SHSUAA), Sliding Window Sensor, Gas Sensor

I. INTRODUCTION

The term 'Smart Home' is generally used for house or home has automated controls for controlling various electrical appliances and switches in a house. The Smart home technology is not only used in houses; but this technology is very largely being used in many hotels and lodges too. The standard of the place increases if the place is equipped with not only manual controls but also automated controls. But currently not many people are familiar with this technology as it is not very cost efficient and cannot fit to the pockets of what we in common terms call "a mango man". Also the people living in remote places and villages are unfamiliar to such advances that man has reached. But if such type of system becomes a casual scene in every house it would be of great help to the people using it.

According to the survey conducted by the UN, currently the percentage of elderly population is 7.6% which is projected to rise as high as 16.2% in 2050. [1]. Around 15% of the world population is disable in some way or the other. [2]. This proves of how useful this system can proof to be of so many people. According to a research from IDC,78% of the world population uses a android phone which is said to increase to 80% by 2015. We will be developing a Android Application as a Remote control. A Bluetooth module will be used to transmit and receive signals. This would help us keep our system within the reach of a common man and remain cost effective.

The SHSUAA is highly safe to use as only the authorised mobile phones are allowed to control. The system uses a password to connect the phone to the system and there after the mobile can be used to control the switches. If the password does not match then no access would be granted to that device. This increases the security of the system. This system use a 82S51 of 8051family microcontroller, a Bluetooth module, relays, transformers, LCD monitor, voltage regulator, power oscillator, sensors and an android phone.

II. LITERATURE SURVEY

People once just thought of having some system which would not require them to the job physically like switching ON/OFF lights, fans, etc. But with the advances in science and technology this thought has now turned into a reality. It is now possible to do all those tasks automatically.

"Smart Home" is the term commonly used to define home, room or building, which has a special system that does some intelligent actions according to situation. The components are connected to each other in such a way that they can be controlled by a remote device. This remote device does not require to have a physical contact with the system. For example, when a person is feeling sick and wishes to switch off the fan. The person can use the application to switch of the fan without taking the trouble to get up. Such applications can used by hotels to upgrade their rooms.

Research on smart homes began in the late 1980's with the intent on making homes more intelligent. By the mid 1990's the focus had turned to incorporating these innovations into the lives of the elderly and disabled people. In Canada, the elderly population had been increasing faster relative to the younger population and still does so

Today. As such, home automation is becoming a boon for the elderly and disabled people and there is a lot of research being carried out in this area. SHS focuses on making it possible for disabled people to remain their life at home, safe, convenient and comfortable. The work by Hussain et. All combined WSN and Radio Frequency Identification (RFID) technology for door control system. Their project deals with the Radio Signal Strength Indicator (RSSI) of wsns. RSSI is a measurement of how strong a signal appears to the node that is receiving the signal. The RSSI can be affected by many factors that can cause it to change quickly. It also used RFID that is a technology used for identifying people who carry identification badges. This technology consists of reader which reads an approaching badge to identify the person who is carrying the badge. The problem in their project is that WSN nodes always make radio transmission in a very short period of time. A sensor expends maximum energy in radio communication both for transmission and reception. Thus, it causes to consume the battery of node shortly because of their limited source of power.[3]

III. METHODOLOGY

The system works in few stages. Each step provides a base to the following step. In this way each is dependent on the previous step. At first the main system requires to be connected to the power supply. As the system gets power of 230volts the stepped down transformer is used to bring the power down to 12 volts.

A. Hardware Connection and Programming;

The first part of the system is the 89S51 microcontroller is a rewritable microcontroller with 4Kb memory. It is a 40 pins microcontroller having 4 ports. The first port is connected to the 16 bit LCD monitor. The LCD monitor is used to display the status of the system. The second port is connected to the relays which would be connected to the appliances. The relays run on 12 volts power supply. The third port is connected to the sensors. The sensors include door sensor, sliding window sensor, water level sensor and LPG gas sensor. The last port is connected to the Bluetooth module by RX and TX pins. The Bluetooth module is used to send and receive signals to and from the environment and the system. [4]

The microcontroller is programmed using BASCOM 8051 that is the BASIC COMPILER of 8051 microcontroller. It has the BOD rate of 9600bits/sec. The appliances and sensors we are using in the system need to be declared while programming. The status of appliances i.e. ON or OFF needs to be declared as variables. We are programming the microcontroller such that it goes into an infinite loop. This means that we can use the system for a very large amount of time. Fig. 1. Shows the circuit diagram of the system.

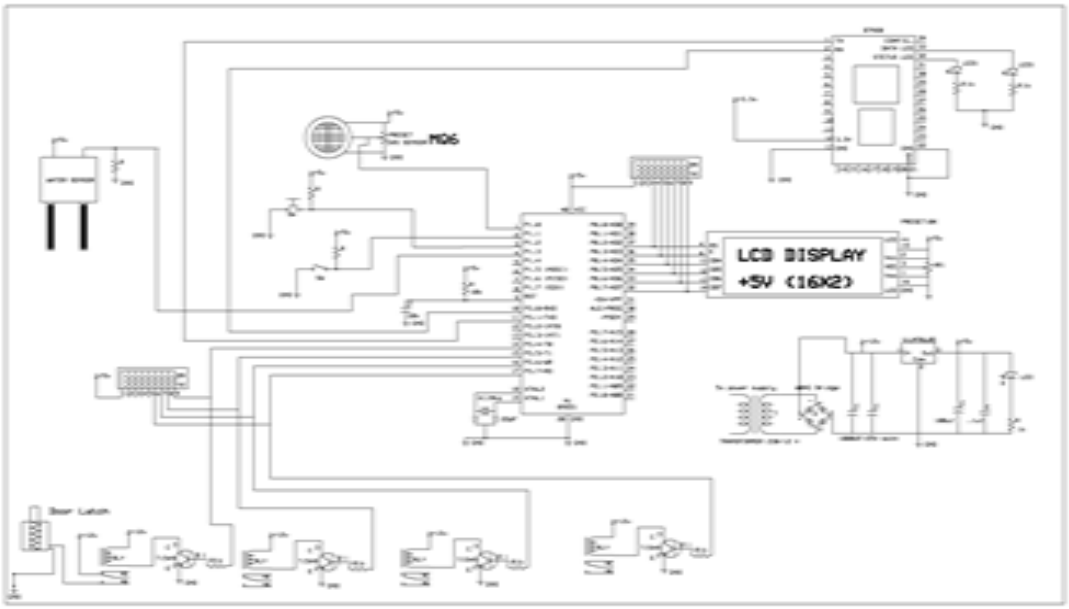

Fig. 1: Circuit diagram of the Smart Home System (SHS)

B. Android Application:

The second part is that of the Android application. The android application is programmed and written using basics for android application. It does not require any special study or training to write the program. It is one of the simplest language. As we open the Android app on the mobile phone the home screen appears. Fig. 2. Shows the start screen of the Android application.

Fig. 2: The start screen of the Android application

Then we need to go into the options to connect our mobile with the system. The Bluetooth of the mobile should be ON. Select the Bluetooth of the system. When you are connecting the mobile to the system for the first time you will be asked to enter the security code. When the right security code is entered an alert of "Successfully Connected "appears on the mobile screen. We have also added voice commands options on the system. By using this functionality the user can be able to give voice commands to the system. After this the main screen appears. Fig. 3. Shows the main screen of the android application. Here the ON/OFF buttons of the appliances and the status of the sensors are notified.

Fig. 3: Main screen of the Android Application

IV. SENSORS

A. Door Sensor:

The Door sensor is used for checking whether the door is closed or open. The sensor used in our system in micro-switch A notification window is there on the main screen of the Android App and the LCD panel which denotes the status of the door. The

sensor is placed on the door. It is similar to a button. When the door is open the button is open and '1' is displayed on the App. When the door is closed the button is pushed inside and '0' is notified on the app. The same happens on the LCD display panel.

B. Sliding Window Sensor:

The sliding window sensor is used to sense whether the window is open or close. The sensor used in our system is limit switch. A clip type of sensor is used for this purpose. It is a bit similar to the door sensor. The clip is normal position when the window is open and the clip is pushed when the window is closed. When the window is open the button is open and '1' is displayed on the App. When the window is closed the button is pushed inside and '0' is notified on the app. The same happens on the LCD display panel.

C. Water Level Sensor:

The water level sensor is used the notify when the water tank is filled with water. This would help the user to be tension free till the water tank is filled. This would in one way also help save water. A electrode is used for this purpose. When the water reaches the electrode a short takes place. This would be notified on the android application and the LCD panel. The number '0' is used to denote when the tank is not fully filled and when the tanks fills upto its level the number '1' is used.

D. Gas Sensor:

The gas sensor is used to sense the presence of LPG gas. This would help prevent a major accident from happening. This would also prove to be of great help to people suffering from blocked nose. When the LPG gas is sensed in the air '1' is used to notify it. '0' is used to denote absence of gas. The gas sensor used in or system is MQ6. Fig. 4. Shows the MQ6 gas sensor.

Fig. 4: MQ6 Gas Sensor.

V. CONCLUSION

In this report, we have developed a Smart Home System Using Android Application to control different switches in a house. We further added some sensors that could sense whether the doors are open or close, the water level of a water tank and gas presence and notify it on the cell phone. The result obtained is a system which increases the standard of living of the people using it and proof to be of a great help to physically handicap n elderly people. We also saw that the system is highly cost effective as the main components can be found in every house and can be used by people of any age without any extra training.

VI. FUTURE WORK

This is a project which has a wider scope of improvisation compared to any other project. The future work in this field includes implementation of this technique using Wi-Fi module which would increase the range of operation of this system. Also some more functionality can be added to increase the usability of the system like anti-theft alarms, temperature sensors, etc. also a notifies of the power being consumed by every device and all devices together can be added.

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