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Intelligent Sides Electronic Wheelchair Using Arduino and GSM Module

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ABSTRACT: The project presents a multifunctional smart wheelchair for movement of disabled people along with patient monitoring using arduino [1]. The wheel chair can move in left, right, forward directions. The movement is controlled by accelerometer and eye movement (IR module). Here the data sensed by IR or accelerometer is given to microcontroller. Microcontroller controls the movement of wheelchair by controlling the DC motors interfaced with motor driver. Patient monitoring is achieved temperature sensor and pulse sensor and data is given to microcontroller. Whenever the parameters rise above the threshold values an alert message is sent to doctor's phone using GSM module along with this[5], obstacle detection is also implemented using ultrasonic sensor.

KEYWORDS: Arduinouno, IR module, Accelerometer, Obstacle detection, Temperature sensor, Pulse sensor.

I. INTRODUCTION

Now a days, more and more inventions and researches are carried out for giving aid to disabled persons using different strategies. In order to make them feel independent simple automatic techniques have to be developed for movement of wheelchair and so on. These kinds of wheelchairs are getting more attraction during these days as they are easy to handle and use. This paper deals with hand controlled and eye controlled wheel chair where the movement of wheelchair is controlled by hand [4][5]and eye given to arduino. Along with this obstacle detection is also carried out using ultra sonic sensor. Moreover, patient monitoring is achieved by using temperature sensor and pulse sensor and an alert message is sent to doctor if the temperature rises above threshold [2].

II. EXISTING SYSTEM

While going through the statistical records of health conditions and diseases, number of people with physical disability is much more. They have to depend on others for moving from one place to another. Manually operated wheel chair was the earliest form of wheelchair. It is operated manually and do not require any electrical system. They are of various type namely self-propelled, attendant propelled and wheel base. Electrical wheel chair which are powered wheelchairs with functions like tilt, recline, leg elevation, seat elevation and so on where also be used. Joystick controlled wheelchairs where common but more force is exerted for controlling the same.

Later, message controlled wheelchairs were also developed which used android app in the phone to transmit the message to controller via Bluetooth. Voice controlled wheelchair uses voice recognition unit having a microphone and HM2007P chip. But it requires more programming and cost is also high.

III. PROPOSED SYSTEM

In this project, an accelerometer and an IR module is given to arduino. According to the commands, wheelchair moves and along with this obstacle detection using ultrasonic sensor is also included. Moreover, patient monitoring system is

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achieved by temperature sensor and pulse sensor and an alert message is sent to doctor using GSM module whenever it rises above the threshold value.

A. Block Diagram

The proposed system has three functions which are done in parallel, wheelchair movement based on accelerometer/IR commands, obstacle detection and patient monitoring. The accelerometer and IR module receives input from the user and transmits the corresponding data to microcontroller[7]. Arduinouno is used as the microcontroller which is the main part and is much simpler compared to other controllers. Microcontroller controls the movement of the wheelchair by the motors interfaced with motor driver. Patient monitoring is achieved by temperature sensor and pulse sensor and the sensed value is given to microcontroller. Whenever the parameters exceeds the threshold value, alert message is sent to the doctors phone using GSM module[4][5].

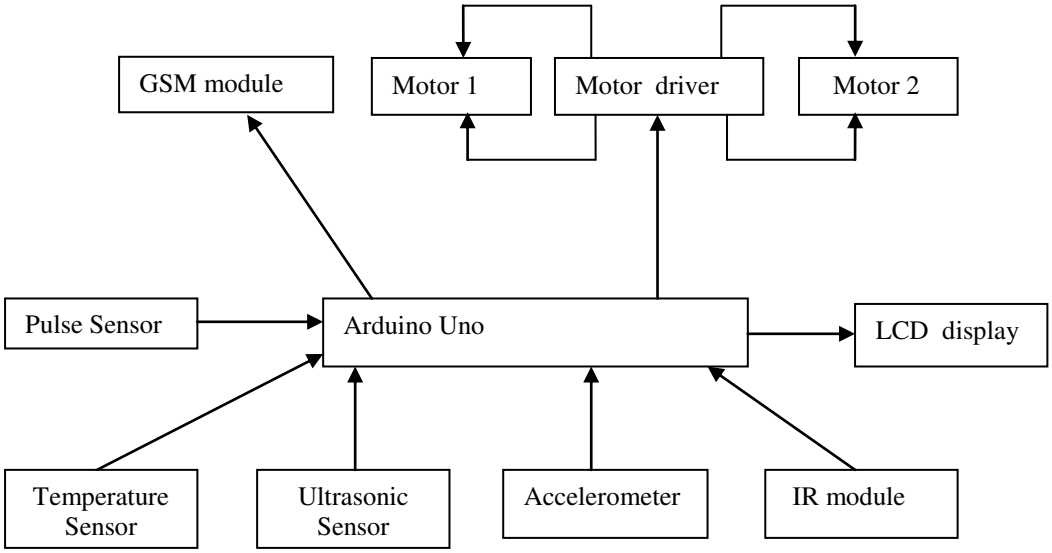

Fig. 1 Block Diagram

IV. HARDWARE IMPLEMENTATION

A.Circuit Diagram

Here arduinouno is interfaced with IR module, accelerometer ADXL335, ultrasonic sensor HC SR04, temperature sensor DS18B20, pulse sensor for taking inputs and motors are interfaced through L293D driver for movement. GSM SIM900A is also interfaced to send the alert message.

In this system power to all the interfaced components are given through adapter. Arduino Uno has 14 digital input output pins and 6 analog input pins. It can be easily plugged to PC for loading programs using USB ports.The accelerometer and IR modules are connected to the digital pins of the arduinouno. Based on the comparison with programmed text and the input received, the DC motors are driven by L293D[3]. The distance calculated by the ultrasonic sensor HC SR04 is also given to the microcontroller for obstacle detection. Also DS18B20 temperature sensor which has a temperature range from -55^{o}c to 150^{o}c and pulse sensor which has a pulse range from 50bpm to 90bpm, gives input to the controller continuously for temperature and pulse monitoring. The transmission pin of

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Arduino Uno is connected to the receiver pin of GSM module by this alert message is given. Temperature and pulse vales are displayed in LCD.

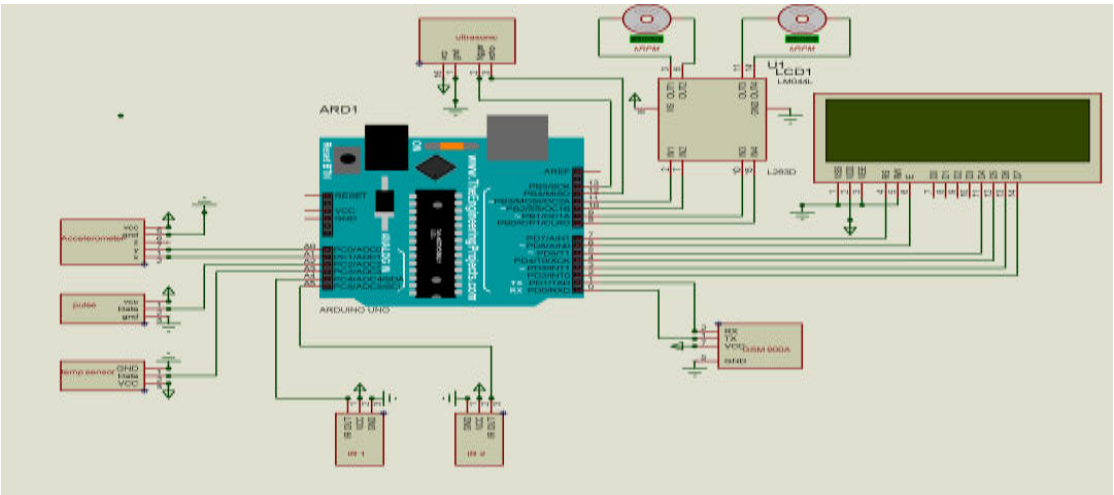

Fig. 2 Circuit Diagram

B. Software: **Language Used**

In this project, Arduino IDE (Integrated Development Environment) is used for programming. It contain text editor to write the codes, many number of in built functions, series menus for easy programming, serial monitoring and message area. Program is then uploaded to arduinouno.

V. RESULT AND DISCUSSION

The following table shows the observation and result for the proposed system when accelerometer or IR inputs are given.

Direction	Motor 1	Motor 2
Forward	Forward	Forward
Backward	Backward	Backward
Right	Forward	Backward
Left	Backward	Forward

Table 1 Observation table

If obstacle distance <100cm, wheelchair stops. When temperature rises above 39^0c and pulse rise above 75bpm, message is sent to doctor's number.

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Fig 3.Final Prototype

The proposed system is very much effective than the existing system in many aspects. Proposed system has two ways of controlling the wheelchair and also has an obstacle detecting system. It also has a patient monitoring system in it. In the existing system there is no such speciality. Thus the proposed system is very much helpful and effective in a handicapped person's life and it also will help them to live a colourful life without depending others for their basic needs.

VI. CONCLUSION

This automatically controlled wheelchair is a useful for partially paralysed person who fill the communication gap between patients, doctors and relatives. They can move around easily and any person can operate this chair by their hand or eye movements. System efficiency is improved with wireless transmission which helps in long distance communication.

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