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Study of Hand Gesture Recognition Based Controlled Vehicle

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ABSTRACT: This paper presents a model for hand motion control vehicle, and identifies trends in technology, application and usability. We present an integrated approach is real time detections, gesture based data which control vehicle movement and manipulation on gesture of the user using hand movements. A three axis accelerometer is adaption. As the person moves their hand, the accelerometer also moves accordingly. The gesture is capture by accelerometer and processed by gesture. Today human machine interactions are moving away from mouse and pen and are becoming advanced. With each passing day the gap between machines and human is being reduced with the introduction of new technology is easy the standard of living. Its having future scope of advanced robotic arms that are designed like the human hand itself can easily controlled using hand gesture only. It also having a great change for an handicapped people easily for their movement.

Keywords: Accelerometer, RF, AT89C51 microcontroller, modular, motor driver.

I. INTRODUCTION

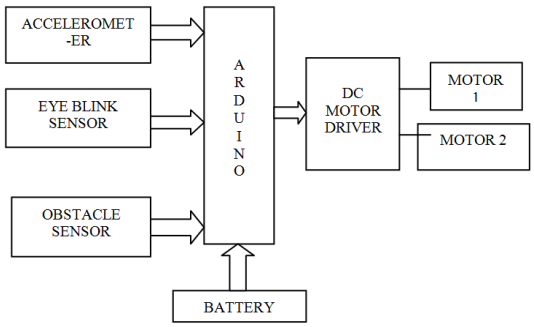
In the existing system, human hand movements are sensed by the robot through sensors and it follow the same. As the person moves their hand, the accelerometer also moves accordingly sensor displaces and this sensor senses the parameter according to the position of hand.

In this system, a gesture driven robotic vehicle is developed, in which the vehicle movements and manipulations i.e., handling and control is depends on the gesture of the user. In this system, gesture is captured by accelerometer and it is processed by software namely, microcontroller software and the parameters are sent to microcontroller and encoder circuit, It is further transmitted (transmitter section) by RF433 MHZ transmitter. In the receiver section, the RF 433 MHZ receives.

Holds down the received parameters and process with microcontroller and gives those parameters to the robotic vehicle so that it acts accordingly to the gesture. By this system, it is possible to achieve processing of long distance.

This will be an effective method to eradicate the social problems faced by the physiologically challenged persons. This is directly interfering with the social relevance of the society. The mobility aid which will help to an extend for the challenged people for their location. Usually these peoples are bedridden and difficult for their movements from their bed. It is very difficult to make them move from one place to another. The main reason behind the implementation of this project is to give a helping hand for the sufferings of the challenged people. They have no way to get rid of from the bed due to their lack of movements. Degeneration of nerve cells and muscle fibers can lead to the challenges. To defeat the challenges is the main objective of this project. By designing the wheelchair for the challenged people can reduce the sufferings of the patients to an extent. Powered wheelchairs play a vital role in bringing independence to the severely mobility– impaired and allow people to get on with their activities of daily living. Many people who suffer from mobility–impairments rely on powered wheelchairs to get out and about.

A. Block Diagram



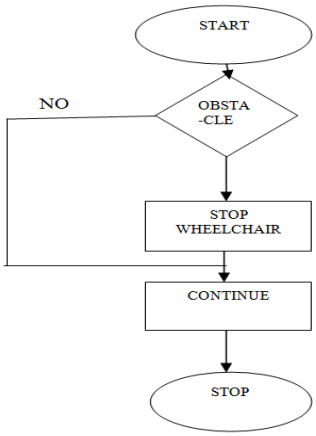
B. Accelerometer

An accelerometer is an integrated device that measures proper acceleration, the acceleration experienced

relative to freefall. Single- and multiaxis models are available to detect magnitude and direction of the acceleration as a vector quantity, and can be used to sense orientation, acceleration, vibration shock, and falling. Micro machined accelerometers are increasingly present in portable electronic devices and video game controllers, to detect the position of the device or provide for game input. It is a capable of measuring how fast the speed of object is changing. It generates analog voltage as the output which is used as an input to the control system. The accelerometer used in this automated system is ADXL345. It is a three axis accelerometer, which senses the tilt in two directions only. The supply voltage ranges from 2 to 3.6v.

C. Motor

Motor receives power from the Motor driver IC. This power is utilized to do physical works, for example move the Wheel chair. DC motor orientation, speed and operation can be controlled with microcontroller. We can start it, stop it or make it go either in clockwise or anti clock wise direction. The speed of the Motor is controlled by the help of PWM (pulse width modulation).



D. Encoder

It is capable of encoding information that consists of Naddress bits. It consists of 18 pins. Pin(1-9) and 14 are connected to ground. Pin number 10,11,12,13 of encoder are connected to 13, 12, 11, 10 of Arduino Uno board respectively. A resistor of 750K Ohm is connected to 15 and 16 number pin. Pin 17 is connected to Data pin of 433MHz RF transmitter module. It operates on 5V power supply to which 18 number pin is connected.

E. Decoder

HT12D[10], 212 series decoder is used which is capable of decoding information that consists of Naddress bits. It consists of 18 pins. Pin (1-9) connected to ground. Pin number 10,11,12,13 of decoder are connected to 10,15,7,2 of Motor driver respectively. A resistor of 47KOhm is connected to 15 and 16 number pin. Pin 17 is not connected. Pin 14 is connected to Data pin of 433MHz RF receiver module. It operates on 5V power supply to which 18 number pin is connected.

II. RF TRANSMITTER AND RECEIVER MODULE

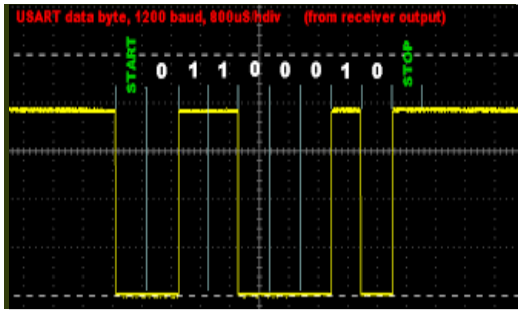


Fig. 1.

Transmitter And Receiver Module RF stands for radio frequency. It is available in different operating frequencies and with different operating range. We have used 433 MHz RF TX/Rx module. RF module is often used along with a pair of encoder and decoder. It can transmit the signal up to 500 ft of range at rate of 1 Kbps to 10 Kbps. Transmitter module consists of 4 pins (GROUND, VCC, DATA, ANTENNA). DATA pin is connected to encoder (pin 17). A 17 cm single strand wire antenna is used which is connected to antenna pin of TX module. Transmitter receives serial data and transmits RF signal wirelessly to the receiver through this antenna. To test the RF transmitter module just connect the DSO with the data pin of the transmitter module and check that a train of pulses are coming or not, shows in fig. 1 if no pulses will occur then it means that modules are not working. Receiver module consists of 8 pins. 3 ground pins, 2 VCC pins, 2 DATA pins and 1 antenna pin. DATA pins are connected to decoder (pin 14). In this module also, a 17 cm single strand wire antenna is used for receiving RF signal from transmitter.

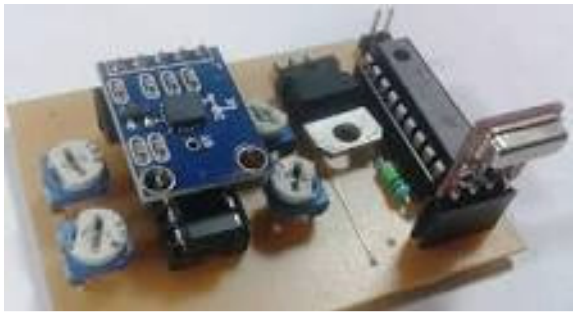


Fig. 2.

A. Stop Condition

When the accelerometer is parallel to the horizontal plane, all the output pins of decoder (13, 12, 11, 10) are set to high which makes the robot in stop mode. Led

are connected to the decoder output pins. Since all the output pins are high, so all the led are glowing To test the RF receiver module just connect the DSO with the data pin of the transmitter module and check that a train of pulses are coming or not which is shown in figure 8, if no pulses will occur then it means that modules are not working and not receiving the data from the transmitter module. The length of the antenna is determined according to the frequency range of RF module.

B. Forward Movement

When the accelerometer is tilted to forward, two output pin of decoder (13, 11) are set to low and other two output pin of decoder (12, 10) are set to high. This condition commands the robot to move in forward direction. Led connected to pin 13 and 11 are not glowing as it is low and led connected to pin 10 and 12 are glowing since, it is high.

C. Backward Movement

When the accelerometer is tilted towards backward direction, two output pin of decoder (12, 10) are set to low and other two output pin of decoder (13, 11) are set to high. This condition commands the robot to move in backward direction. Led connected to pin 13 and 11 are glowing as it is high and led connected to pin 10 and 12 are not glowing since, it is low.

D. Moves towards Right

When the accelerometer is tilted towards right, two output pin of decoder (12, 11) are set to low and other two output pin of decoder (13, 10) are set to high. This condition commands the robot to move towards right. The output can be seen in the above picture. Led connected to pin 13 and 10 are glowing as it is high and led connected to pin 11 and 12 are not glowing since, it is l.

E. Moves towards Left

When the accelerometer is tilted towards left, two output pin of decoder (12, 11) are set to high and other two output pin of decoder (13, 10) are set to low. This condition commands the robot to move towards left. Led connected to pin 13 and 10 are not glowing as it is low and led connected to pin 11 and 12 are glowing since, it is high.

Fig. 3.

III. COMPARISONS WITH EXISTING SYSTEM

The major advantage of this system over other systems is that it provides real time palm gesture recognition, leading to an effective and natural way of controlling robots. Additional advantage- many existing system have used Bluetooth wireless control which is replaced by RF modules in this paper, and due to which the range has been enhanced.

IV. CONCLUSION

In this paper, an automated robotic vehicle has been developed which works according to your hand gesture. The robot moves wirelessly according to palm gesture. The RF module is working on the frequency of 433 MHz and has a range of 50-80 meters. This robot can be upgraded to detect human life in earthquake and landslide by implementing the sensor accordingly. It can also be upgraded to bomb detecting robot as it has robotic arm it can also lift the bomb. GPS system can be added to the robot by the help of which its location can be tracked.

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