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Electric Wheelchair

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Abstract: ***There are some people who cannot walk because of some problems such as accidents, handicapped factors, and aging factors. So there should be some mechanism that can be used to remove these defects. The proposed Android Controlled Wheelchair is used to remove these defects and people can survive in the environment easily. The android application is created and installed on the Smartphone and connection is done using Bluetooth. The wheelchair can move in touch mode. In the touch mode when user want to change the direction, by using the touch screen of the Smartphone, the user has to choose the direction specified within the four quadrants on the screen. The proposed wheel chair contains the Arduino microcontroller which is used to execute all the commands. The device motor driver L298D is used and HC05 Bluetooth module is used. This wheelchair will help the people with lower extremities, older people to survive in the environment. The main objective of this project is to facilitate and increase the movement of people who are handicapped and elderly people who are not able to move well because of their disabilities. The result of this project will allow handicapped people to live a life on their own and with less dependence on others. This project uses Arduino kit Microcontroller circuit and DC motors to make of wheelchair moving and IR Sensors to detect the hurdles obstacles.***
Keywords: IR sensor, Bluetooth, GSM module, L298D

I. INTRODUCTION

Wireless Android-based wheelchair control and system a system where the dc motor is use to move the wheel chair. Now a days, handicapped people face problem to control wheelchair by themselves. Sometime they need other people to help them. This project will provide a new way to control the movement of wheelchair which are turn to the left, turn to the right, move forward and reverse. Electric appliances can also be switched on and off without using any wire. The overall wheelchair operation use dc motor and motor driver modules combined with microcontroller system which is ARDUINO board. Wireless android biased wheelchair control and system consist of android device and a control box that can be attached to standard wheelchair to control the movement by using a dc motor and send wireless signal to radio frequency reciver by means of radio frequency transmitter. Communication protocol is use to communicate sensor and command information between the android device and the control box.

There are four option for basic motion of a wheelchair to be applied by the user. The four condition of the wheelchair can be described as : (a) moving forward.(b) moving backward.(c) turning to the right.(d) turning to the left.

A. IR Sensor

1) Features :

a) 5VDC operating voltage.
b) I/O pins are 5V and 3.3V compliant.
c) Range: Up to 20cm.
d) Adjustable Sensing range.
e) Built-in Ambient Light Sensor.
f) 20mA supply current.
g) Mounting hole.

Fig:1 IR SENOR

B. GSM SIM 800L

1) Features:

a) Quad-band 850/900/1800/1900MHz

b) Connect onto any global GSM network with any 2G SIM (in the USA, T- Mobile is suggested)
c) Make and receive voice calls using a headset or an external 8 speaker and electret microphone
d) Send and receive SMS messages
e) Send and receive GPRS data (TCP/IP, HTTP, etc.)
f) Scan and receive FM radio broadcasts
g) Lead out buzzer and vibrational motor control port
h) AT command interface with "auto baud" detection

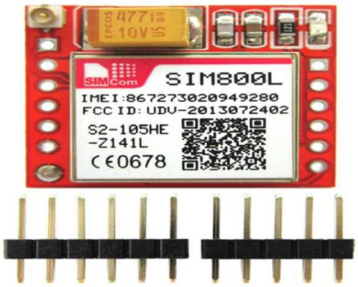

Fig:2 GSM SIM 800L

II. PROPOSED METHODOLOGY

In order to produce a good project, there are several procedure that must be followed. Initially, information about the wheelchair problem must be identified. Then, more information about the wheelchair problem gathered from the journals, internet, books and also articles. Besides that, the research continuous with the research continues with the search on the basic concept of android application and also search on coding for basic4 android device. Next, after finishing the research, the coding will be simulated in Android Visual Device (AVD) or android phone in order to indentify whether the coding can be simulated without any error. After that, the hardware for the android-based wheelchair controller will be designed. Lastly, the hardware will be combined with the coding to get the complete android-based wheelchair controller that will be controlled by android device.

A. Block Diagram

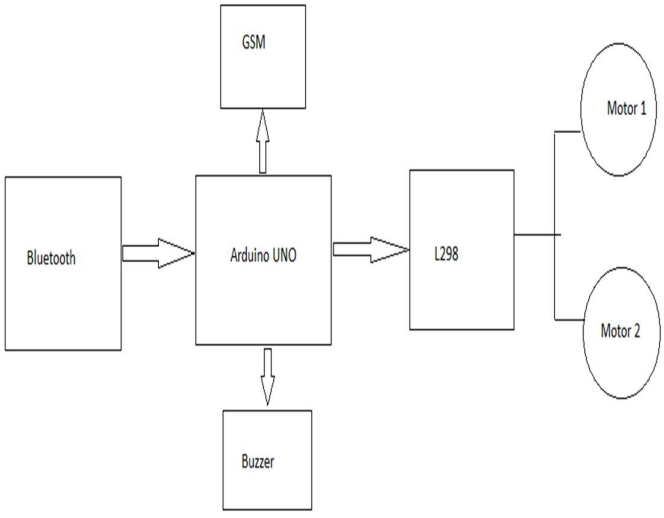

Fig3: Block diagram of proposed Methodology

This system consist of the Arduino controller, DC motor driver module which is used to operate the motor as motors are high power and Arduino is low power device. IR sensor is used to detect the obstacles behind the chair.GSM module is used to send the alert message on mobile numbers which are entered in the program.The Bluetooth is connected to the Arduino UNO as it can be seen from the figure.The Arduino UNO has a GSM module as well as a buzzer. The buzzer will buzz when it will sense any kind of obstacle. The Arduino UNO is then connected to the DC motor driver as shown in figure above.The DC motor driver is then connected to the two DC motors which are of the same rating.So this sums up the complete block diagram.

B. Connection Diagram

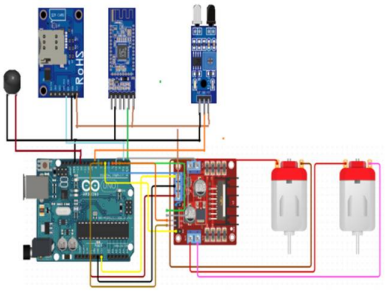

Fig4: Connection diagram

The diagram which is shown above is the connection diagram of the electric wheelchair.Since the Arduino cannot be connected directly to the two DC motors, a DC motor driver is connected in between them.The four inputs of the Arduino is connected to the four pins of the DC motor driver.

The three input pins of the Arduino i.e. pin 1., pin 2, pin 3 is connected to IN1, IN2, IN3 of the DC motor drive, and the pin Vin is connected to the 5V supply of the motor.There are four outputs of the DC motor drive.Two of them is connected to the motor1 and the rest two is connected to the motor2.The ground supply of the DC motor drive is connected to the negative terminal of the battery.The positive supply of 12V of the DC motor drive is connected to the positive terminal of the battery.The GSM's negative terminal is connected to the negative supply of the battery.

And the positive is connected to the positive side.The Arduino's TX pin is connected to the GSM's RX pin.The Arduino's RX pin is connected to the Bluetooth TX pin.The IR sensor is connected to the A0 pin respectively.The supply of the switch is connected according to the terminals of the battery.This is how the connections is done of the electric wheelchair.

III. HARDWARE STRUCTURE OF PROJECT

Fig.5:Hardware structure of project

IV. COMPARISON BETWEEN NORMAL AND ELECTRIC WHEELCHAIR

Normal Wheelchair	Electric Wheelchair
	
1.Normal wheelchairs are not operated by mobile phones.	1. Electric wheelchairs are operated by mobile phones.
2. Normal wheelchairs cannot be used as a stretcher.	2. Electric wheelchair has a special feature that it can be used as a stretcher
3. No sensors and special switches are installed in the wheelchair.	3. There is obstacle IR sensor and emergency switch having special importance.
4. It doesn't consist of the Bluetooth.	4. It consist of the Bluetooth device.
5. The normal wheelchair does not have any motor attached.	5. The electric wheelchair consists of the two DC motors.
6. There are no restrictions on the weight baring capacity of the normal wheelchair.	7. The electric wheelchair can bare up to 50 kgs of weight.
8. There is always need of third person to move the wheelchair.	8. The person sitting on the wheelchair can operate it alone by themselves.

V. OBSERVATION TABLE

Sr.No.	Details	Observation
1	Battery Charging Time	4 hrs.
2	Total Distance covered 1 complete charging	2 km
3	Maximum Weight	50 kg
4	Speed analysis	
	a)Normal surface	20
	b)Elevated surface	10

VI. ADVANTAGES

A. Easy to drive with negligible efforts.
B. Less complexity and less hardware to mount.
C. Can be mounted on the existing wheelchair.
D. Wireless control helps to monitor the wheelchair easily.
E. Reduces manpower and dependency on other human drive.
F. Wheelchair is compact and economical.
G. Android application can scan the valid input at a faster rate and hence control the movement of wheelchair.
H. Provides easy movement for physically challenged people.
I. Easy to develop an existing wheelchair and does not require any sophisticated components.
J. Low power consuming and easy to operate the wheelchair.

VII. DISADVANTAGES

A. Due to the fluctuation in Bluetooth range the chair won't move as it is mobile operated.
B. The IR sensor will not work in sunlight.
C. If the network is poor, the emergency message will not be sent.

VIII. APPLICATIONS

A. People having physical disability can use this electric wheelchair.
B. Since it is mobile operated everybody will be able to use it.
C. It can be used as a stretcher also.

IX. CONCLUSION

Our project entitled "Electric Wheelchair" is generally used by the people who are handicapped, having physical disability or suffering through old age. Since it is a mobile operated wheelchair, it can be used by everybody whether they are educated or not. Arduino Control app is used to control wheelchair which is paired with the Bluetooth device. This wheelchair can also turn into stretcher manually. It can reduce the human effort since the person sitting on the chair can only operate it personally. So no third person's help is needed. The IR sensor is there to sense the obstacles behind the chair.

X. FUTURE SCOPE

Using gear box we can produce a high speed moving wheelchair. PWM modulation can also increase the speed. Solar panel can also be used to charge the battery for powering supply to the components required to drive the wheelchair.

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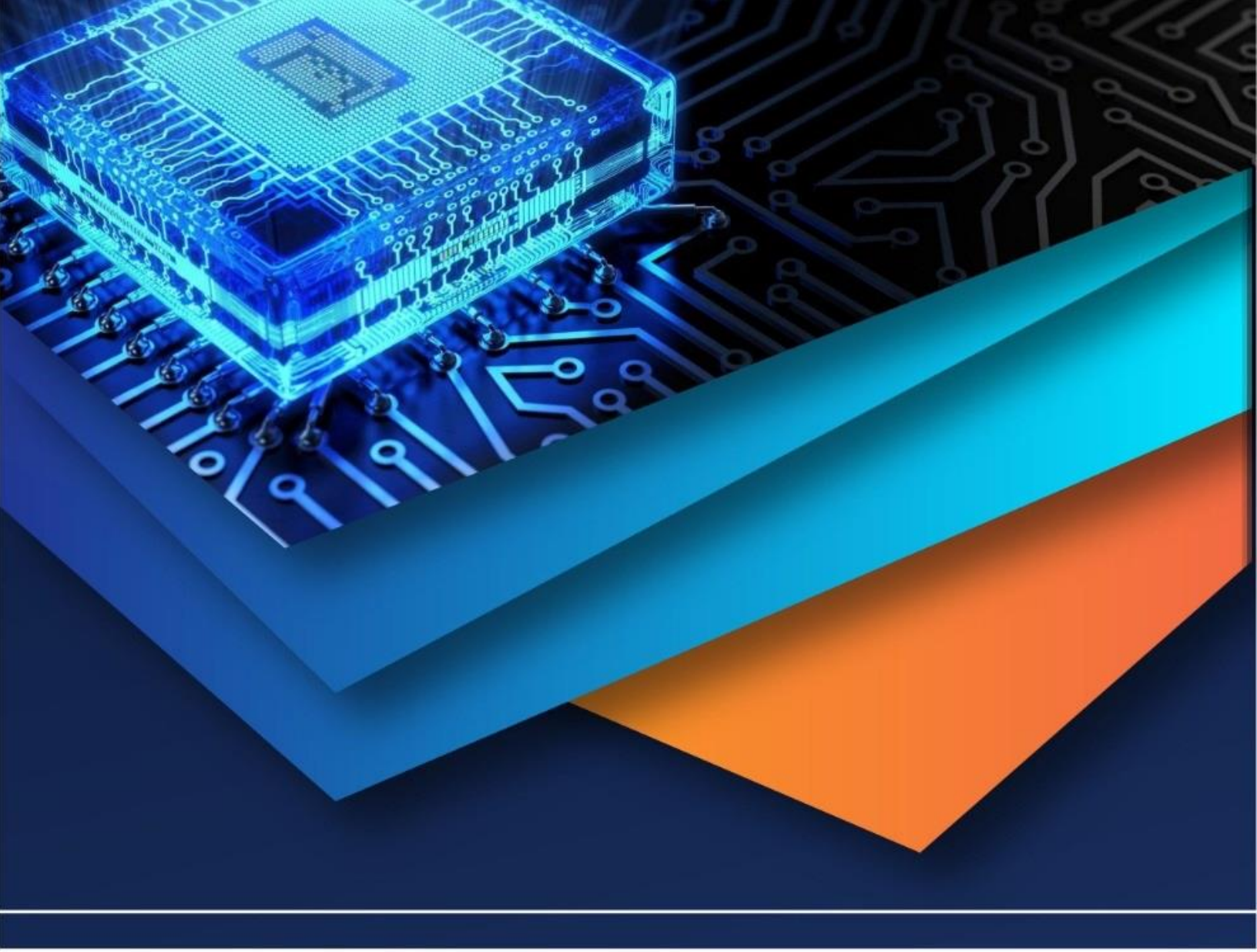

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