SMART WHEELCHAIR

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Abstract: One of the basic problems of users on commercial wheelchair is overcoming in this project. The stair climbing functionality cannot be available in commercial wheelchairs. In this project we use belt for climbing staircase while in old wheelchairs wheels are used. To detect obstacle at the back side of wheelchair ultrasonic wheelchair is used. This wheelchair control is based on the AVR ATMEGA8 microcontroller. The advance feature is that th use of ESP8266. ESP8266 is used to send emergency message. The joystick is provided for movement of wheelchair. Thus this project helps to paralysed stroke or physically challenged people to walk on stair. And project is based on low cost component.

1. INTRODUCTION:

Elderly or disabled or aged people has problem to climbing the stairs. Thus we implement model to help those people to climbing stairs using this wheelchair. We make such type of model where ultrasonic sensor is used to detect the obstacle at back side of chair. The ESP8266 is used here to send emergency message to relatives. Seatbelt facility is also provided for safety. If the obstacle an chair distance is less than 10cm the buzzer gets on.

2. COMPARISON:

Conventional wheelchair	Smart wheelchair
Obstacle is not detected.	Obstacle is detected.
Alarm is not provided.	Alarm is not provided.
Emergency switch not used	Emergency switch can be used
Seat belt not provided.	Seat belt is provided.
Light is not provided.	Light facility for night vision.

3. METHODOLOGY:

Physically challenged and aged people faced many problems in day to day movement. This wheelchair is proposed to help those people. It uses ultrasonic sensors is for to detect obstacle at back side. It operates at 12v/24v battery. It uses Johnson dc motor is used to drive the wheelchair. The wheelchair is walking on stairs by using belt drive mechanism. Emergency switch used in case of emergency to person who sitting on chair.

The joystick is used for movement of wheelchair in right left directions. The main part of system is AVR controller which controls all system.
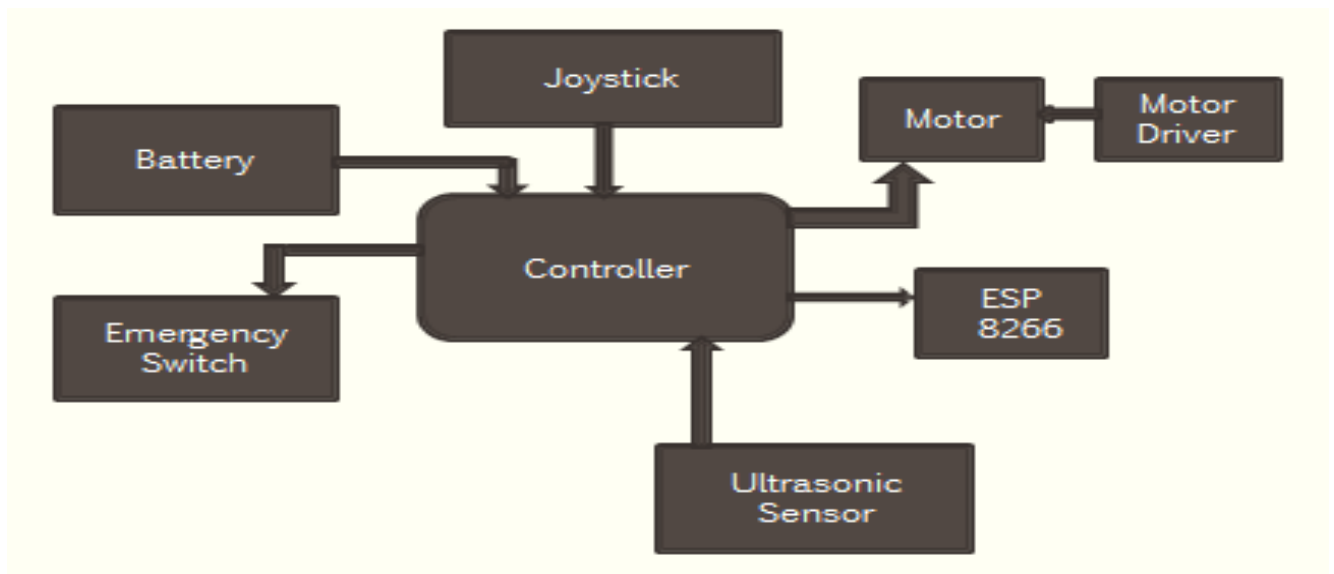
4. BLOCK DIAGRAM:

Fig 1

5. HARDWARE DESCRIPTION:

5.1. JOYSTICK MODULE:

Joystick is made by mounting two potentiometers at a 90 degrees angle.

It is a switch Pushbutton.

Fig 2

5.2. ULTRASONIC SENSOR:

Ultrasonic sensor HCSR04 is used here. It is connected to back side of wheelchair. thus when the wheelchair and obstacle distance is in between 0 to 10cm then buzzer gets on.

Maximum range is 0 to 400cm.

It has one transmitter and one receiver.

Fig 3

5.4. JHONSON MOTOR:

There are four motors are used in this system. It is works on the 12v supply. It is used to drive the wheelchair on space or on stairs. The signal from the AVR controller is given to motor.

To drive the motors the motor driver is used. L298 H bridge driver is used here.

The one motor has 150rpm speed.

Maximum torque capacity is 11kg load.

Fig 4

5.5. ESP8266:

ESP 8266 is used for when person has emergency then emergency message can be send to relatives or neighbours.

Future scope:

1. ESP8266 are used to ON & OFF lamp

2. Also used to Switching ON/OFF fan.

ESP8266 is a low cost WiFi module device and operate at 3.3v supply. It is 32bit controller most widely used.

Fig 5

5.6. AVR ATMEGA 8 MICROCONTROLLER:

AVR ATMEGA 8 is used in this system. The whole system is controlled by using this controller. It give signal to the devices like motors, ultrasonic sensor, ESP8266. It is also low cost device and provides more facilities.

40 pin IC, RAM is 1K byte, ROM 512 byte

Fig 6

5.7. BATTERY:

We use lithium Ion battery. It is 12volt battery.

It provides supply to all other devices used in the system.

6. FEATURES:

1. User friendly.

2. Alarm facility.

3. Reduce physical strain.

4. Emergency system provided.

7. RESULT:

1. When emergency button pressed then emergency message can send to relatives.

2. Obstacle is detected using ultrasonic sensor.

3. Person easily climbing stairs using this chair.

8. CONCLUSION:

By using this smart wheelchair the disabled and elder peoples can travel on the stairs without others. Wheelchair is done with the help of low cost components thus it is affordable to common people. Emergency system is also provided thus avoid accidents and provide safety to peoples.

ACKNOWLEDGEMENT:

REFERENCES:

1. Weijun tao, Junyi Xu, Tao liu "Electric powered wheelchair with stair climbing ability" International journal of advanced robotics systems, vol 4, july 2017.

2. Murray J lawn, takakazu ishimatsu "Modelling of stair climbing wheelchair mechanism with high sinle step capability" IEEE transactions on neural system and rehabilitation engineering, vol 11, September 2008.

3. 3.Gopu G, Geetha Devasena, M. S. Lavanya G. "Automatic belt controlled wheelchair" ARPN journal engineering and applied sciences, volume 09, December 2014.

4. Akhilesh ghogale, Gauresh naik, Prince D silva, Devillers pinto "Stair climbing wheelchair: A literature review" International journal of research and development, vol 06, sept. 2018.