

# **RF Flex Sensor Robot**

# Overview

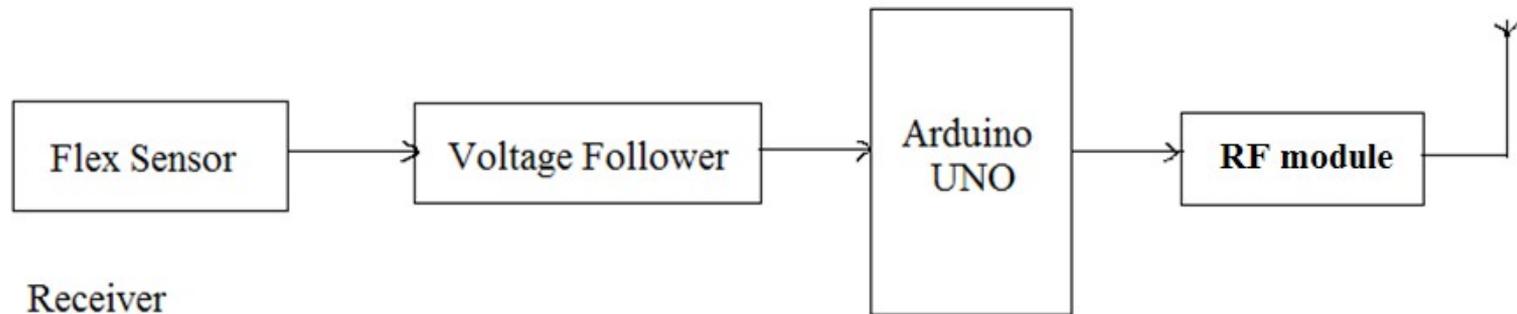
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# Introduction

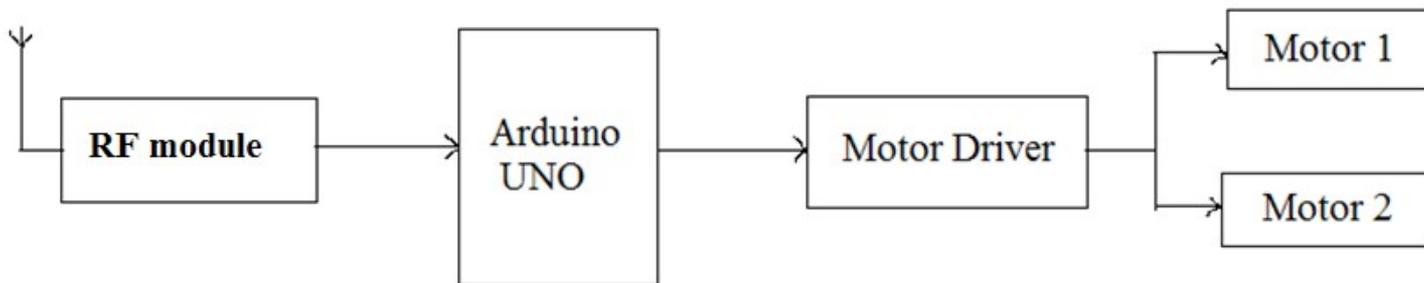
- A gesture controlled robot is a kind of robot which can be controlled by your hand gesture
- User uses a flex sensor attached to the fingers of a hand glove
- The gesture is used to control the movements of two motors
- RF robots are controlled wirelessly at a frequency of 434 MHz

# Block Diagram

Transmitter



Receiver



# Hardware Requirements

- Microcontroller board – Arduino Uno
- RF transmitter TLP434A with encoder HT12E
- RF receiver RLP434A with decoder HT12D
- Flex Sensor
- Motor driver IC
- DC Motor
- Power Supply

# Arduino Uno Features

- ATmega328P microcontroller
- Input voltage - 7-12V
- 14 Digital I/O Pins (6 PWM outputs)
- 6 Analog Inputs
- 32k Flash Memory
- 16Mhz Clock Speed



# ATmega328P

- 8-bit microcontroller
- 8KB ROM
- 256 bytes RAM
- 3 timers
- 32 I/O pins
- 1 serial port
- 8 interrupt sources

# RF transmitter TLP434A with encoder HT12E



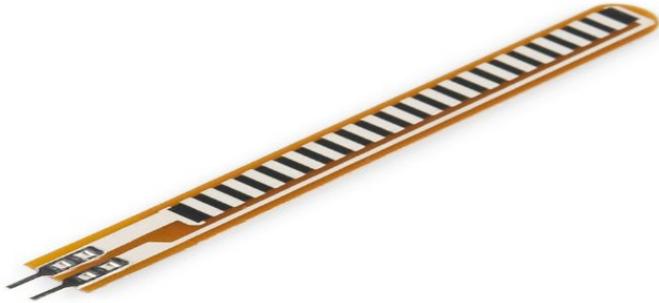
- Uses ASK (Amplitude Shift Keying) modulation
- HT12E converts the parallel inputs into serial output.
- Active low transmission enable

# RF receiver RLP434A with decoder HT12D



- Uses ASK demodulation
- The chosen pair of encoder/decoder should have same number of addresses and data format.
- HT12D converts the serial input into parallel outputs.

# Flex Sensor

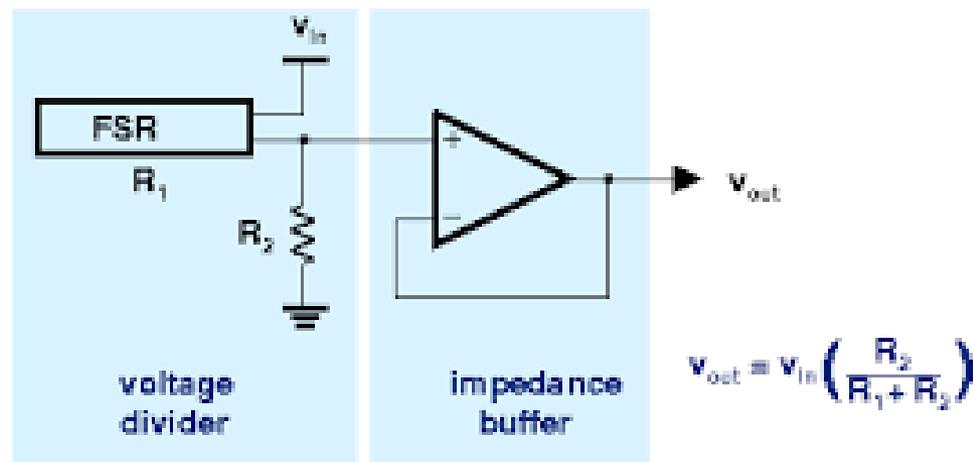


- A flex sensor changes its output when it is bent or when force is applied on it
- The sensor has two output wires
- The resistance between these two wires varies when the sensor is bent or when subjected to a force
- They convert the change in bend to resistance
- The more the bend more the resistance value

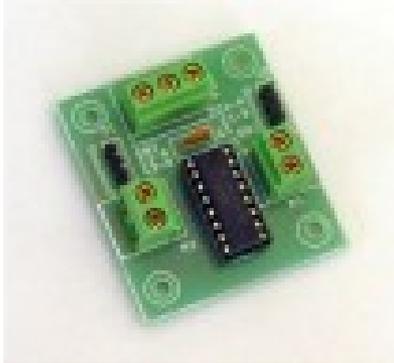
# Voltage Follower

- To avoid loading effect and isolate the output from the signal source, voltage follower or impedance buffer is used with flex sensor

## Basic flex sensor circuit



# Motor Driver IC



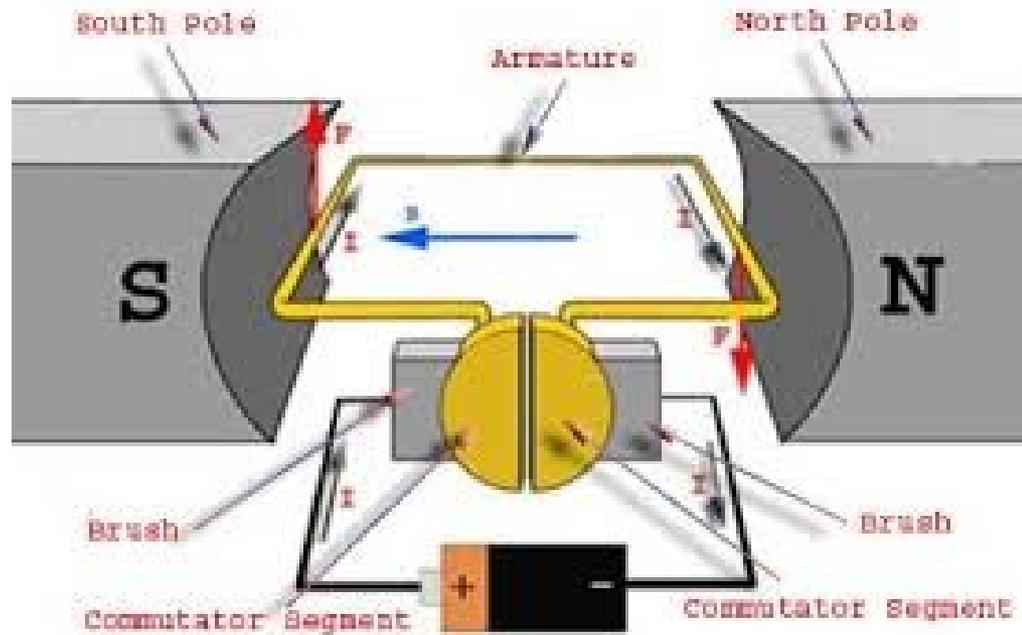
- This Motor Driver Board is designed to work with L293D IC.
- This can control 2 DC Motors, their direction using control lines and their speed using PWM.

# DC Motor

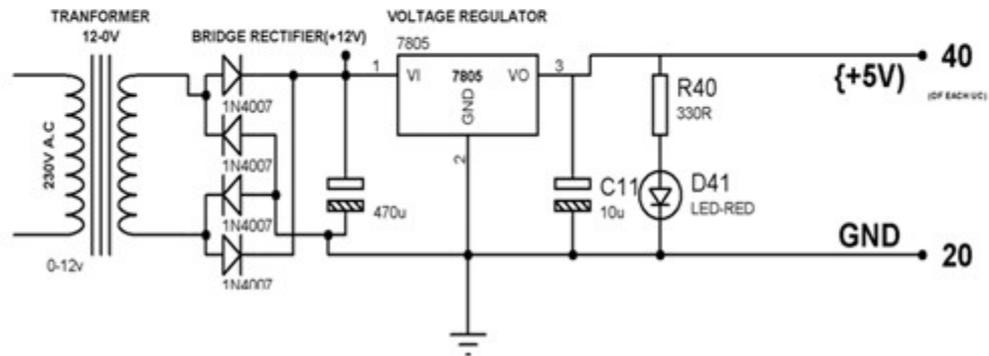
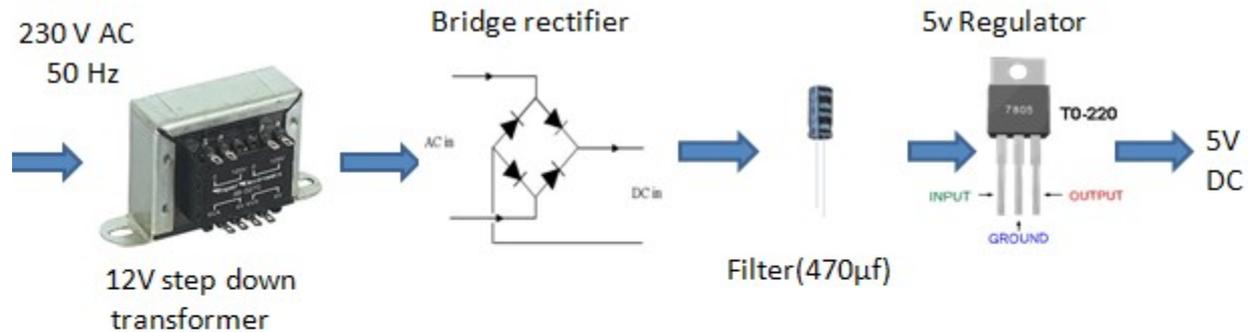


- Converts direct current electrical power into mechanical power
- The very basic construction of a dc motor contains a current carrying armature which is connected to the supply end through commutator segments and brushes are placed within the north south poles of a permanent or an electro-magnet

# DC Motor - Construction



# Power Supply



# Software requirements

- Tool  
  Arduino IDE
  
- Programming languages used  
  Embedded C/C++

# Advantages

- Code compatibility and expandability across different Arduino boards
- Cost is less as Arduino is open source
- The schematic of Arduino is open source. So for future enhancement of the project the board can be extended to add more hardware features
- Advantage of RF over IR is the wide range of control possible

# Conclusion

- RF based hand gesture recognition robot using flex sensor has been designed
- RF uses frequency of 434 MHz

# References

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