MEMS BASED HAND MOTION ROBOTIC VEHICLE WITH RF

AIM:

Design and Development of MEMS Based Hand motion robotic vehicle with RF.

PURPOSE:

Robotic Applications are widely used in various sectors like industrial, home and manufacturing. There are different ways to control robots like RF, Zigbee, IR and wired communication. It is very convenient for user when we combine multiple technologies to each other. Here we integrate RF and MEMS together to control robot. We are using Accelerometer (MEMS) that can detect gestures based on hand moments. Here project title is MEMS based hand motion robotic vehicle with RF using Arduino.

DESCRIPTION:

Here there are two sections, one is transmitter and other is receiver. Transmitter side - Arduino interfaced with MEMS sensor (ADXL345/335 – Accelerometer) and RF transmitter. Receiver side – Arduino interfaced with L293D and RF receiver.

WORKING:

MEMS sensor (ADXL345/335 - Accelerometer) can detect gestures of hand when it was placed on hand. When hand moves in directions like front, back, left and right, MEMS sensor generates X, Y values and send to Arduino. Based on these values Arduino generates RF codes with 4 bit data and transmit to RF transmitter (433Mhz). RF receiver receives data and transmits to Arduino. Based on these commands Arduino gives signals to L293D and motors will be controlled accordingly. Finally robot moves based on these commands.

TECHNICAL SPECIFICATIONS:

HARDWARE:

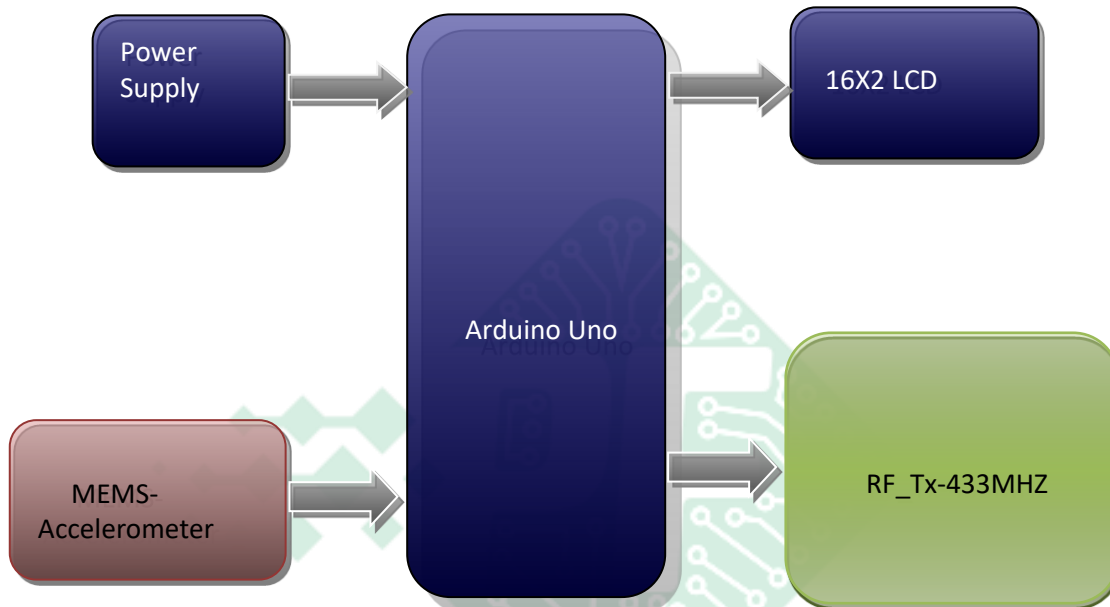|		
Microcontroller	:	Arduino Uno
Crystal	:	16 MHz
LCD	:	16X2 LCD
Wireless Module	:	433MHz
H-Bridge	:	L293D
Motor	:	12V DC Gear Type
Accelerometer (MEMS)	:	ADXL 345/335
Power Source	:	12v 1 amp DC Adaptor and Battery

SOFTWARE:

Arduino IDE

Proteus based circuit diagram
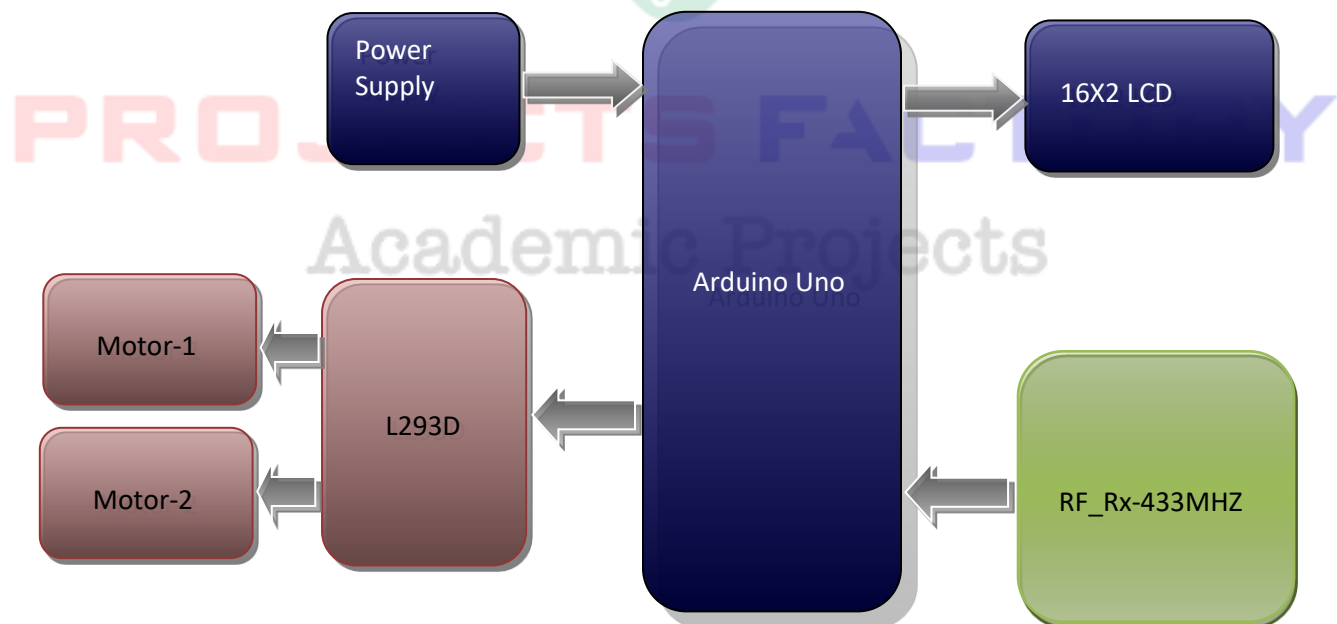
APPLICATIONS:

- ➢ Robotic Applications
- ➢ Gesture Based Applications
- ➢ Accelerometer (MEMS) based Applications
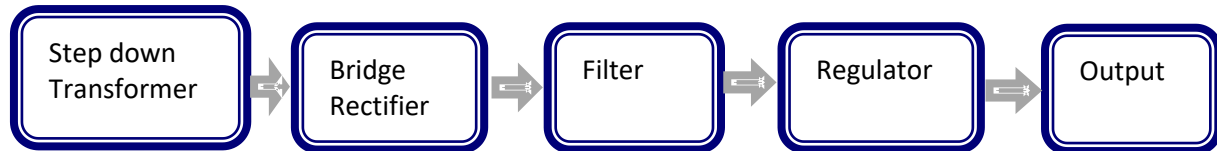- ➢ Wireless communication

BLOCK DIAGRAM:

Transmitter Section:

```
┌──────────┐         ┌─────────────┐         ┌──────────┐
│  Power   │────────▶│             │────────▶│ 16X2 LCD │
│  Supply  │         │             │         └──────────┘
└──────────┘         │             │
                     │ Arduino Uno │
                     │             │
┌──────────────┐     │             │         ┌──────────────┐
│    MEMS-     │────▶│             │────────▶│ RF_Tx-433MHZ │
│ Accelerometer│     │             │         └──────────────┘
└──────────────┘     └─────────────┘
```

Receiver Section:

```
              ┌──────────┐     ┌─────────────┐     ┌──────────┐
              │  Power   │────▶│             │────▶│ 16X2 LCD │
              │  Supply  │     │             │     └──────────┘
              └──────────┘     │             │
                               │ Arduino Uno │
┌─────────┐   ┌───────┐        │             │
│ Motor-1 │◀──│       │        │             │
└─────────┘   │       │◀───────│             │
              │ L293D │        │             │     ┌──────────────┐
┌─────────┐   │       │        │             │◀────│ RF_Rx-433MHZ │
│ Motor-2 │◀──│       │        └─────────────┘     └──────────────┘
└─────────┘   └───────┘
```

POWER SUPPLY BLOCKDIAGRAM:

Step down Transformer → Bridge Rectifier → Filter → Regulator → Output

INTERFACES COVERD:

- We have covered RF module 433MHz module interface
- MEMS accelerometer (ADXL335/345)
- Robotic Structure control (L293D and DC gear motors)