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Implementation of ARDUINO based spontaneous transportation scheme for physically challenged person by using photovoltaic cell

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Abstract- **Artificial intelligence plays an integral and indispensable role in the advancing technology. In an era of expeditious human life, the demand for automated devices is increasing rapidly. The growth of smart technology has given room for many applications. Such systems analyze the situation and respond appropriately in accordance to the function they are to perform. In this paper, the mechanism of a smart car for a physically disabled is explained. The concept is based on the use of sensors for direction control and automatic sensing of the presence of any obstruction nearing it. Thus, alerting the driver in the form of a LED glow and speed of the car was automatically reduced. The smart car is also equipped with a separate ARDUINO and Ultrasonic sensor for safety alert system. The smart car ensures complete safety of the driver on seat and helps him to move about independently.**

Keywords— Smart technology; Ultrasonic sensors; Arduino software; Arduino UNO.

I. INTRODUCTION

Robotics has become an essential part in every professional field existing today. The smart systems and automated mechanisms are related closely. Some of the characteristics of smart systems are, sensors for signal acquisition, components transmitting diverse decisions and instructions, units to command and control based on the available information .

The smart car is one such application where the disabled person operates the car by himself without worrying about the obstacles that might come across or those that have missed his sight. This paper aims at eliminating the clause of dependency of the user on board by setting up a car using contact sensors and infrared sensors.

Fig. shows the block diagram of the smart car. The different components used are: a Arduino UNO board, Ultrasonic sensors, a buzzer, an LED (Light Emitting Diode) and a power supply. A safety alert system that is based on an Arduino and a Ultrasonic sensor further enhances the safety of the disabled person as soon as he sits in the car. Fig shows the block diagram of the safety alert system.

In this paper, the principle of each component used in constructing the smart car, various applications and advantages of the car has been discussed.

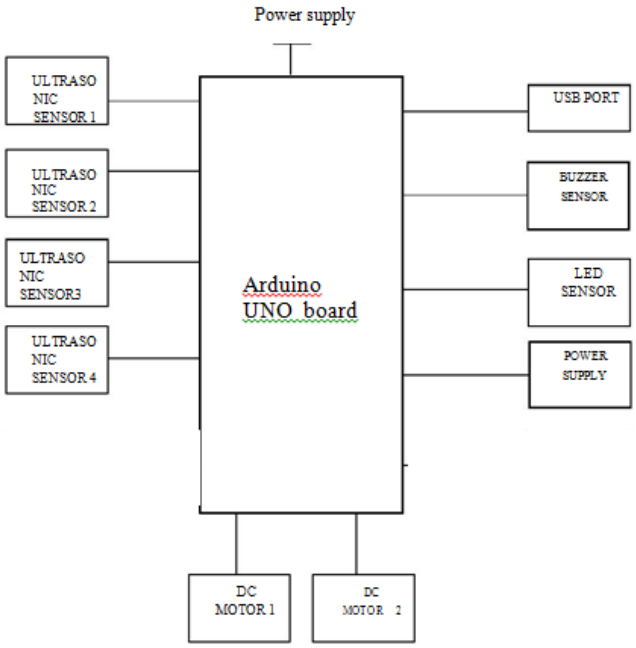

Fig. Block Diagram of the smart car

Fig. Block Diagram of the smart car

II. COMPONENTS USED

The smart car is composed of a Arduino UNO board, four Ultrasonic sensors, two DC motors, four AA batteries placed in a battery case, a buzzer board and an LED board. Other hardware that makes the body of the car includes main frames of different sizes, motor frames, L-frames, wheels, bolts and nuts. Three pin header pins, jumper wires and a power wire complete the connections of the components to the Arduino

UNO board. The detailed hardware composition is shown in Fig. 1. The safety alert system of the car consists of an Arduino board. All of the hardware is connected using jumper wires.

The following sections describe each one of these modules in brief, followed by the steps that the operation of the car will go through in the form of a flow chart that was employed to program the microcontroller to achieve the objective of the car.
It consists of:

1) 2 motor ports
2) A power switch
3) Power connector
4) 7 input ports
5) 5 output ports
6) A USB port

A. DC Motor
The DC (Direct Current) motor is used to rotate the wheels of the car. Two DC motors have been used in this project connected to Motor 1 port and Motor 2 port in the CPU board respectively. The motors are programmed to rotate in anticlockwise or clockwise direction based on the contact sensor pressed. This facilitates the car to move in four different directions; forward, backward, left or right.

B. Ultrasonic Sensor
The contact sensor senses whether a switch is pressed or not. The main purpose of using this in the smart car is that the victim can move the car in a direction he wishes by simply pressing a push key. The contact sensors are connected at four different input ports in the Arduino UNO board. Each of these is programmed as follows:

Ultrasonic Sensor 1- forward motion
Ultrasonic Sensor 2- move left
Ultrasonic Sensor 3- backward motion Ultrasonic Sensor 4- move right

C. Power Supply
The smart car is powered by four AA batteries, which are placed neatly in a battery case. As no complex electrical circuitry is used for the power, the durability of the car is more.

D. Buzzer Board
The buzzer board gives a warning sound “beep” when it receives an electric signal.

E. LED Board
The LED emits light when it receives an electric signal. These are available in various colors. However, red LED has been used in the smart car due to the fact that it has a longer wavelength and can be visible at a far off distance even in unfavorable weather conditions.

F. Motor Port
This part processes the signal to control the DC motor.

G. Arduino board uno
For controlling the signal from the pressure sensor and combined module, Arduino has been used in the safety alert system. Arduino is a single board physical computing platform for managing and handling electronics. It is based on ATmega328 (datasheet) and functions as a microcontroller. Its open source platform facilitates programmer to process the electronics signal from the attached components and control them. Arduino programs are generally written with C or C++. Most of the sensors or modules that are available in the market are Arduino compatible. The board is not expensive, freeware and has very active developing community. The Arduino board is provided with a 5V power supply initially before uploading the program onto it.

H. Joystick
The joystick is nothing but two potentiometers that allow us to measure the movement of the stick in 2-D. Potentiometers are variable resistors and, in a way, they act as sensors providing us with a variable voltage depending on the rotation of the device around its shaft. The kind of program that we need to monitor the joystick has to make a polling to two of the analog pins. We can send these values back to the computer, but then we face the classic problem that the transmission over the communication port has to be made with 8bit values, while our DAC (Digital to Analog Converter - that is measuring the values from the potentiometers in the joystick) has a resolution of 10bits. Finally we make the LED blink with the values read from the sensors as a direct visual feedback of how we control the joystick.

III. CIRCUIT DIAGRAM AND FLOWCHART

Fig. shows the flowchart of the operation of the smart car. When the user sits inside the car, the pressure senses his pressure on the seat. This transmits a message to the android mobile phone. No message is sent otherwise. As soon as the power button is pressed, the CPU board waits for the user to select a particular key. It checks which of the contact sensors is pressed. If contact sensor 1 is pressed, both the motors rotate in forward direction (clockwise).

If contact sensor 2 is pressed, motor1 rotates in clockwise direction and motor 2 in an anticlockwise .If contact sensor 3 is pressed, both the motors rotate in an anticlockwise direction. If contact sensor 4 is pressed, motor1 rotates in an anticlockwise direction and motor 2 in clockwise direction. If any of the IR sensors sense an obstruction, it triggers the buzzer to beep and the LED to glow.

If at all none of the contact sensors are on for instance, then the car is not in motion.

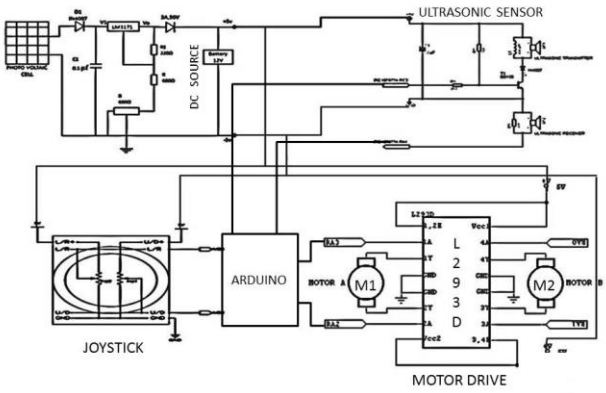

Fig: Circuit diagram

IV. PRINCIPLE OF WORKING

A. Smart car

All the components are connected to a single Arduino board that makes the model less bulky. The car uses four contact sensors and two IR sensors; all connected as input ports. A buzzer and an LED are connected to the output ports in the control the direction of the two wheels of the car.

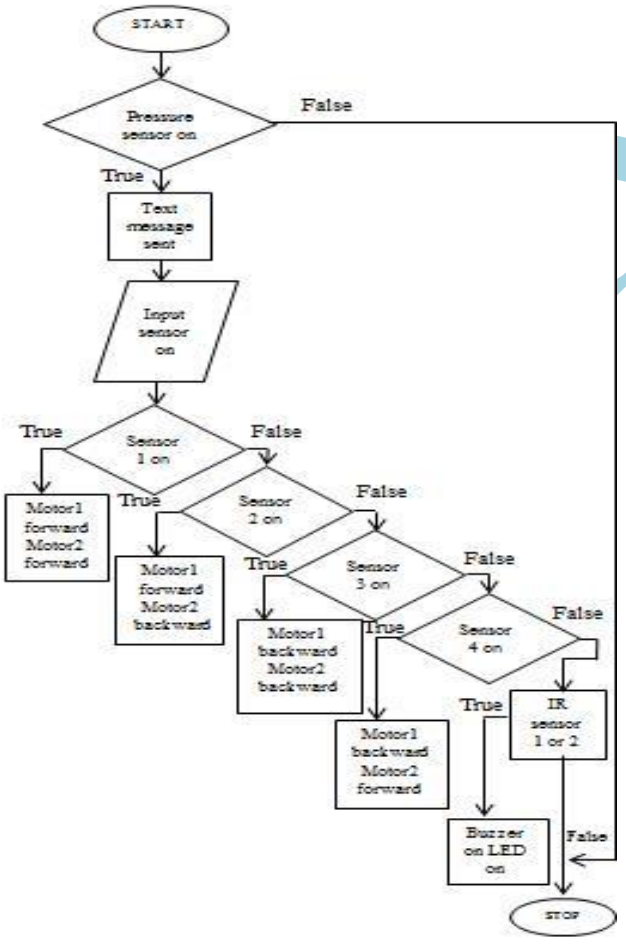

Fig: Flow chart

A software program is installed in the memory of the Arduino board. Two DC motors have been used which Arduino board; this assigns a task for each of the component, together completing it as a moving vehicle. The four contact sensors are placed adjacent to each other forming a rectangular plate-like structure. Once the software program has been installed within the memory of the Arduino, the car is ready to be used. The operation of the car starts by switching on a start button. This powers the car. The operator presses one of the contact sensors based on the direction he wants to move. Each sensor is programmed for a different direction. The DC motors rotate in either clockwise or anticlockwise direction according to the sensor pressed .Thus they facilitate the wheels of the car also to rotate. The car also comprises of two IR sensors located at the front and back of the car. The IR sensors are programmed in a way that if the any of the sensors sense any object, they switch the LED on but also trigger the buzzer to beep. This action alerts the user that an obstruction is nearing.

B.Safety alert system

The whole idea of this system is to alert a person through a text message that the physically disabled is about to start a ride in the smart car. The pressure in the circuit is placed within the seat of the car. When the victim sits on the seat, a pressure is developed on the sensor allowing the leads of the wires to come in contact. The transmitting port (7) of the Arduino is connected to the receiving port (Rx) of the GSM module. The Arduino is programmed to transmit a signal to the GSM module when the leads of the pressure sensor come in contact. Now, the GSM module detects the incoming signal and communicates to the mobile phone through a text message. The text message could be “The smart car is in use”.

V. ADVANTAGES

All the software used is extremely user friendly. The entire smart car consists of very little complex structure making it less bulky. The smart car does not have any external wire circuitry, thus preventing any danger for the user. The text message is sent instantly. This action helps alert the responsible person and facilitates him to take measures for his safety. More than one mobile number can be stored in the Arduino program which facilitates different caretakers to receive the message at the same time. As there is no emission of any kind of harmful material; smart car is eco- friendly.

VI. FUTURE SCOPE

Most of the technology seen today is dependent on automated systems. Moreover, eco- friendly systems are in need. Scientists and researchers are working upon technologies to eliminate the vehicles and mechanisms that harm the environment in any way. The smart car is a great choice and most suitable for a pollution free environment because there no release of any toxic substance from it. The smart car for the physically challenged is also a useful replacement for wheelchairs.

VII. RESULT

All the blocks depicted and were individually tested and integrated to make the main module. The memory chip in the Arduino board was programmed successfully using the software Arduino as in to achieve the smart car mechanism. The final model of the smart car is shown in fig. The safety alert system to be placed within the car is shown in Fig.

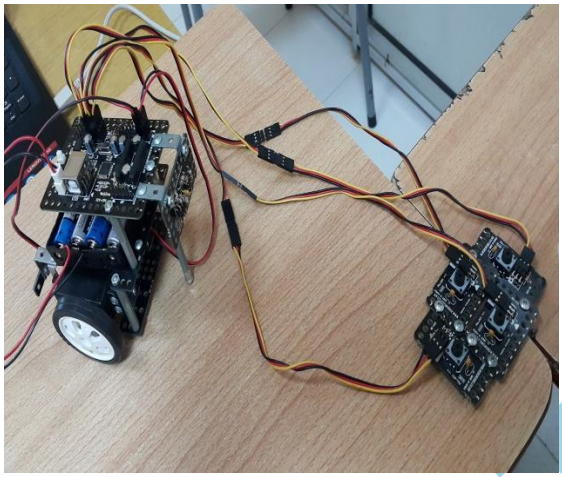

Fig.. The final look of the Smart car for the Physically Challenged

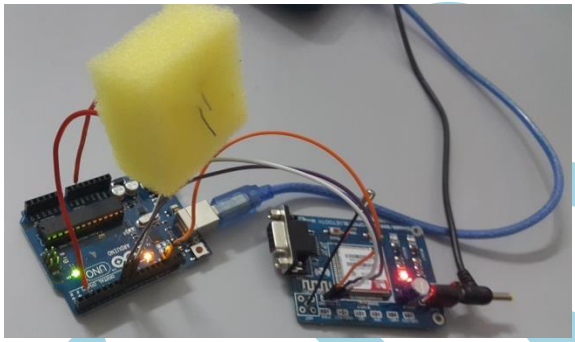

Fig.. The safety alert system of the smart car

VIII. CONCLUSION

In this project, a detailed explanation of a Smart car for disabled people is discussed. The use of simple sensors (contact and infrared) clearly proves how the car is operated in the form of press key buttons.

This smart car mechanism plays a very essential role especially in hospitals, orphanages and almost all fields that hinder the handicapped to move around independently. The safety alert system is based on Arduino; which are widely on demand today. Since a Arduino program is used, the model can also be programmed using smartphones and tablets. This makes it an extremely user friendly, easily controllable and compatible car.

REFERENCES

[1] http://www.livescience.com/56497-artificial-intelligence-intriguing-uses.html

[2] Meensika Sripan, Xuanxia Lin, Ponchan Petchlorlean and Mahasak Ketcham, “Research and Thinking of smart home technology”, International Conference on Systems and Electronic Engineering (ICSEE'2012) December 18-19, 2012 Phuket (Thailand) Ala al-Fuqaha, Mohsen Guizani, Mehdi Mohammadi, Mohammed

[3] Aledhari, Moussa Ayyash, “Internet of Things: A survey of emerging technologies, protocols and applications”, IEEE Communication Surveys& Tutorials, Vol. 17, No. 4, Fourth Quarter 2015.

[4] Video- Arduino+GSM module(SMS message, HTTP requests) http:// internet of things agenda.techtarget.com/definition/smart-sensor http:// www.arduino.cc/en/Main/arduinoBoardUno

[5] Biswarup Nandi, Soumi Mondal, Ritwik Mutt, Debdeep Das, Rana Biswas, “Knock to Unlock”, International Journal of Emerging Research in Management & Technology, vol. 4, Issue 9, September-2015.

[6] Mrs. D.J. Bonde, Rohit Sunil Shende, Ketan Suresh Gaikwad, Akshay Sambhaji Kedari, Amol Uday Bhokre, “Automated Car Parking System

[7] Commanded by Android Application”, International Conference on Computer Communication and Informatics (ICCCI -2014), Jan. 03 – 05, 2014, Coimbatore, INDIA

[8] Akanksha Singh, Arjit Pal, Bijay Pai, “GSM Based Home Automation, Safety and security system using Android Mobile Phone”, International Journal of Engineering Research and Technology, Vol. 4, Issue 5, May-2015.

[9] http://www.itead.cc/wiki/SIM900/SIM900A_GSM/GPRS_Minimum_S ystem_Module

[10] http://www.instructables.com/id/How-to-Make-a-Ridiculously-Cheap-Analog-Pressure-S/

