Smart Vehicle for Physically Challenged People

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Abstract: The main purpose of the vehicle is to solve the problem faced by patients who are blind and differently abled. Vehicle aims at providing appropriate help needed by the patient. The vehicle has multiple functions which are designed in a way to serve according to the need of the patient. The function includes use of ultrasonic sensors for detection of obstacle and use of accelerometer which will help to drive the vehicle accordingly, it is useful for the people suffering from blindness. Vehicle is also designed to serve patients who are physically challenged by installing the circuit of gesture recognition along with flex sensors which will be mounted on the fingers of the patient. A specific finger movement would indicate a specific message. The message will be conveyed to the respective authorities about the patient needs, even in their absence via GSM module.

Keywords: ARDUINO NANO; Accelerometer; Wireless technology; WIFI Module; Flex Sensor; Internet of things

I.   INTRODUCTION

In everyday life, the problem of a person to always stay with the patient has always generated some issues. Smart handicap vehicle has rightfully provided the solution to the above problem. With lesser complexity and maintenance, it can be easily installed in the hospitals. Gesture recognition is the process in which gestures made by the user convey a message or can be used to control a device. Physical gesture is the powerful mode of communication. Physical gestures may include sign languages, hand movements, etc. This project makes use of fist movement to control the direction of vehicle. A primary goal of this vehicle is to create a model of the wheelchair that can identify human gestures and use them to control the vehicle. This vehicle also has an important feature of obstacle avoidance. This feature is totally based on robotics. Robotics is an important and rapidly growing field. Being a branch of engineering, applications of robotics is increasing rapidly with technology advancements. This feature of obstacle avoidance is based on Arduino and ultrasonic sensors to avoid collisions. This feature is mainly designed for the blind to avoid collisions. The project also has another feature called motion-based message conveyor. As the name suggests there will be motion of fingers to send an emergency message. We are using three flex sensors placed on three different fingers to convey the messages. If the person wants to go to the washroom, he would bend the index finger and a message 'Toilet' would be sent to the respective caretaker. Similarly, flex sensor placed on the middle finger indicates 'Food' and the ring finger 'Water'. has any problem he will move his body part containing accelerometer to a particular direction.

II.   LITERATURE SURVEY

A. Bluetooth Module HC-05: This Module is an easy to use Bluetooth SPP (Serial Port Protocol) module, designed for the transparent wireless serial connection setup. It also provides switching mode between devices. The Bluetooth module has two devices i) master device ii) slave device. One device connects to the master while the other device connects to the slave. Bluetooth module HC-05 consists of six pins. The six pins are Key, 5V, GND, Tx, Rx, Status in order to have proper communication, the master device must be connected to the slave. Once the pairing is done between two devices, the device will ask to enter the password. The password will be either 0000 or 1234. Enter the password and both the devices will be connected to each other.
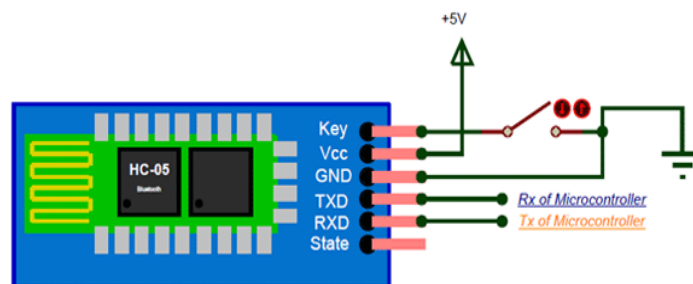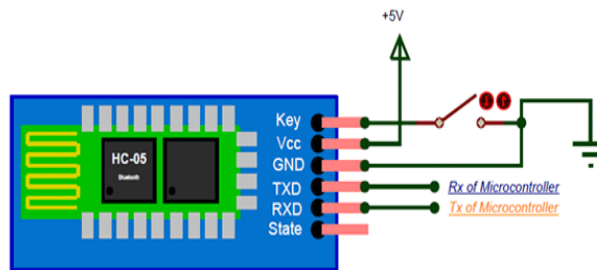
Figure 1: HC-05 Bluetooth Module

B. Flex Sensor: Flex sensor works on the circuit of analog voltage divider. It works on the principle of change in resistance. There is a substrate present on the flex sensor. When the flex sensor is bent, there is a change in substrate, which causes change in the resistance. Thus, there is fluctuations in the value. There is predetermined range of values for each message. The flex sensor is mounted on the fingers of the patient. Each flex sensor is used to convey a different message. When the patient bends his finger as per his need, there is a change in the value. Once the value comes under the predetermined range a message is developed which is conveyed via GSM module to the necessary authorities. The change in the values is directly related to the change in resistance. Flex sensor circuit is used to decode these changes in the resistance.
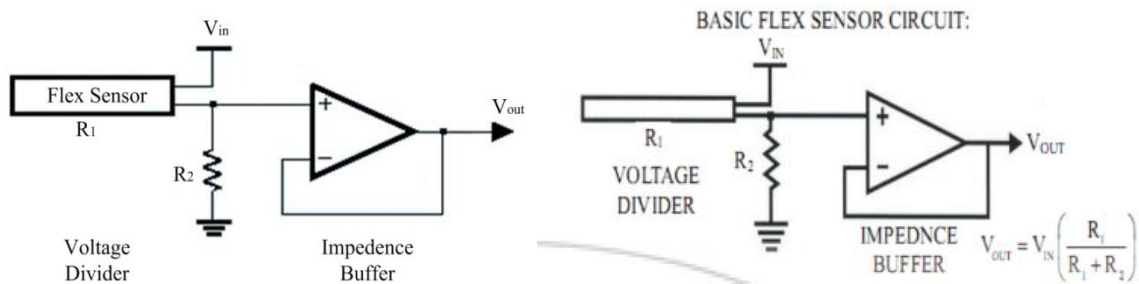

Figure 2: Functional Diagram of Flex Sensor

C. Arduino NANO: Arduino acts as a main component of the entire system. It is the brain of the system. Arduino is a single board kit which consists of a microcontroller and set of digital and analog pins that can be interfaced to various expansion board, breadboards and other circuits. The Arduino board consists of an Atmel AVR microcontroller (ATmega328). The board also consists of 5v linear regulator and a 16 MHz crystal oscillator. For our model, Arduino Nano is used. There are 14 digital pin and 8 analog pins. The digital pins can be used to interface the sensor by using it as input pin. Th Arduino Nano is operated at 0v and 5v for the digital pins. There are three possible modes for supplying the power either by using USB jack, Vin Pin or +5v pin. IDLE is the software used.
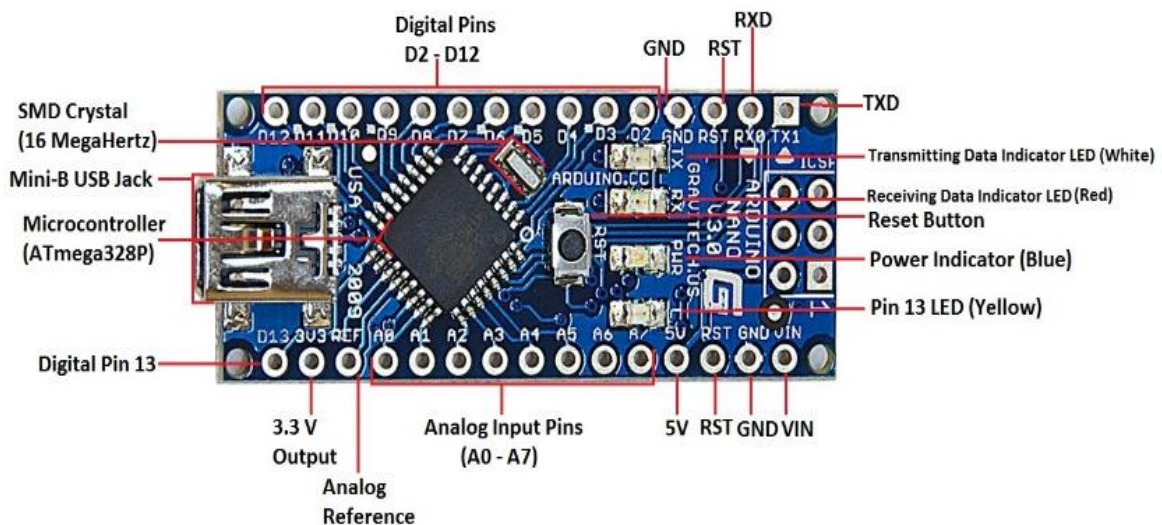

Figure 3: Arduino Nano Module

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D. Ultrasonic Sensor: Ultrasonic sensor consists of 2 main parts, transmitter and receiver. Transmitter section is used to convert the electrical signal into ultrasound. Receiver is used to convert the ultrasound back to electrical signal. Ultrasonic sensor circuit is used to avoid the collision and prevent the damage. With the increase usage of ultrasonic sensors, the accidents have drastically reduced with time.

E. Accelerometer: An accelerometer is a device is used for measuring proper accelerations. It even measures velocity or speed/time. It is a low power device which requires power in the range of micro or milli-amp. An accelerometer measures the angle at which a device is moving or tilted with respect to the surface of the Earth. It measures acceleration in two or three axis for e.g. x, y & z. Depending upon the acceleration, users come to know in which direction the object is moving. It helps the user to understand about surrounding of an item better. They are even used in applications which are related to sensing vibrations or orientation. In today's world such devices are used in various devices like Smartphones, Tablets etc.
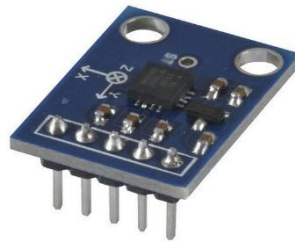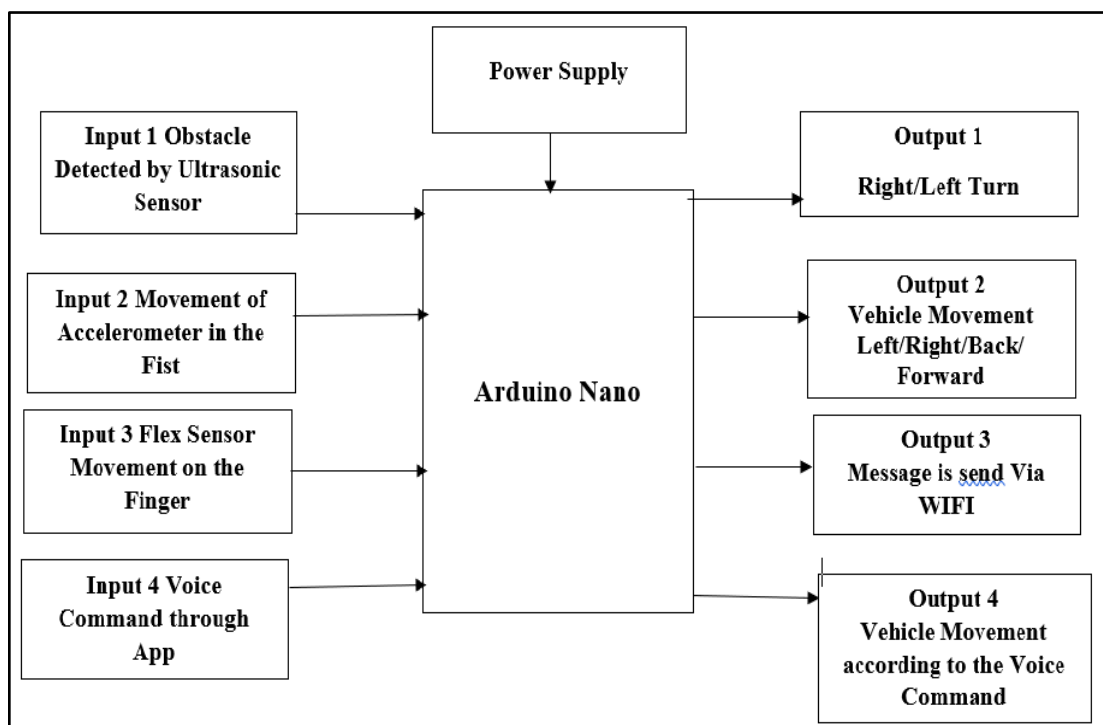

Figure 4: Accelerometer

III. BLOCK DIAGRAM

Figure 5: Block Diagram

IV. CONCLUSION

The Smart handicap vehicle functions as designed overall. The most significant part of this vehicle is that it can perform multiple tasks at a time. The vehicle not only helps the patient, but also the doctor and their relatives to be in touch with the patient. The vehicle will make the life of the needy much easier and comfortable. The project provides social benefits, where problems of physically challenged people are solved by using a smart vehicle, which performs various tasks as mentioned above. Several tasks are combined into a single vehicle and based on the disability of a person; the task is performed on a single click.

V. FUTURE SCOPE

Smart wheelchair will be integrated into the smart home, providing a seamless user experience and control over all household appliances. The vehicle can be detected using GPRS. The vehicle will provide facilities such as temperature, blood pressure measurement of a patient and provide details to the doctor. This vehicle can be used in a hospital for patients.

REFERENCES

[1]. Kirti Bhagat, Sayalee Deshmukh, Shraddha Dhonde and Sneha Ghag, "Obstacl Avoidance Robot", Department of Computer Engineering, International Journal of Science, Engineering and Technology Research (IJSETR), Volume 5, Issue 2, February 2016.
[2]. Yanan Xu & Yunhai Dai, "Review of Hand Gesture Recognition Study", Contemporary Engineering Sciences, Vol.10, 2017, No 8, Sep 2015.
[3]. Ajinkya Raut, Vineeta Singh, Vikrant Rajput and Ruchika Mahale, "Hand Sign Interpreter", MCOE Pune, The International Journal of Engineering and Science (IJES), Volume 1, Issue 2, 2012.
[4]. Alapati Sreejan & Yeole Shivraj Narayan, "A Review on Applications of Flex Sensors", Department of Mechanical Engineering, VJ Institute of Engineering & Technology, International Journal of Emerging Technology & Advanced Engineering (IJETAE), Volume 7, Issue 7, July 2017.
[5]. Baharuddin Mustapha, "Ultrasonic and Infrared Sensors Performance in wireless System" International conference on Artificial Intelligence, Vol.2, No 4,2013.
[6]. George Mucheru, "Operation of Gyro Sensor & 3-Axis Accelerometer", Helsinki Metropolia University of Applied Sciences, Vol.1, May 2014.