Design and Development of Assistance Device for Elderly and Differently Abled Person

Swarnalakshmi N[1], Sharmila A[2], Anbarasi M[3], Elakkiya B A[4]

Assistant Professor, Electrical and Electronics Engineering,

Sri Manakula Vinayagar Engineering College, Pondicherry, India[1]

Student, Electrical and Electronics Engineering, Sri Manakula Vinayagar Engineering College, Pondicherry, India[2,3,4]

Abstract: Recently, the physically challenged person and elderly person who uses wheelchair are increasing. However, only two type wheelchairs exist, one is hand operating and other is operated by the joystick, have come into wide usage. The former type needs muscular strength for the operation and the latter type needs the skill. Therefore, there is a problem that it is difficult for the differently abled and elderly person to use these interfaces. Hence mobile app-based voice recognition has been used. While using this technology wheel chair can move according to the signal given through the voice or through the button and also automate the home appliances simultaneously. So, the elderly and differently abled person can move and operate home appliances independently without the help of others. Different abled and elderly person may also not able to speak so that only voice recognition cannot be used so that we are using both buttons and voice recognition in mobile app so that it will be more efficient for persons who cannot able to speak. And moreover nowadays the differently abled and elderly persons are exposed to attack by physical aggression and robberies. And buzzer is also attached for their convenience.

Keywords: Microcontroller – Bluetooth – Zigbee – Motor Driver – Object Sensor – Relay – DC motor – Android application.

I. INTRODUCTION

The elderly population over the age of 65 is expected to be more than double from 375 million in the year 1990 to 761 million by the year 2025. Many differently abled and elderly people usually depend on others in their daily life especially in moving from one place to another. For the wheelchair users, they need continuously someone to help them for movement of wheelchair. Their lives are made difficult by the fact that there is lack of an intuitive control system for their wheelchairs that allows moving independently.

The interface of wheelchair and home automation using the command in the mobile app: The command direction of wheelchair is forward, reverse, left and right and then the for home appliances are light, fan and motor. The main components are Bluetooth, Object sensor, Microcontroller and zigbee. Use of Object sensor to detect the obstacles within the range of 4 meter and notifies the system and stop the wheelchair till further command. In this work, the wheelchair control using microcontrollers and Bluetooth module via based on the mobile app. Use of zig bee receive the command through microcontroller and that command based on home appliances means it transmitter to the receiver zig bee and then with the help of microcontroller home appliances work automatically.

In recent times the usage of wheel chair becoming high in that most are physically challenged and some are due to accidents and incidents and some are both physically challenged and dump. So we thought to help them by reducing some work which they get help of other by using our project they can be independent. In automatic wheel chair we are adding voice recognition by using mobile app so, that it is easy to paralyzed person without others help and buttons for persons who can't able to speak and buzzer is also added for emergency purpose so that they can use at their risk situation and during emergency purpose. In addition to this we adding home automation is added so that they can operate the home appliances without the aid of others.

II. PROPOSED SYSTEM

Our main proposal was to reduce the controller's work of using the wheel chairs, for the differently abled people and elder peoples are need additional help for controlling their wheel chair so we are implementing the voice recognition to control the wheel chair automatically through their voice by commanding the commands like left, right, forward, backward, and also stop. This commands are coded to the controller to work the motor through the commands like if

give the forward command the motor will run in forward direction, if we give the stop command the motor will be stop. so while giving these commands the wheel chair will be run automatically through their voice and also we inserting the IR sensor while the wheel chair moving if any unwanted object appears then the sensor will be sense the object and the motor of the wheel chair will be stopped. And we are including that, by sitting in the wheel chair they can control the home appliances by the uses of voice recognition and also buttons then we are adding the buzzer for the emergency purpose.
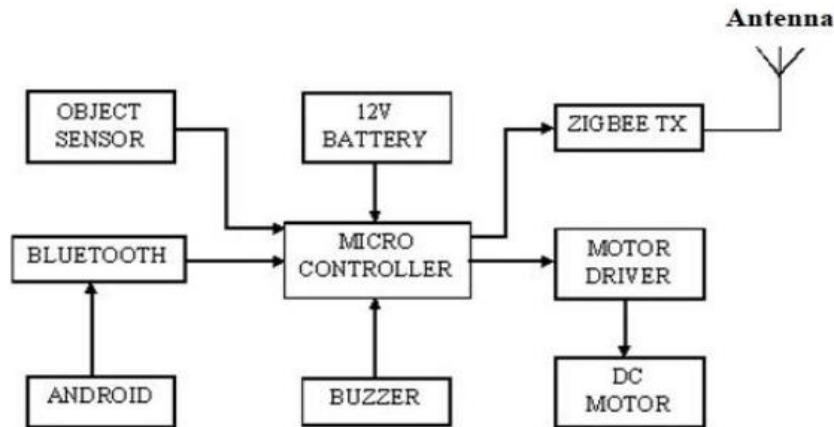
III. BLOCK DIAGRAM

Fig 1: Motor driver section in wheel chair

In fig 1, we are using two section, one wheel chair section and another one is home automation section in wheel chair section it consists of android mobile, Bluetooth module, zigbee transmitter, 12v battery for source, object sensor, motor driver, DC motor and buzzer in this section and in home automation section it consists of relay circuit, zigbee receiver, micro controller, power supply and home appliances. These are the components we employed for our project.
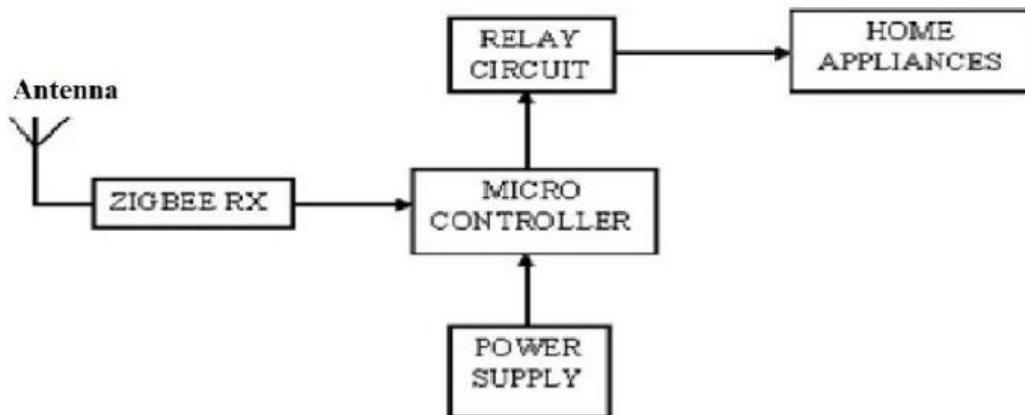

Fig 2: Home automation control system

And also implementing automatic movement of wheel chair we are using android mobile with help of the input command. The input command are left, right, forward, backward, stop, light on, light off, fan on, fan off, motor pump on and motor pump off these are the command is used in the automatic wheel chair and home automation control system. These commands are interface with microcontroller to motor drive and arduino nano to relay system in the home automation control system.

IV. CIRCUIT DIAGRAM

The Primary parts of Wireless Power Transmission are Microwave Generator, Transmitting antenna and Receiving antenna (Rectenna).
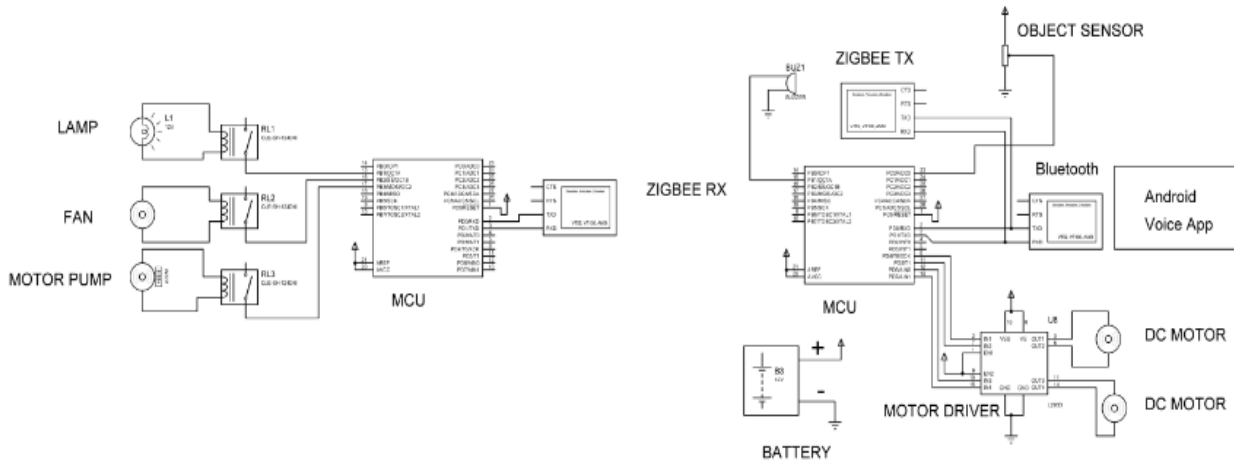
Fig 3: circuit diagram

In the above circuit diagram the Bluetooth is connected to the android voice app in mobile. Using android voice app the input command is transmitted to the microcontroller. In that the Bluetooth connection are transmitter is connected to the receiver end in the microcontroller and receiver is connected to the transmitter in the Bluetooth. Fig 4 describes the flow chart of wheelchair.
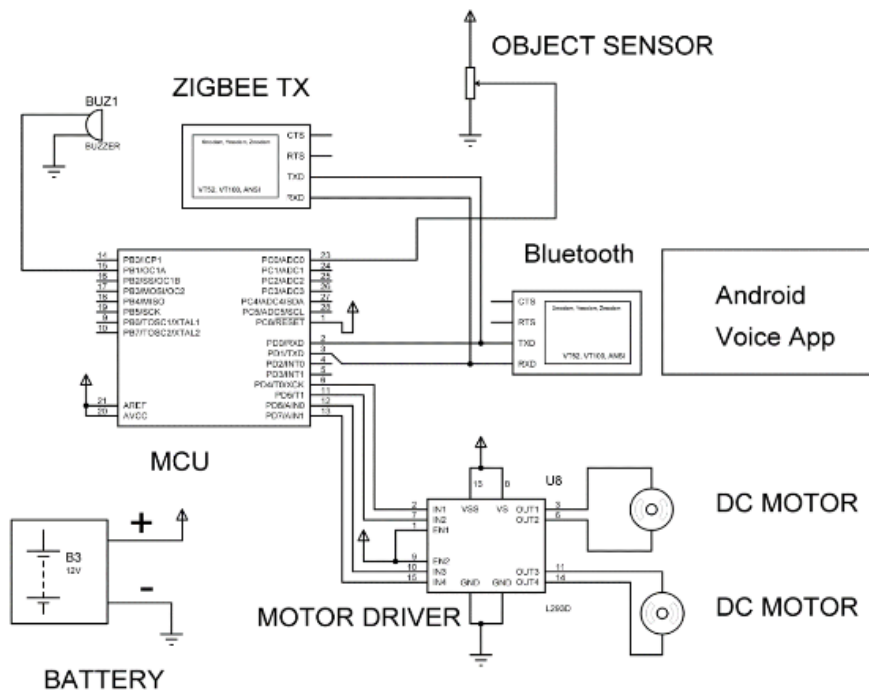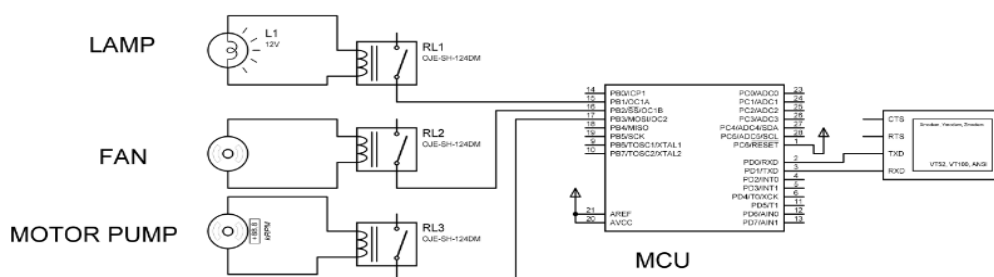

Fig 4: wheel chair circuit diagram

Fig 5: Home automation circuit diagram

If the input commands are left, right, forward, backward and stop means it work the motor driver. In the motor driver there are four input and output, the input is analysis the object sensor. The object sensor is sense the obstacles and produces the signal to the microcontroller. Using that sensor only the wheel chair is automatically moves with the help of android voice app command. If the other input commands are microcontroller transmit to the zigbee transmitter. The zigbee transmits the command to the receiver zigbee which is used in the home appliances.

In the above circuit diagram the zigbee is receive the input command to the zigbee transmitter in the Fig 5. The zigbee receiver receives the command and transmits to the microcontroller. The microcontroller is connected to the relay, it works based on the input command like light on, light off, fan on, fan off, motor pump on and motor pump off. Based on the command it turn on and turn of the relay.
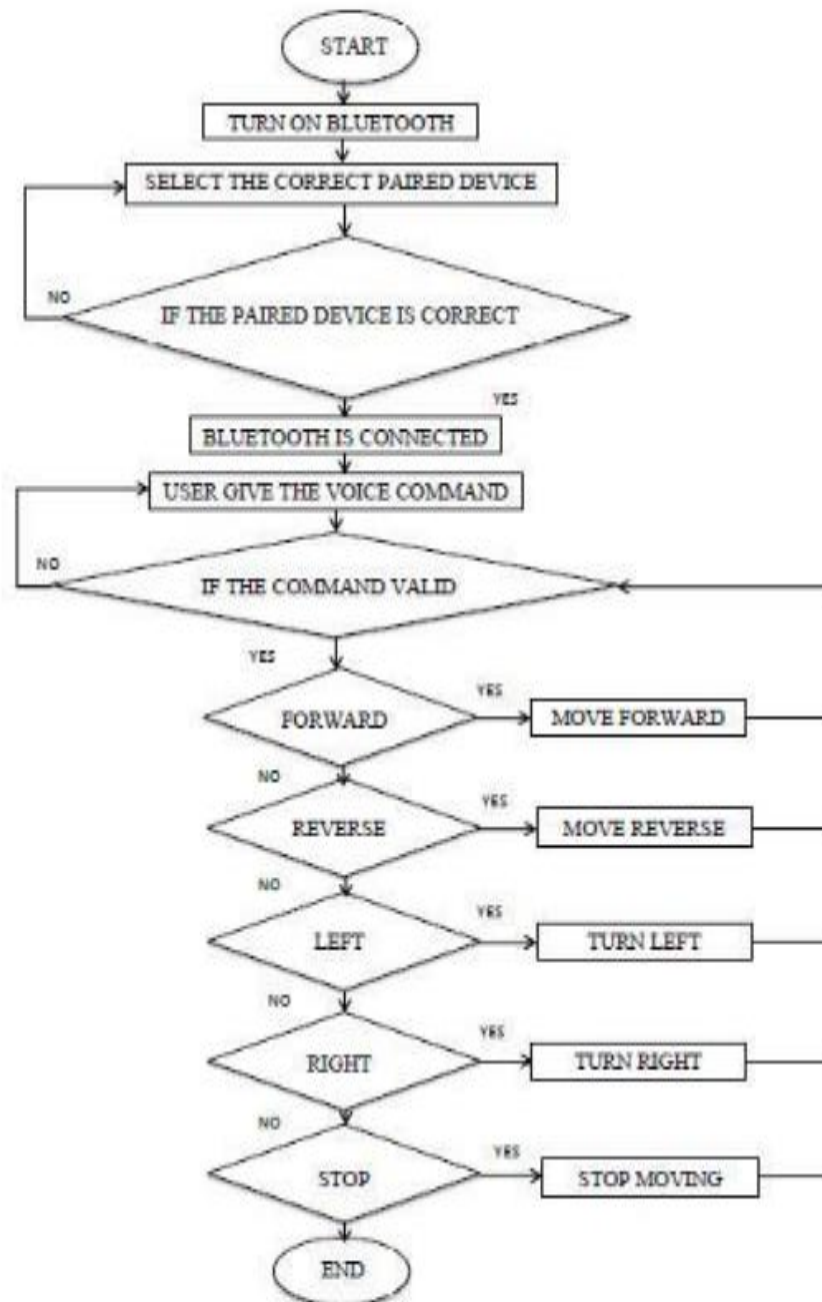
V. FLOWCHART
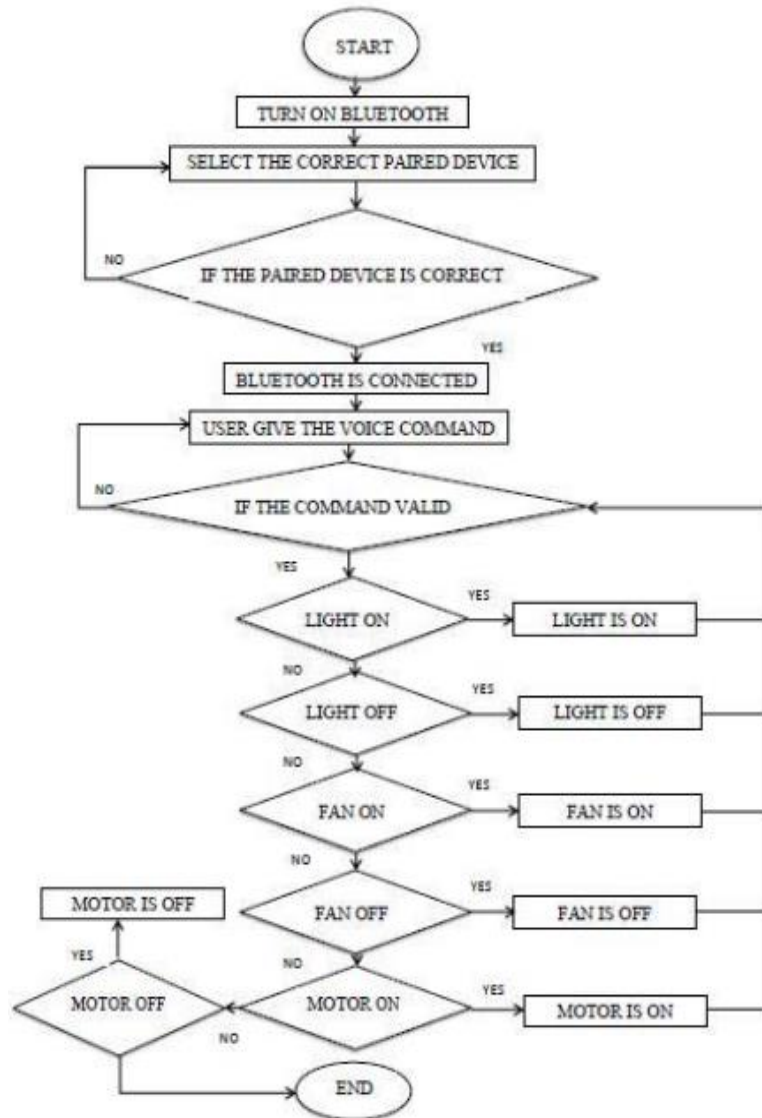

Fig 6: Flow chart of wheel chair

Fig 7: Flow chart of home automation

The above figures are the flow chart of proposed system. Using the input commands are same in the both the flow chart if the input commands are based on wheelchair means the wheelchair is work and the input commands are based in the home appliances means the home appliances is work. Both are connecting to the signal of zigbee. The zigbee transmitter is used in the wheelchair circuit and zigbee receiver is used in the home automation system, so that only the input command are transmit to the one system to another system.

VI. RESULT
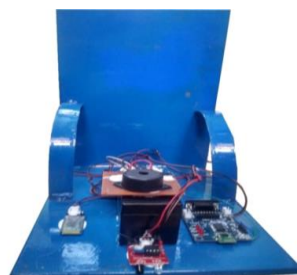
HARDWARE IMPLEMENTATION OF WHEEL CHAIR:

Fig 8: wheelchair

The hardware implementation of wheel chair is implemented using voice recognition method and also button mode. In that there are few possible directions of movements used. If the command is forward the wheelchair moves forward. The remaining commands are respectively move the wheelchair automatically using the given input command. In that command the wheelchair automatically move, if any obstacle is there in the object sensor, sense the obstacle and stop the wheelchair. In the above fig 8, the hardware of wheelchair is implemented and the hardware is working well.

Movement of wheel chair:

Movement of Wheelchair	Right Motor		Left Motor		Voice and button Command
Move forward	Low	High	Low	High	Forward
Move backward	High	Low	High	Low	Backward
Turn left	Low	High	Low	Low	Left
Turn right	Low	Low	Low	High	Right
Stop moving	Low	Low	Low	Low	Stop

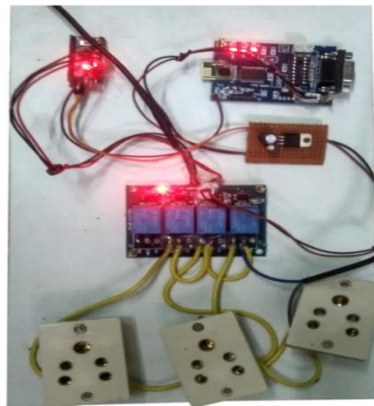**Hardware implementation of home automation:**

Fig 9: home automation hardware

Here the hardware implementation of home automation is implemented using the voice recognition and button mode is used. In that there are six possible commands are used for the automatic home appliances. There are light on, light off, fan on, fan off, motor on, motor off. If the command is light on the microcontroller is receive the command and transmit to the relay. The relay receive the command and operate the home appliances, in that command the relay automatically switch on the light and remaining commands are used like this. The given voice command are controlled by the microcontroller. The fig 9 the hardware of home automation is implemented and the hardware is working well.

Test result of IR sensor:
An Infrared sensor circuit is one of the basic and popular sensor modules in an electronics device. This sensor is analogous to human's visionary senses, which can be used to detect obstacles and it is one of the common application in real time. This circuit comprises of the following components,
- LM358 IC 2 IR transmitter and receiver pair
- Resistors of the range of kilo ohms
- Variable Resistors
- LEDs (Light Emitting Diode)

Output (High/Low)	Distance (CM)	Input voltage (V)
Low	1	5
Low	2	5
High	3	5

VII. CONCLUSION

The main aim of this project implemented is to help the physically challenged person and elderly person who are dependent on wheelchair for their mobility. We implemented the wheelchair system and also home automation system. The main objectives were to design an android application that can direct the movement of a wheelchair and home automation, to develop the voice recognition to help the elderly person and physically challenged person to move their wheelchairs independently and to provide the elderly person and physically challenged person with the ability to control the movement of the wheelchairs by using android phone, therefore this success is to serve many people with disabilities. It should be continued and developed in the future as it has a huge potential to improve its performance, reliability and safety. Using both home automation and wheelchair technology is new to our country. So, it will definitely attract the people and help for physically challenged people. While all these issues are kept in mind only we are implemented this project.

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