VOICE CONTROLLED HOME AUTOMATION

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Abstract –

The home automation industry is rapidly growing in order to provide support systems for the elderly and the disabled, particularly those who live alone. Moreover, it is well recognized that the world's population is aging. Systems for automating the home must respect societal conventions and be user-friendly. The overall design of a constructed and operational wireless home automation system (WHAS) is described in this study.

*Key Words***: Arduino UNO, Bluetooth module (Hc-05),**

1. INTRODUCTION

The coordination of all domestic amenities and appliances is referred to as "home automation." An LCD panel that is centrally managed, for instance, may be able to control anything from lighting to home theater setups to heating, air conditioning, security, audio, and video systems.

The advent of specialized appliances, such as water heaters to speed up the process of boiling water for baths and automatic washing machines to eliminate the need for human laundry, has automated many home tasks. Homes are wired for electrical power, doorbells, TV outlets, and telephones in developed nations. The light turns on in the different application when someone enters the room. Modern technology allows the space to detect a person's presence and determine who

2. Literature Survey

- *By using home automation we can control different house hold appliances like lights , fans , TV etc. Additionally, a home automation system can also provide other features like security , alarms emergency systems etc.*
- *In this project we have designed a voice activated home automation system.*
- *Home Automation is becoming popular due to its numerous benefits . Automation refers to the control of home appliances and domestic features by local networking or by remote control.*
- *The work focuses on the concept of home automation where the monitoring and control operations are facilitating through smart devices installed in residential buildings.*
- *IOT grants to people and things to be connected any-time, anyplace, with anyone, ideally using any network and any service*

3. Implementation

The home automation system can work using computer software or control panel.
Larger-Scale Automation Systems Operate with Computer Software – As our homes are filled with a large number of appliances, it is tedious to memorize their working procedures and its accurate timings in order to work safely. Anyone of us would wish to have these appliances working in an automatic condition as these appliances are brought for our comfort and convenience.

SCADA is a kind of software to enable automation process and care for these appliances. The installation can be done on a panel mounted micro-controller known as Programmable logical control (PLC) instead of desktop PC. An engineer can help you to install to set the operational parameters in the different procedures such as lighting time, TV to be switched on/off, water heater to be turned on/off, etc.

Smaller Installations operate using a single thermostat like Control Panel – Central controlling is not at all essential for smaller and less installations as they can be controlled individually by making use of a single thermostat. A

thermostat is an analog device to calculate temperatures and trigger relays to activate under preset conditions such as heaters, AC, and refrigerators. Also limit switches, level sensors and proximity switches work in the exact way for doors, windows, water tanks, etc.
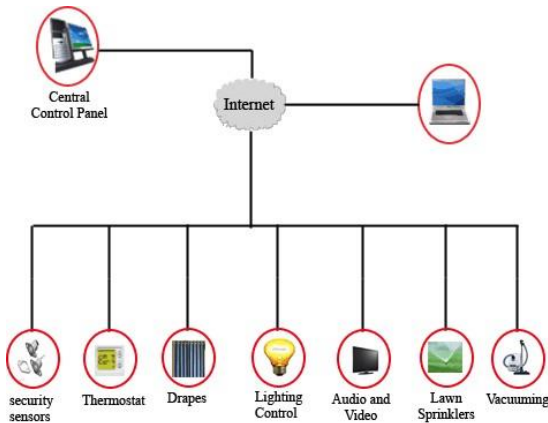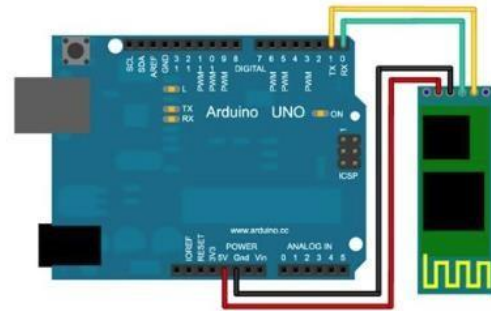

Figure 1: Introduction

4. Bluetooth Module (HC-05)

☐ **HC-05 module** *is an easy to use* **Bluetooth SPP (Serial Port Protocol) module,***designed for transparent wireless serial connection setup.The HC-05 Bluetooth Module can be used in a Master or Slave configuration, making it a great solution for wireless communication.This serial port bluetooth module is fully qualified* **Bluetooth V2.0+EDR (Enhanced Data Rate)** *3Mbps Modulation with complete 2.4GHz radio transceiver and baseband. It uses* **CSR Bluecore 04-***External single chip Rluetooth system with CMOS technology and with AFH (Adaptive Frequency Hopping Feature)*

4.1 Hardware Features

- *Typical -80dBm sensitivity.*
- *Up to +4dBm RF transmit power.*
- *3.3 to 5 V I/O.*
- *PIO(Programmable Input/Output) control.*
- *UART interface with programmable baud rate.*
- *With integrated antenna.*
- *With edge connector*

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4.2 Software Features

- *Auto-connect to the last device on power as default.*
- *Permit pairing device to connect as default.*
- *Auto-pairing PINCODE:"1234" as default.*

4.3 Connecting HC-05 to Arduino UNO
4.4 Figure 2 :Bluetooth interface witharduino uno
4.5 Program for HC-05 Bluetooth Module

The program given below is the HC-05 bluetooth moduleprogram.This process is quite different from others sincewe are going to use android mobile to control and communicate with arduino.Here the bluetooth module acts as an interface between our mobile and Arduino board.Before getting into the execution process,follow the given procedure:
- *First of all,the user should install an application called* **Bluetooth SPP PRO** *from the playstore which is a free*

application.

- *After installation,pair the bluetooth module to your mobile as like connecting one device to other using bluetooth.The default pairing code is **1234**.*
- *Upload the given program to the Arduino Uno board.After uploading the code,unplug the USBfrom the arduino.*
- *Now use external power adapter to power the Unoboard.*
- *The Bluetooth SPP PRO has three types of communication mode.Here Byte stream mode is used to communicate.So select that mode andgive the input as **1**,as soon as the input has given the led will turn on and for **0** led will turn off.*

5. RELAY 4 – channel

- *This relay module allows you to combine the processing power of the Arduino to devices that use higher current and voltage. It does so by providing four relays that are rated for 7A ateither 28VDC or 10A at 125VAC.*

- *Each relay has a Normally Open (NO) and a Normally Closed (NC) contact.*

- *With these relays you can be controlled.*

6. *Typical Connection to an Arduino*

- *The drawing below shows the typical connections to an Arduino. In the example shown, a low output on D7 will cause the light bulb to turn on.*
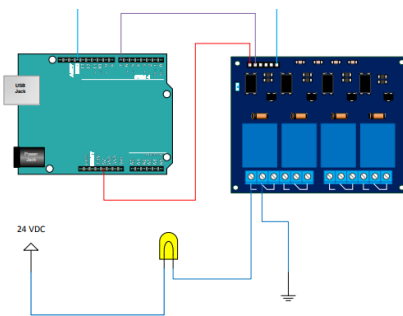

Figure 3 : Interfacing arduino with relay

7. Arduino UNO

The Arduino Uno is a microcontroller board based on the ATmega328 (_datasheet_). It has 14 digital input/output pins (of which 6 can be used as PWM outputs), 6 analog inputs, a 16 MHz ceramic resonator, a USB connection, a power jack, an ICSP header, and a reset button. It contains everything needed to support the microcontroller; simply connect it to a computer with a USB cable or power it with an AC-to-DCadapter or battery to get started.

7.1 NEED FOR ARDUINO

Active User Community, Growth of Arduino, Inexpensive Hardware, Arduino Board as a Programmer, Multi-platform Environment

7.2 ELEMENTS OF ARDUINO BOARDS

Elements of an Arduino Board can be done into twocategories:

- *Hardware*
- *Software*

7.2.1   *Hardware*

- *The Arduino Development Board consists of many components that together makes it work. Here are some of those main component blocks that help in its functioning: • Microcontroller: This is the heart of the development board, which works as a mini computer and can receive as well as send information or command to the peripheral devices connected to it. The microcontroller used differs from board to board; it also has its own various specifications.*
- *External Power Supply: This power supply used to power the Arduino development board with a regulated voltage ranging from 9 – 12 volts. International Journal of Control, Automation, Communication and Systems (IJCACS), Vol.1, No.2, April 2016 24*
- *USB plug: This plug is a very important port in this board. It is used to upload (burn) a program to the microcontroller using a USB cable. It also has a regulated power of 5V, which also powers the Arduino board in cases when the External Power ply is absent.Internal Programmer: The developed software code can uploaded to the microcontroller via USB port, without an external programmer.*
  Reset button: This button is present on the board and can be used to resets the Arduino microcontroller.
- *Analog Pins: There are some analog input pins ranging from A0 – A7 (typical). These pins used for the analog input / output. The no. of analog pins also varies from board to board.*
- *Digital I/O Pins: There are some digital input pins also ranging from 2 to 16 (typical). These pins used for the digital input / output. The no. of these digital pins also varies from board to board.*
- *Power and GND Pins: There are pins on the development board that provide 3.3, 5 volts and ground through them*

7.2.2   **Software**

The program code written for Arduino is known as a sketch. The software used for developing such sketches for an Arduino is commonly known as the Arduino IDE. This IDE contains the following parts in it:

- *Text editor: This is where the simplified code can be written using a simplified version of C++ programming language.*
- *Message area: It displays error and gives a feedback on saving and exporting the code.*
- *Text: The console displays text output by the Arduino environment including complete error messages and other information*
- *Console Toolbar: This toolbar contains various buttons like Verify, Upload, New, Open, Save and Serial Monitor. On the bottom right hand corner of the window there displays the Development Board and the Serial Port in use.*

8.   Working

In this project, a simple Voice Activated Home Automation system is designed. Voice commands are used to control different appliances. We will now see the working of the project. All the connections are made as per the circuit diagram above.

After making the necessary connections, we have to switch on the power supply to the circuit. Now, we need to pair the Phone's Bluetooth to the HC – 05 Bluetooth Module. Before that, we have to install the App mentioned above in the phone. The home screen of the

app looks something like this.

Figure 3

We have used the following commands: "turn on AC", "turn off AC", "turn on light", "turn off light","turn on TV", "turn off TV", "turn on fan", "turn offfan", "turn on all" and "turn off all".

Future Scope

The next phase for the Home automation market will occur based on a few key improvements in thetechnology available in Automation, such asimprovement in Wireless Automation solutions as well as lowering of price points as the market begins to accept Home automation usage in larger volumes. Some trends that we foresee for this phase of the industry are

• Big companies like Philips, Siemens & Schneider will eventually bring out fairly mass market automation products with appealing user interface but at a lower price point than today, and more people will be able to afford the products

• Solution offerings will slowly move to a more user friendly design, where aside from a few keycomponents, users will be able to buy and use the Automation products themselves without the aid of any technical expert

• Some foreign players will have niche in high endautomation and focus on the premium market (>20 Lakhticket size).

9. ADVANTAGES

☐ *Actual energy savings ultimately depend on the type of device you select and its automationcapabilities. But on average, product manufacturers estimate the systems can helpconsumers save anywhere from 10 to 15percent off of heating and cooling bills.*

☐ *Many systems come with remote dashboard capabilities, so forgetting to turn off that coffee pot before you leave no longer requires a trip back to the house. Simply pull up the dashboardon a smart device or computer, and turn the coffee pot off in a matter of seconds.*

☐ *Remote monitoring can put your mind at ease while you're away from the house. With remote dashboards, lights and lamps can be turned on and off, and automated blinds can be raised and lowered. These capabilities – combined with automated security systems – can help you mitigate the risks of intrusions: you will be alerted immediately if something uncharacteristic happens.*

10. DISADVANTAGES

Depending on the complexity of the system, installing a home automation device can be a significant burden on the homeowner. It can either cost you money if you hire an outside contractor or cost you time if you venture to do it yourself.

Automating everything in life may sound extremely appealing, but sometimes a good old- fashioned flip of the switch is a lot easier than reaching for your smart phone to turn lights on and off. Before you decide which system is right for you, think about how far you really want to take home automation in your household.

Controlling all aspects of home automation from one centralized platform is important, but not all systems are compatible with one another. Your security system, for example, may require you to log in to one location to manage settings, while your smart thermostat may require you to log in to another platform to turn the air conditioner on and off. To truly leverage the convenience of home automation, you may need to invest in centralized platform technology to control all systems and devices from one location.

Even though the price of home automation systems has become much more affordable in recent years, the cost to purchase and install a device can still add up. Consumer Reports offers a wide range of information and insights –including costs – on the best home automation systems on the market.

11. CONCLUSIONS

The project has proposed the idea of smart homes that can support a lot of home automation systems. A smart home contains a connection between wireless communication, sensors, monitoring and tracking. Smart homes are a huge system that includes multiple technologies and applications that can be used to provide security and control of the home easily.

This project discussed the designed modules like sensors' circuits, monitoring and tracking of the home through IP camera, mobile notifications and home navigator.

In this project, an efficient approach for smart homes was proposed and implemented. C# programming language and ATMEL AVR microcontroller have been used to connect the sensors circuit to the home and to control the IP camera.

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