GESTURE CONTROL CAR

Report by:

HARSHAL AHER

Abstract

Gesture Controlled Car is a robot which can be controlled by simple human gestures. The user just needs to wear a gesture device in which a sensor is included. The sensor will record the movement of hand in a specific direction which will result in the motion of the robot in the respective directions. The robot and the Gesture instrument are connected wirelessly through radio waves. User can interact with the robot in a more friendly way due to the wireless communication. We can control the car using accelerometer sensors connected to a hand glove. The sensors are intended to replace the remote control that is generally used to run the car. It will allow user to control the forward, backward, leftward and rightward movements, while using the same accelerometer sensor to control the throttle of the car. Movement of car is controlled by the differential mechanism. The mechanism involves the rotation of both forth & rear wheels of left or right side to move in the anticlockwise direction and the other pair to rotate in the clockwise direction which makes the car to rotate about its own axis without any kind of forward or backward motion. The main advantage of this mechanism is the car with this mechanism can take sharp turn without any difficulty.

CONTENT

CHAPTER 1

INTRODUCTION

GESTURE CONTROLLED CAR

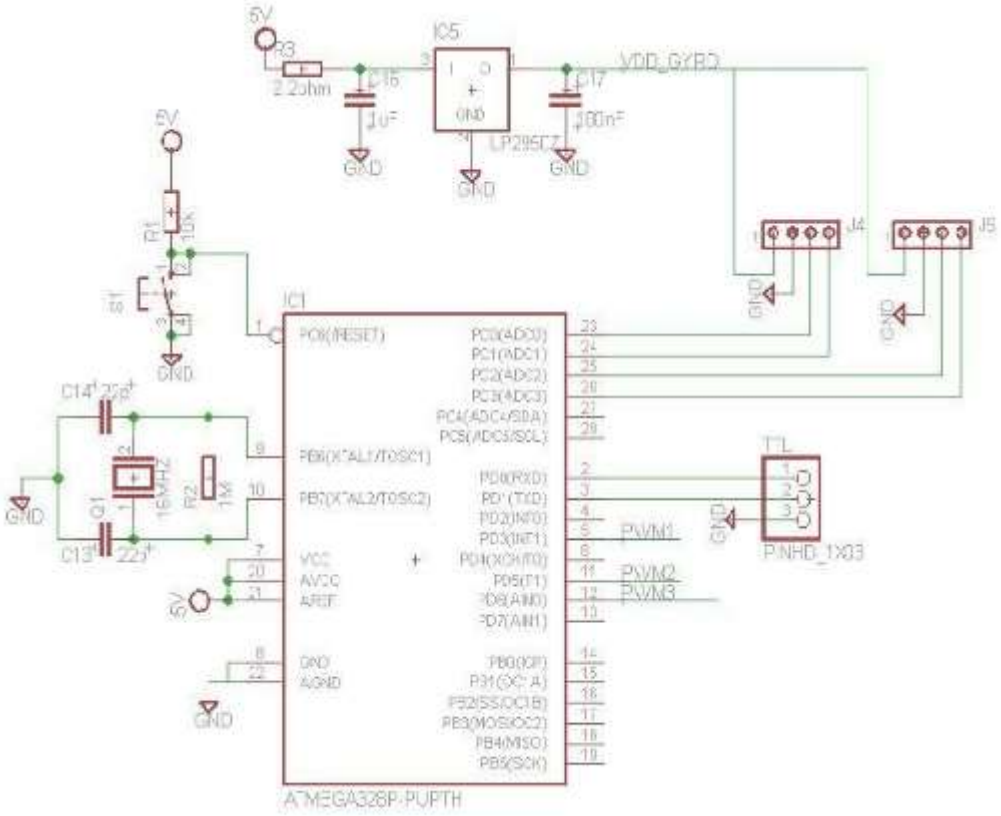
A **gesture controlled robot** is controlled by using hand in place of any other method like buttons or joystick. Here one only needs to move hand to control the robot. A transmitting device is used in your hand which contains RF Transmitter and accelero-meter. This will transmit command to robot so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

Here the most important component is accelerometer. Accelerometer is a 3 axis acceleration measurement device with +-3g range. This device is made by using polysilicon surface sensor and signal conditioning circuit to measure acceleration. The output of this device is Analog in nature and proportional to the acceleration. This device measures the static acceleration of gravity when we tilt it. And gives an result in form of motion or vibration

CHAPTER 2

SYSTEM DESIGN

2.0.1. BLOCK DIAGRAM



BLOCK DIAGRAM OF ARDUINO LILYPAD

CHAPTER 3

COMPONENT DESCRIPTION

1. GY-61 DXL335 3-Axis Accelerometer Module

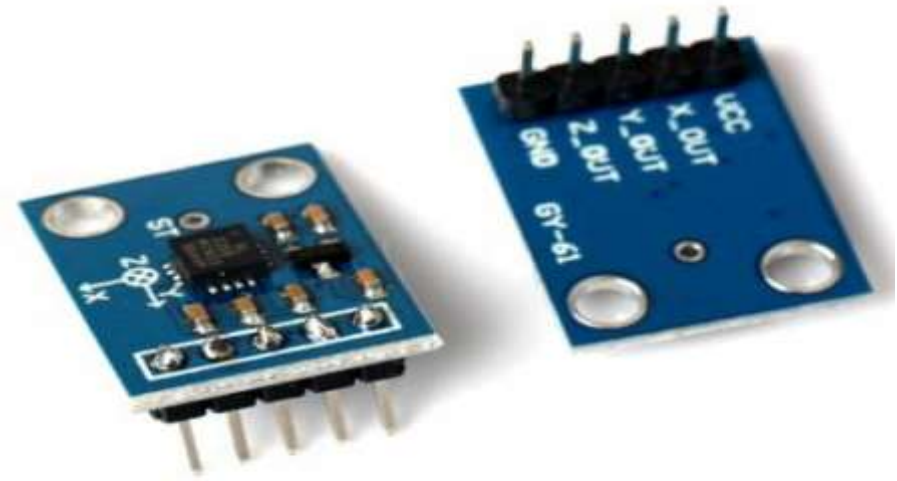
GY-61 DXL335 3-Axis Accelerometer Module is a three axis accelerometer sensor module based on ADXL335 integrated circuit. The ADXL335 is a triple axis accelerometer with extremely low noise and power consumption. The sensor has a full sensing range of +/-3g. It can measure the static acceleration of gravity in tilt-sensing applications, as well as dynamic acceleration resulting from motion, shock, or vibration.
There is an on-board 3.3V voltage regulator to power the ADXL335 so power provided should be between 3.3V and 6V DC.

Y-61 DXL335 3-Axis Accelerometer Module - General Specifications

- ADXL335 3-axis Accelerometer
- On-board 3.3V Voltage Regulator
- Analog voltage output centered at 1.65V
- Suitable for connection to 5V and 3.3V systems

GY-61 DXL335 3-Axis Accelerometer Module - Technical Specifications

- **Supply Voltage**: 3V - 5V
- **Full scale range**: +/-3g
- **Sensitivity**: 300mV/g (Typ)



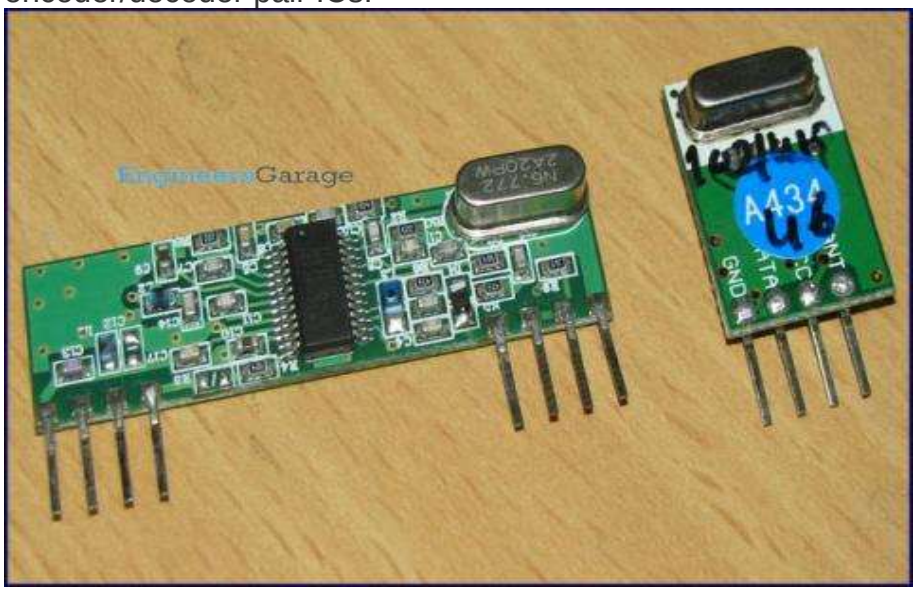
RF MODULE

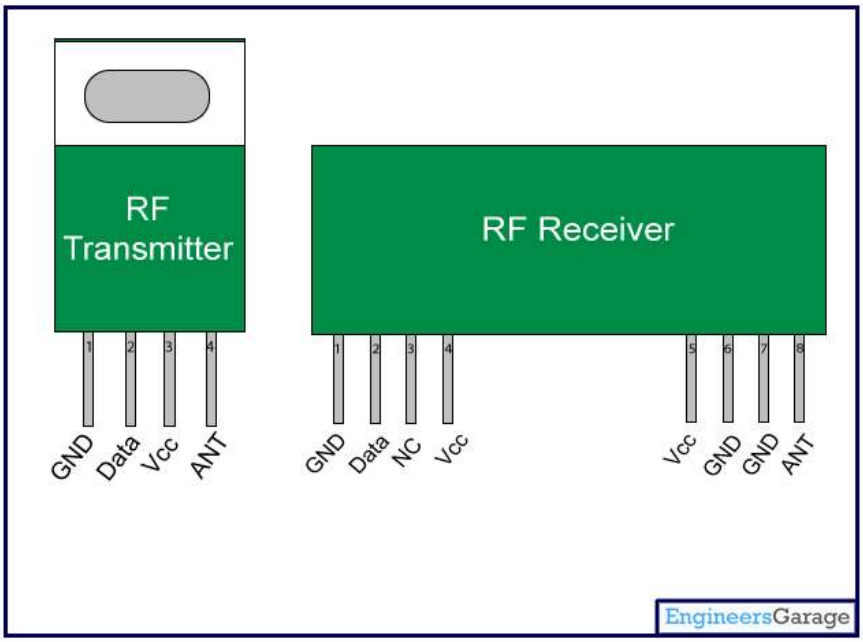
The RF module, as the name suggests, operates at Radio Frequency. The corresponding frequency range varies between 30 kHz & 300 GHz. In this RF system, the digital data is represented as variations in the amplitude of carrier wave. This kind of modulation is known as Amplitude Shift Keying (ASK).

Transmission through RF is better than IR (infrared) because of many reasons. Firstly, signals through RF can travel through larger distances making it suitable for long range applications. Also, while IR mostly operates in line-of-sight mode, RF signals can travel even when there is an obstruction between transmitter & receiver. Next, RF transmission is more strong and reliable than IR transmission. RF communication uses a specific frequency unlike IR signals which are affected by other IR emitting sources.

This **RF module** comprises of an **RF Transmitter** and an **RF Receiver**. The transmitter/receiver (Tx/Rx) pair operates at a frequency of **434 MHz**. An RF transmitter receives serial data and transmits it wirelessly through RF through its antenna connected at pin4. The transmission occurs at the rate of 1Kbps - 10Kbps.The transmitted data is received by an RF receiver operating at the same frequency as that of the transmitter.

The RF module is often used alongwith a pair of encoder/decoder. The encoder is used for encoding parallel data for transmission feed while reception is decoded by a decoder. HT12E-HT12D, HT640-HT648, etc. are some commonly used encoder/decoder pair ICs.





HT12E & HT12D ENCODER AND DECODER IC FOR RF MODULES

The HT 12E Encoder ICs are series of CMOS LSIs for Remote Control system applications. They are capable of Encoding 12 bit of information which consists of N address bits and 12-N data bits. Each address/data input is externally trinary programmable if bonded out.
The HT 12D ICs are series of CMOS LSIs for remote control system applications. This ICs are paired with each other. For proper operation a pair of encoder/decoder with the same number of address and data format should be selected. The Decoder receive the serial address and data from its corresponding decoder, transmitted by a carrier using an RF transmission medium and gives output to the output pins after processing the data.

Features

Encoder

- **18 PIN DIP**
- **Operating Voltage : 2.4V ~ 12V**
- **Low Power and High Noice Immunity CMOS Technology**
- **Low Standby Current and Minimum Transmission Word**
- **Built-in Oscillator needs only 5% Resistor**
- **Easy Interface with and RF or an Infrared transmission medium**
- **Miniml External Comonents**

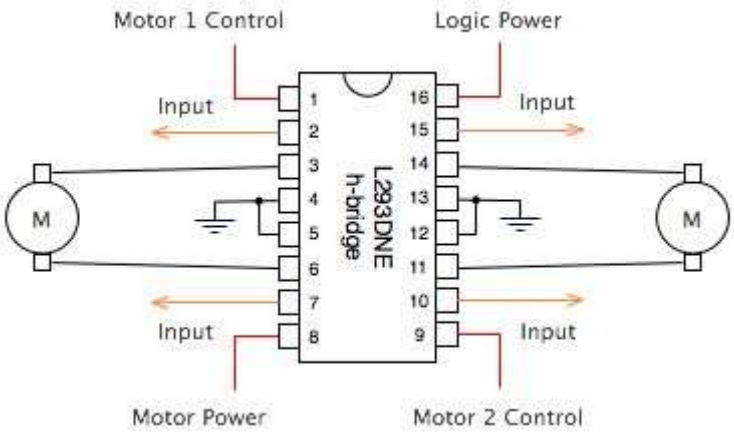
Decoder

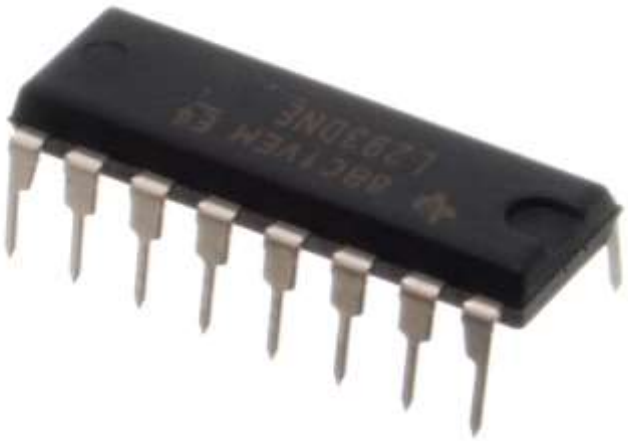
Applications

- **Burglar Alarm, Smoke Alarm, Fire Alarm, Car Alarm, Security System**
- **Garage Door and Car Door Controllers**
- **Cordless telephone**
- **Other Remote Control System**

L293DNE

1 Features 3 Description The L293 and L293D devices are quadruple high- 1• Wide Supply-Voltage Range: 4.5 V to 36 V current half-H drivers. The L293 is designed to • Separate Input-Logic Supply provide bidirectional drive currents of up to 1 A at • Internal ESD Protection voltages from 4.5 V to 36 V. The L293D is designed • High-Noise-Immunity Inputs to provide bidirectional drive currents of up to 600-mA at voltages from 4.5 V to 36 V. Both devices are • Output Current 1 A Per Channel (600 mA for designed to drive inductive loads such as relays, L293D) solenoids, DC and bipolar stepping motors, as well as • Peak Output Current 2 A Per Channel (1.2 A for other high-current/high-voltage loads in positiveL293D) supply applications. • Output Clamp Diodes for Inductive Transient Each output is a complete totem-pole drive circuit, Suppression (L293D) with a Darlington transistor sink and a pseudoDarlington source. Drivers are enabled in pairs, with 2 Applications drivers 1 and 2 enabled by 1,2EN and drivers 3 and 4 enabled by 3,4EN. • Stepper Motor Drivers • DC Motor Drivers The L293 and L293D are characterized for operation from 0°C to 70°C.





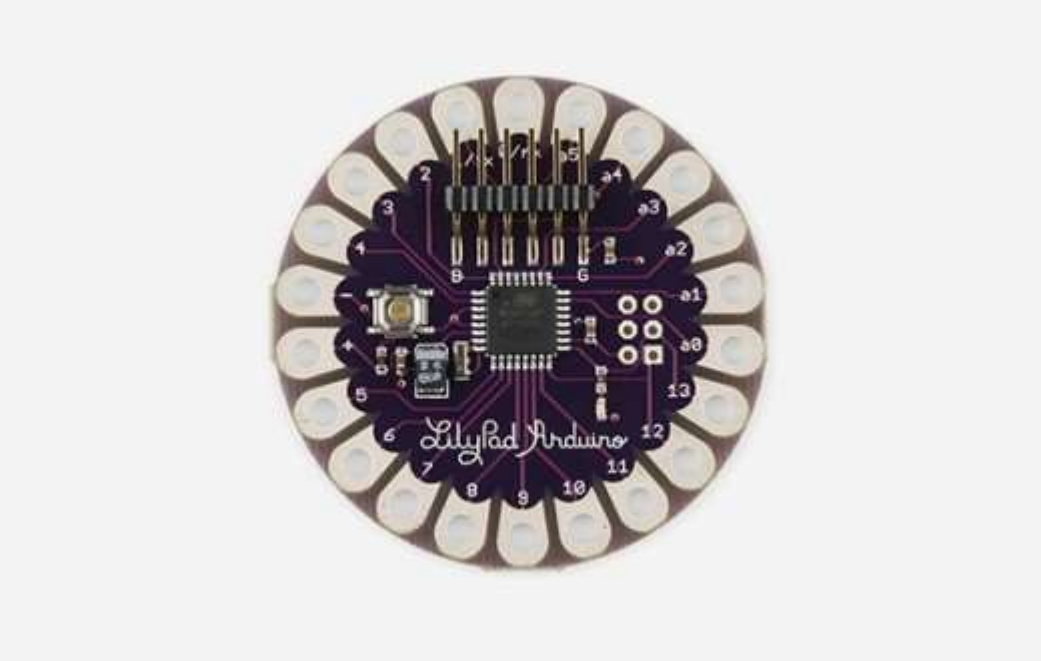
LilyPad Arduino

The LilyPad Arduino family of boards has been designed for wearable applications. It works on rechargeable batteries and allows easy connection with sensors and actuators developed for an easy integration in clothes and fabrics.

The LilyPad Arduino, LilyPad Arduino Simple and LilyPad Arduino Simple Snap are different from the usual Arduino boards because they need a

USB to Serial interface to be programmed. The Arduino USB 2 Serial interface is the one we recommend, but any standard FTDI compatible interface is suitable. The Arduino USB 2 Serial interface behaves as an Arduino UNO and shares the same drivers.

The LilyPad Arduino, LilyPad Arduino Simple and LilyPad Arduino Simple Snap are programmed using the Arduino Software (IDE), our Integrated Development Environment common to all our boards and running both online and offline.



CHAPTER 4

WORKING

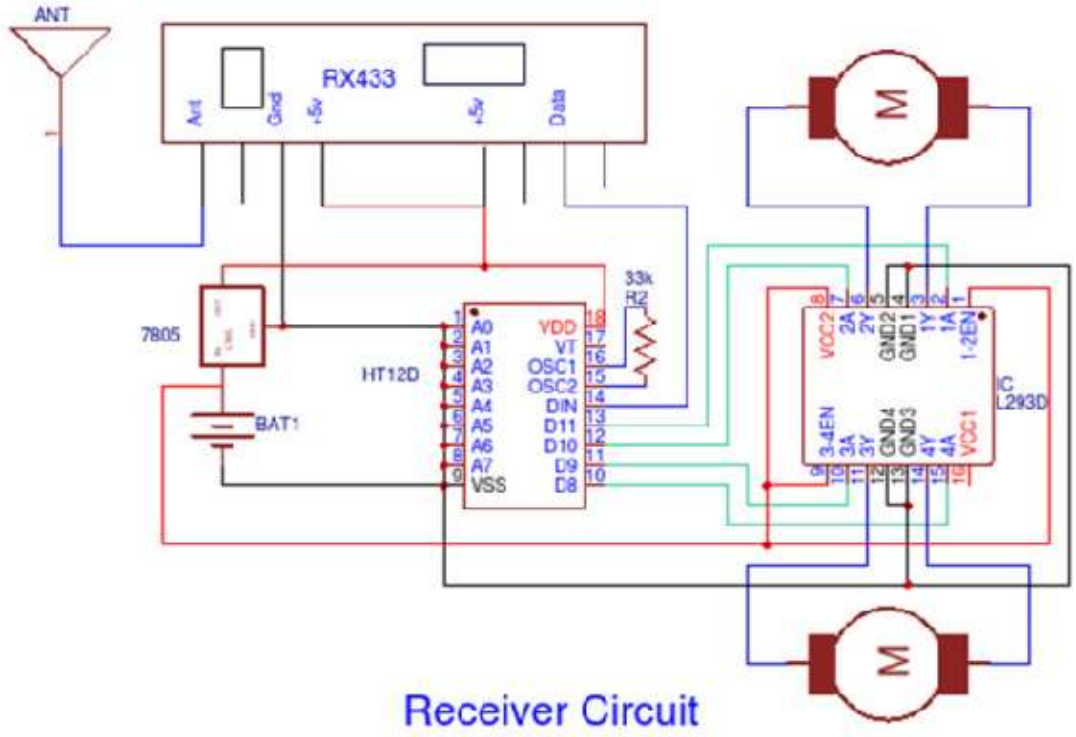
Circuit Diagram and Explanation

Gesture Controlled Robot is divided into two sections:

1. Transmitter part
2. Receiver part

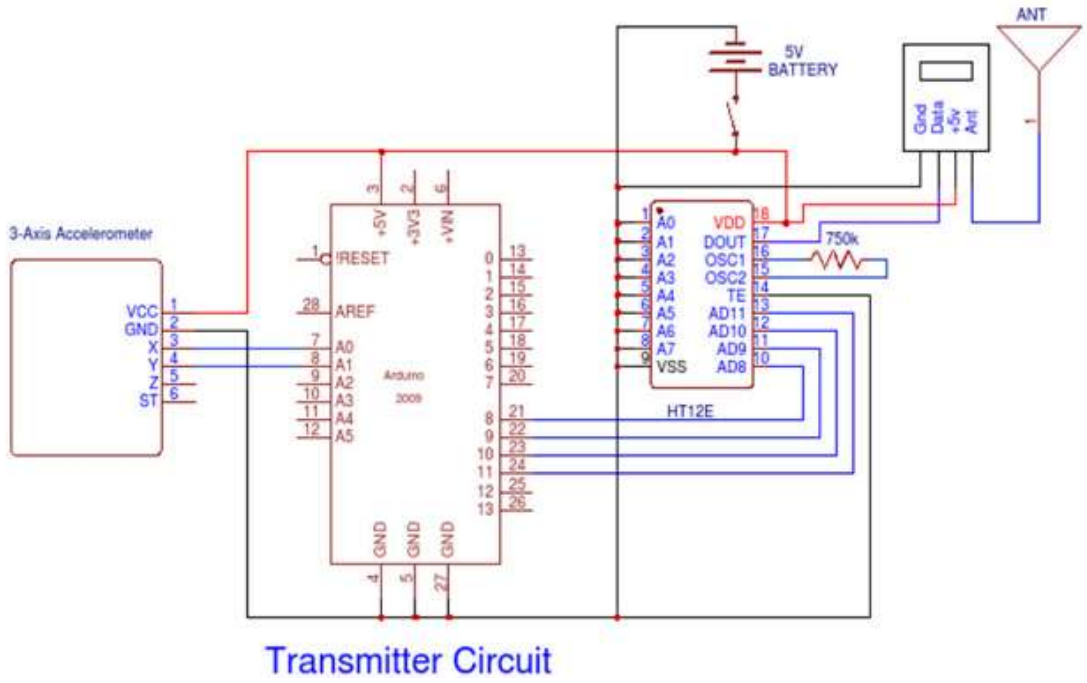
CIRCUIT DIAGRAM

1. RECEIVER



Receiver Circuit

2.TRANSMITTER



Transmitter Circuit

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

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

Working

Gesture controlled robot moves according to hand movement as we place transmitter in our hand. When we tilt hand in front side, robot start to moving forward and continues moving forward until next command is given.

When we tilt hand in backward side, robot change its state and start moving in backwards direction until other command is given.

When we tilt it in left side Robot get turn left till next command.

When we tilt hand in right side robot turned to right.

And for stopping robot we keeps hand in stable.

CHAPTER 5

ADVANTAGES:

Another big advantage of Arduino is its library of examples present inside the software of Arduino. I'll explain this advantage using an example ofvoltage measurement. For example if you want to measure voltage using ATmega8 micro-controller and want to display the output on computer screen then you have to go through the whole process. The process will start from learning the ADC's of micro-controller for measurement, went through the learning of serial communication for display and will end at USB - Serial converters.

Figure 1: Arduino IDE

The project is ready after putting some reasonable resistors and zener diode. You can easily see the voltage on the Serial terminal of Arduino.

3- Effortless functions:

During coding of Arduino, you will notice some functions which make the life so easy. Another advantage of Arduino is its automatic unit conversion capability. You can say that during debugging you don't have to worry about the units conversions. Just use your all force on the main parts of your projects. You don't have to worry about side problems.

4- Large community:

There are many forums present on the internet in which people are talking about the Arduino. Engineers, hobbyists and professionals are making their projects through Arduino. You can easily find help about everything. Moreover the Arduino website itself explains each and every functions of Arduino.

So, We should conclude the advantage of Arduino by saying that during working on different projects you just have to worry about your innovative idea. The remaining will handle by Arduino itself

Disadvantages:

1- Structure:

Yes, the structure of Arduino is its disadvantage as well. During building a project you have to make its size as small as possible. But with the big structures ofArduino we have to stick with big sized PCB's. If you are working on a small micro-controller like ATmega8 you can easily make your PCB as small as possible.

2- Cost:

The most important factor which you cannot deny is cost. This is the problem which every hobbyist, Engineer or Professional has to face. Now, we must consider that the Arduino is cost effective or not.

Some years' ago I was working on a project in which I had to build three smart energy meters. Now, for three smart energy meters present at some distance connected with different loads must have their own processors. So, I estimated my expenditures with and without the Arduino which you can see in the block diagram present below.

Note: *I took cost of all products from Amazon with shipping charges. There may be some difference of cost in your area.*

Figure 2: Cost Comparison of Arduino and ATmega

The thing must be noted that I multiplied Atmel Programmer with 1 because we don't need many programmers for all the micro- controllers. Only one programmer is enough. The difference between the costs is mainly due to this programmer reason. Still if you need one package then the cost difference will be as less as nearly $5 and it will rise when you have to use many packages.

3- Easy to use:

In my opinion, if you started your journey of micro-controllers with Arduino then it will be very difficult for you to make the complex intelligent circuitries in future. The easy to use hardware/software of Arduino unable a person to learn the basics of many things likes Serial communication, ADC, I2C etc.

CHAPTER 6

MORE FEATURES OF ARDUINO LILYPAD:

Wearable Arduinos

The e-textiles segment of the Arduino market is ruled by LilyPads. These are identifiable as unique purple, flowery-looking, circular boards. The pins on LilyPads are called “petals”, they have bigger holes and copper filled to the edge of the board. These are designed so conductive thread can be sewn through the holes, and make electrical contact with the exposed copper on the petal.

LilyPads are great for e-texitles – projects which combine electronics and fabric wizardy. They can be used to make nifty talking aprons, dice gauntlets, or more simple trinkets like light-up firefly jars.

CHAPTER 7

CONCLUSION

We have successfully created the circuit for a gesture controlled car which is in working condition . The car has been tried and tested for it's range of transmission and reception of the signal.

The test has been very successful as the range is large .The motion of the car indicates that circuit is in working condition.

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