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VOICE CONTROLLED HOME AUTOMATION SYSTEM

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ABSTRACT

In today's world everything is becoming either digital or an automatic process which means the human efforts are becoming less. Voice Based Home Automation System is a project where user can control the home devices like lights, fans, etc. by through their voice and reduces the effort of going to switch board and turn on or turn off the devices. This project is a combination of hardware & software, in which there is an Android application through which user can speak with the given commands like fan_on, fan off, etc. which will be sent to Arduino ATMEG-A 328 via Bluetooth HC-06. All the commands are sent through Bluetooth HC-06 to Arduino and from Arduino to Relay Controller Kit and depend on the command given by the user, only that particular device will either triggered on or off which is connected to Relay Controller Kit. Other feature of the project is that user can send a message to Arduino via GSM K-it which is connected to Arduino, sending messages to turn on or turn off the device instead of commands. For the emergency cases like there is fire in the home Fire Alarm Kit is used and the commands for the fire are fire and fire off. The main aim of this project is to help the handicap as well as the old peoples, and the project prototype is ready with the commands execution and made with the intention for the development of the society.

Keywords: - Relay Controller Kit, Fire Alarm Kit, Arduino Uno, Bluetooth HC-06, Android Application, Commands, GSM Kit.

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I. INTRODUCTION

Voice Based Home Automation System is a project for handicap as well as for old peoples, in which user can speak i.e. the commands send from the Android application to Arduino Uno via Bluetooth Hc-06. Based on the user commands, that particular device will either turn on or it will be turn off. Firstly, the user has to login to the Android application and after logging in, that particular user is registered for the system to use. Then t-he user will say the commands that are displayed on the screen and based on those commands that device will be turn on or off accordingly. The Bluetooth HC-06 is connected to Arduino through which the commands are sent t-o Arduino wirelessly. The most important part of this project is sending the commands to Arduino via Bluetooth HC-06 and after it has been received by the Arduino it is pass to the Relay Controller Kit and based on the command that device which is connected to Relay Controller Kit will automatically turn on or turn off. The cost of the project is effective and due to this the wastage of electricity i.e. consumption of energy can be reducing to

a greater extend. For software Android Studio is used for programming the speech to text and for Arduino Uno its IDE is used for programming the Arduino.

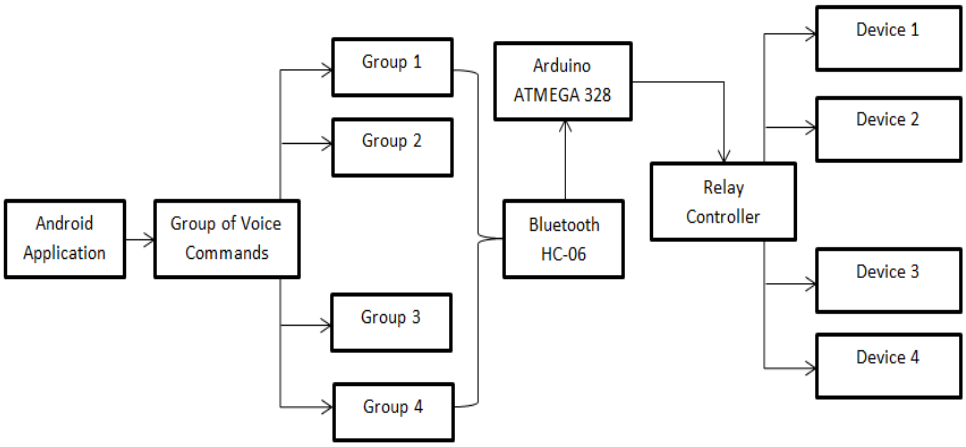
II. METHODOLOGY

For the development of this project Rapid Application development i.e. RAD model is used. RAD model provides short time to build the project. One of the most important factors of RAD Model is that it reduces development time, provides reusability of the component, and helps in fixing the integration issues at the very beginning stage of the project. Some of the factors that RAD has problems like strong team and individual performances, good designers as well as programmers.

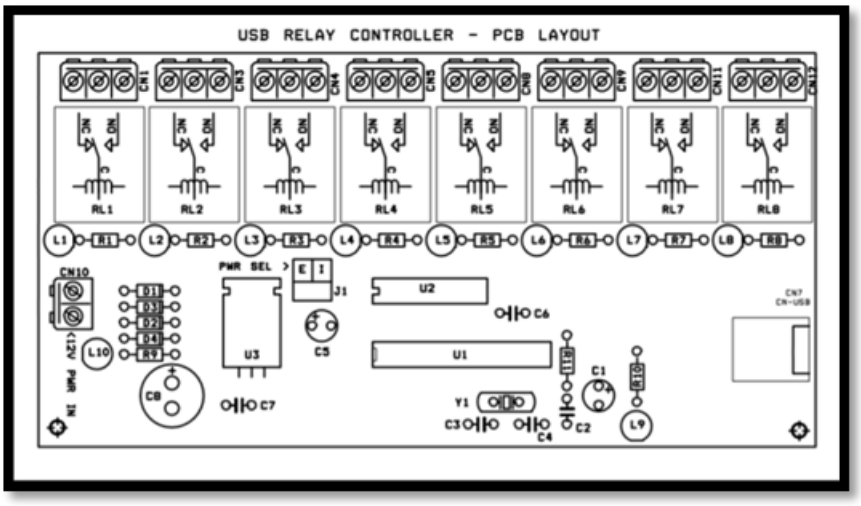
This project contains few diagrams they are listed below:

- Block Diagram,
- Hardware Circuit Diagram and
- Voice commands
- Flowchart

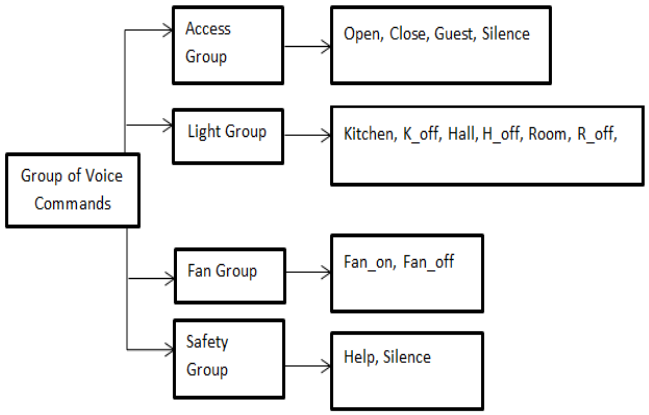
Block Diagram: -



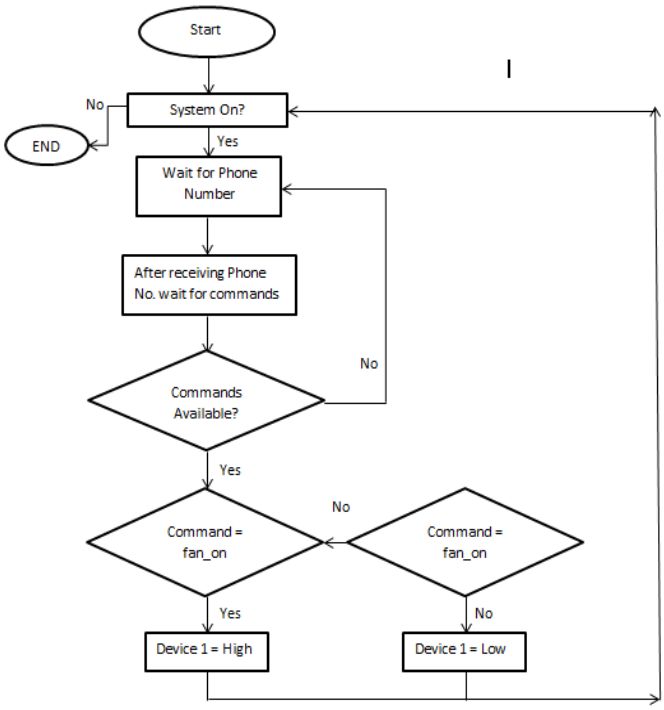
Hardware Circuit Diagram: - (USB Relay Controller Kit)



Voice Commands: -



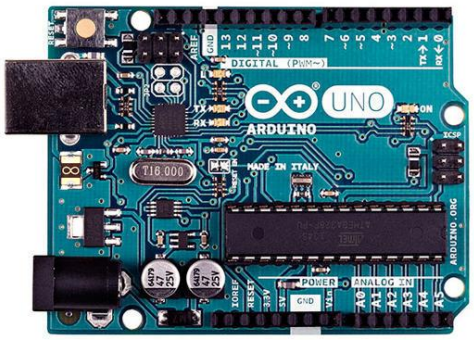
Flowchart: -



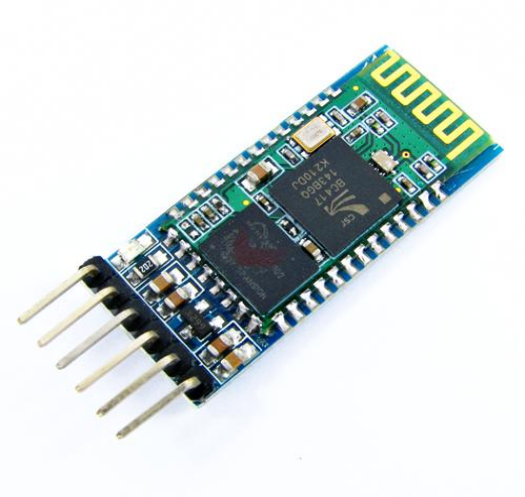
III. TECHNOLOGY USED

A. Hardware Design

Arduino Uno: - Arduino Uno used in this project is, AT-MEGA 328. Arduino is connected with Bluetooth HC-06 and GSM Kit. The TX of the Bluetooth HC-06 is connected to the RX of the Arduino and the RX of the Bluetooth HC-06 is connected to the TX of the Arduino. Similarly, the TX of the GSM Kit is connected to the pin 3 of Arduino which is defined as the RX and the TX of the GSM Kit is connected pin 4 of the Arduino which is defined as the TX. Arduino Uno is also connected with Relay Controller Kit, in which the pins of Relay Controller Kit R1, R2, R3, and R4 are connected to the pins 5, 6, 7, 8 of Arduino. A 9V battery is used to give the power supply to the Arduino Uno.

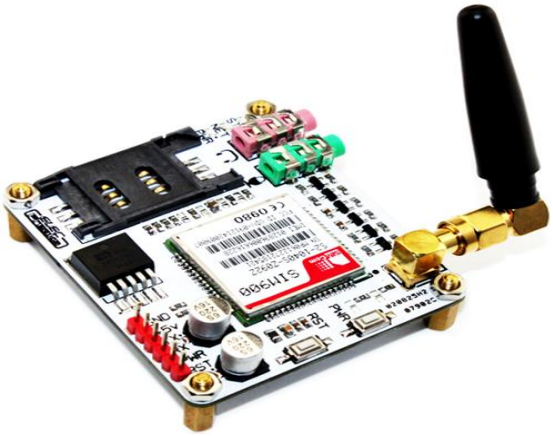


Bluetooth HC-06: - Bluetooth HC-06 is used for sending the user commands to Arduino. The range of the device is less than 20m. The TX and RX pins of Bluetooth HC-06 are connected to RX and TX of Arduino. The ground pin of Bluetooth HC-06 is connected to ground pin of Arduino and the last power pin i.e. 5V of Bluetooth HC-06 is connected to power pin of Arduino. One of the drawback of the Bluetooth HC-06 is that the user devices with in the device range can only be able to send commands to Arduino otherwise the commands won't be sent.



Relay Controller Kit: - Relay Controller used in this project is 8 Channel relay. Relay Controller is connected to Arduino as said in the Arduino part, and the device has 12V power supply which is connected through batteries externally. The 8 Channel has different device connected for e.g. bulb, motor fan, led, etc. and based on the Arduino code and user commands that particular device will be turn on or turn off accordingly.

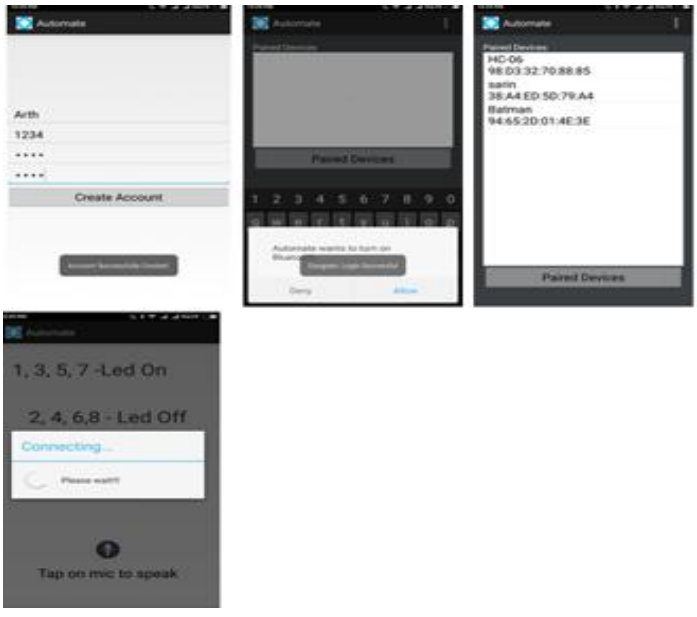
GSM Kit: - GSM Kit used in this project is Sim900A. It is used for the SMS feature i.e. sending user the SMS that the device is ON and would you like to turn it OFF. It is connected to the Arduino pin 3 and 4 which is declared as the TX and RX of the GSM Kit.



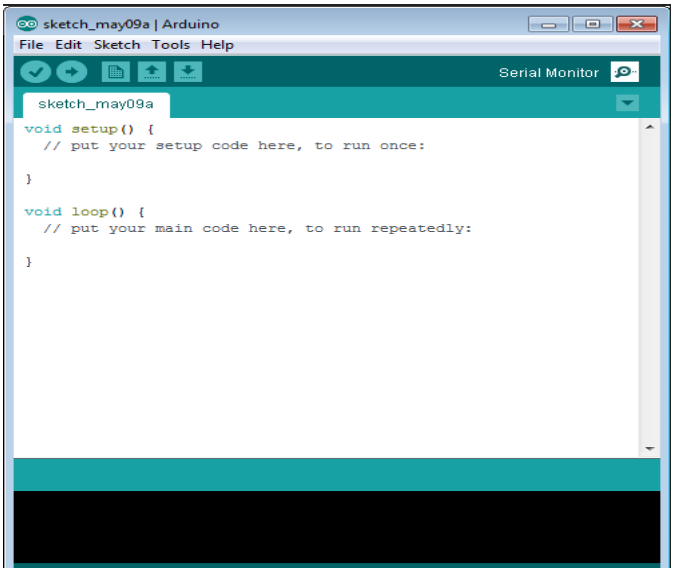
Fire Alarm Kit: - Fire Alarm Kit is connected to the buzzer and buzzer is connected to Relay Controller Kit which is connected to the Arduino and the input comes from the analog signal and output is written in digital signals.

B. Software Design

Android Studio: - The Software is developed to receive the commands from user and sending it to Bluetooth HC-06. Firstly, the user speaks the commands which are dis-played on the screen and based that commands user will speak the command which is then converted into text format and send to the Bluetooth HC-06. User has to keep the phone near to the mouth for speaking the commands as the speech to text convertor will recognised the commands properly and the send to the Bluetooth HC-06, and if the commands are not correct they will not have been sent. The user phone has to be connected to internet for speech to text conversion purpose and also to the Bluetooth HC-06 to send the commands from software.



Arduino IDE: -The functionalities provided by the different hardware devices as well as the GSM and Arduino UNO are coordinated and configured using an Arduino IDE. The sketch shown below is the basic sketch of our system at the beginning of our project.



IV. FUNCTIONS

Following are the functions of each group which are as follows:

1. **Access Group: -** In this group, it controls the entry and exit of the user in a house. Sometimes when a guest comes, the command "guest" is used to ring bell. The bell can be turn off using the command "silence", similarly if the user wants to enter or exit the house he can use the commands "open" or "close".
2. **Light Group: -** This group controls various lights used in the different parts of the house like rooms, kitchen, and hall. To control the room, light the command used is "room" and "r_off" similarly for kitchen and hall the commands used are "kitchen", "k_off", "hall" and "h_off".
3. **Fan Group: -** This group is used to control the fans in the house and the commands are "fan_on" and "fan_off".
4. **Safety Group: -** This group is very special because it is used for the safety of the user i.e. the command "help" will start the fire alarm and to turn off this fire alarm command used is "silence".

V. VOICE COMMAND PROCESSING

Voice Based Home Automation System uses the google API for processing of voice of different user's like old and handicap peoples. The API converts the user voice to text format and then sending that text format to Bluetooth H-C 06 and from Bluetooth HC-06 is passed to Arduino. It can help the handicap people to control their home de-vices without taking many efforts to move from one place to other. Following table shows the performance of Voice Commands:

Group	Voice Commands	Max. Distance (cm)
Access Group	Open	5
	close	5
	guest	10
	silence	1
Light Group	kitchen	5,15
	k_off	1
	hall	5,15
	h_off	10
	room	10
	r_off	5,10
Fan Group	fan_on	15
	fan_off	5
Safety Group	help	10
	silence	1

VI. FUTURE SCOPE

Voice Controlled Home Automation System can be further being used in an advanced way by implementing "Internet of Things". In IOT an open source cloud platform is used for e.g. "ThingSpeak: IOT Analytics". The appliances are connected to this cloud by using a Wi-Fi receiver which in turn passes the command to these appliances over the cloud. IOT has been in a boom recently and is a very fast growing field.

VII.CONCLUSION

Voice Based Home Automation System is a project for t-he handicap and old peoples. In this project every possible group is taken into consideration like light, fan, etc. Based on this group there are different commands and that commands are used to trigger that particular device either ON or OFF. It reduces the consumption of energy as the devices are controlled by voice and if the user forgets to turn of the device SMS is send to remind the user about turning OFF the device.

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