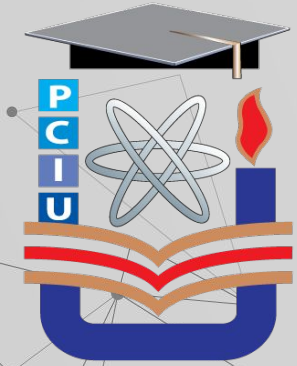


Port city international University

Proposal On: Gesture controlled Robot using arduino

Presented To: Mumtahina Ahmed

Department of Computer Science and Engineering
Port City International University
21/11/2021

Group 5:

(Isfak Ahmed CSE-01506410)
(Punam Bhattacharjee CSE-01506416)
(Sajia Alam CSE-01506436)
(Maruf CSE-01506438)
(Ratul Barua CSE-01506439)
(Zahidul Kabir CSE-01506443)

GESTURE CONTROLLED ROBOT USING ARDUINO UNO

Introduction: A gesture controlled robot is controlled by using a hand in place of any other method like buttons or joystick. Here one only needs to move hand to control the robot. A transmitting device is used in our hand which contains RF Transmitter and accelerometer. This will transmit commands to the robot so that it can do the required task like moving forward, reverse, turning left, turning right and stop. All these tasks will be performed by hand gesture.

Motivation: Robots are playing an important role in automation across all the sectors like construction, military, medical, manufacturing etc. After making some basic robots like line follower robot, computer controlled robot etc, we have developed this accelerometer based gesture controlled robot by using arduino uno. In this project we will be using hand motion to drive the robot. For this purpose we will use an accelerometer which works on acceleration.

Components:

1. Arduino UNO
2. Arduino Nano
3. MPU6050 Sensor
4. DC Motors
5. Accelerometer
6. HT12D
7. HT12E
8. RF Pair
9. Motor Driver L293D
10. 9 Volt Battery
11. Battery Connector
12. USB cable
13. Robot Chassis

Arduino UNO:

The Arduino Uno is an open-source microcontroller board based on the Microchip ATmega328P microcontroller and developed by Arduino.cc. The board is equipped with sets of digital and analog input/output pins that may be interfaced to various expansion boards and other circuits.

Fig: Arduino UNO

DC Motors:

A direct current (DC) motor is a type of electric machine that converts electrical energy into mechanical energy. DC motors take electrical power through direct current, and convert this energy into mechanical rotation

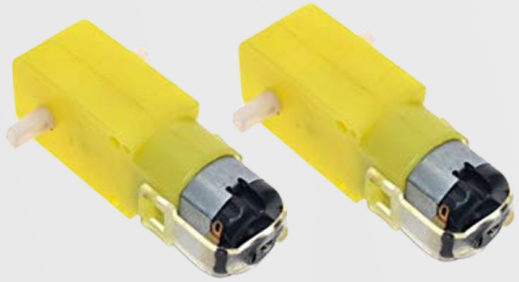


Fig: DC Motors 12V

Accelerometer:

An accelerometer is a basic technology that converts mechanical motion into an electrical signal. It is an electromechanical device that measures acceleration force, whether caused by gravity or motion.

Fig: Accelerometer

HT12D:

HT12D simply converts serial data to its input (may be received through RF receiver) to 12 bit parallel data. These 12 bit parallel data is divided into 8 address bits and 4 data bits.The received data is checked 3 times for more accuracy. It has built in oscillator, we need to connect only a small external resistor

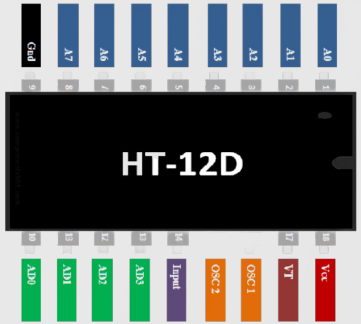


Fig: HT-12D

HT12E:

The HT12E is a 2^12 encoder in 18 pin DIP package. This is CMOS LSI for remote control system applications. It is capable of encoding information which consists of N address bits and 12-N data bits. Each address/data input can be set to one of the two logic states

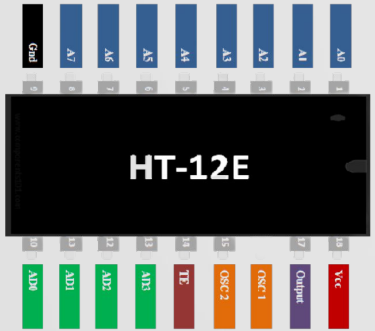


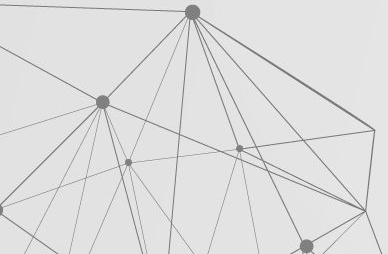
Fig: HT-12E

RF Pair:

RF pair consists of an RF transmitter and receiver. These can be interfaced with Encoder and Decoder ICs. For better accuracy, antenna should be used at transmitter and receiver ends:

L293D:

The L293D is a dual-channel H-Bridge motor driver capable of driving a pair of DC motors or single stepper motor. As the shield comes with two L293D motor driver chipsets, that means it can individually drive up to four DC motors making it ideal for building four-wheel robot platforms.



Robot chassis

Aluminum Chassis comprises the body of a robot. Roll cages, bumpers and other body accessories can also be found in this category.Working: Gesture controlled robot moves according to hand movement as we will be placing the transmitter in our hand. When we will tilt our hand in front, the robot will start moving forward and continues moving forward until the next command is given. When we will be tilting the hand in the backward side, the robot will change its state and will start to move in the backwards direction until another command will be given. When we tilt it on the left side Robot will get turn left till the next command. When we will tilt the hand on the right side, the robot turns to the right. And for stopping robots we will keep our hands stable.

Circuit Diagram and Explanation:

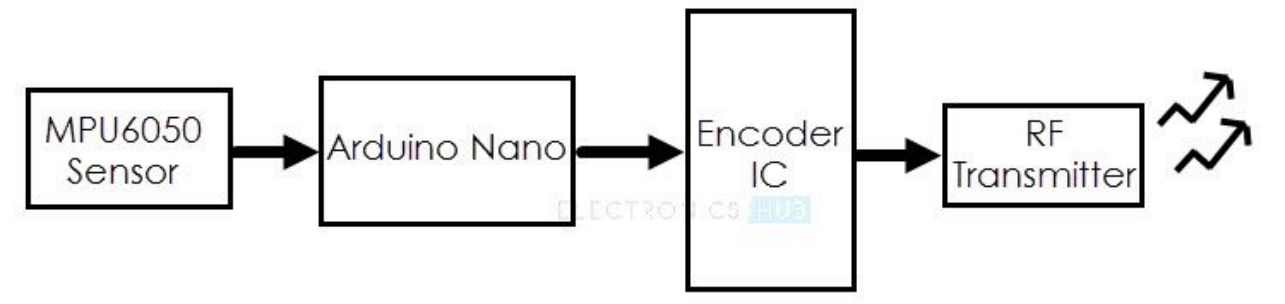
Gesture Controlled Robot is divided into two sections:

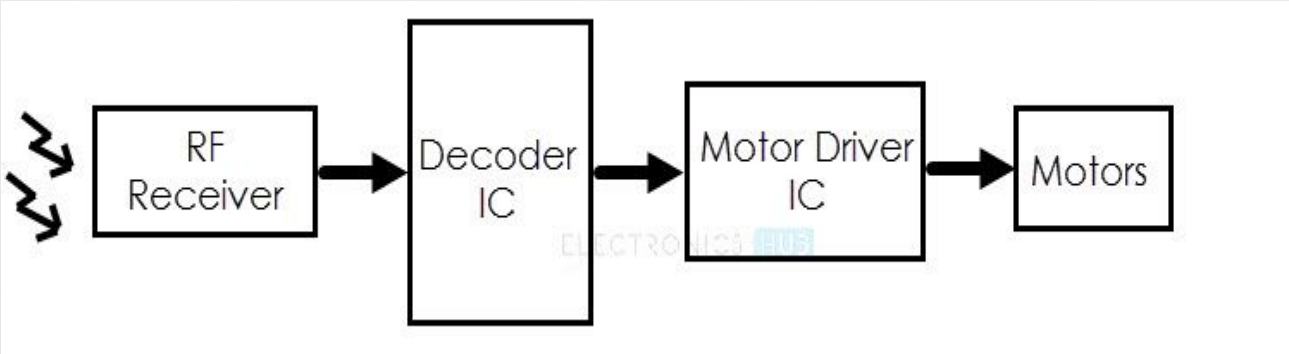
1. Transmitter part
2. Receiver part

In the transmitter part an accelerometer and a RF transmitter unit is used. As we have already discussed, the accelerometer gives an analog output so here we need to convert this analog data into digital. For this purpose we will be using a 4 channel comparator circuit in place of any ADC. By setting reference voltage we will get a digital signal and then apply this signal to HT12E encoder to encode data or convert it into serial form and then send this data by using RF transmitter into the environment.

At the receiver end we will use a RF receiver to receive data and then will apply it to the HT12D decoder. This decoder IC converts received serial data to parallel and then read by using arduino. According to received data we will drive the robot by using two DC motor in forward, reverse, left, right and stop direction.

Methodology:





Working of Hand Gesture Controlled Robot

In this project, a mobile robot that is controlled by the gestures made by the hand, is designed. The working of the robot is explained here.

As mentioned earlier, the gesture controlled robot is a wireless operated robot and has two parts: Transmitter and Receiver. When the robot is powered on, the transmitter part, which consists of Arduino, MPU6050, Encoder and RF Transmitter, will continuously monitor the MPU6050 sensor.

This data is captured by the Arduino, which then transmits a corresponding data to the Encoder, based on the orientation of the MPU6050 Sensor. The parallel data received by the encoder is converted into serial data and this serial data is transmitted by the RF Transmitter.

At the receiver section, the RF Receiver receives the serial data and transmits it to the Decoder IC. The Decoder will convert the serial data to parallel data and this parallel data is given to the motor driver IC. Based on the data, the movement of the motors, and hence the movement of the robot is defined.

Thank YOU