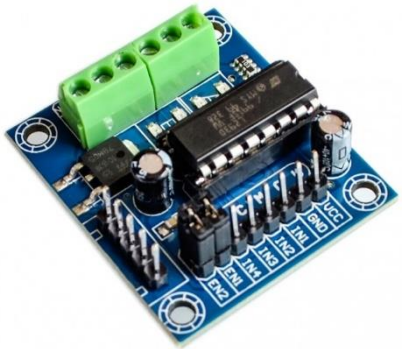
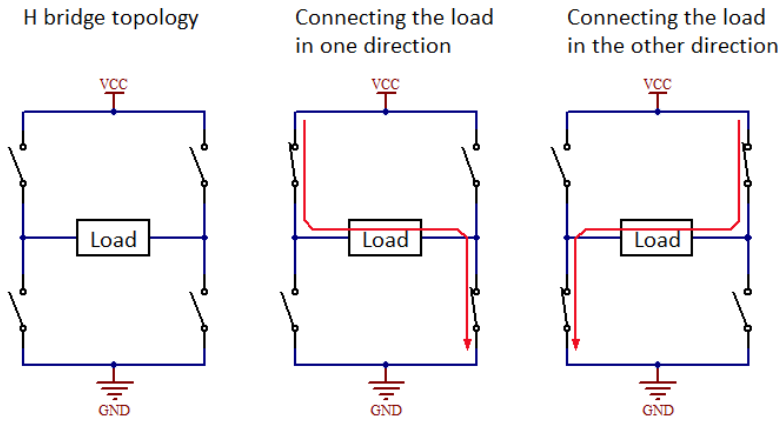
Motor Drive System:

- This section is responsible for connecting and programing the motor drive for controlling of motion for the smart farm robot.
- The system main component is the H-bridge used for controlling speed of the motors as well as their direction.
- The mechanism is based on synchronization of the wheels' motors where when all wheels move in same direction the robot moves in linear motion and when right or left motors move in opposite directions the robot moves in angular motion.

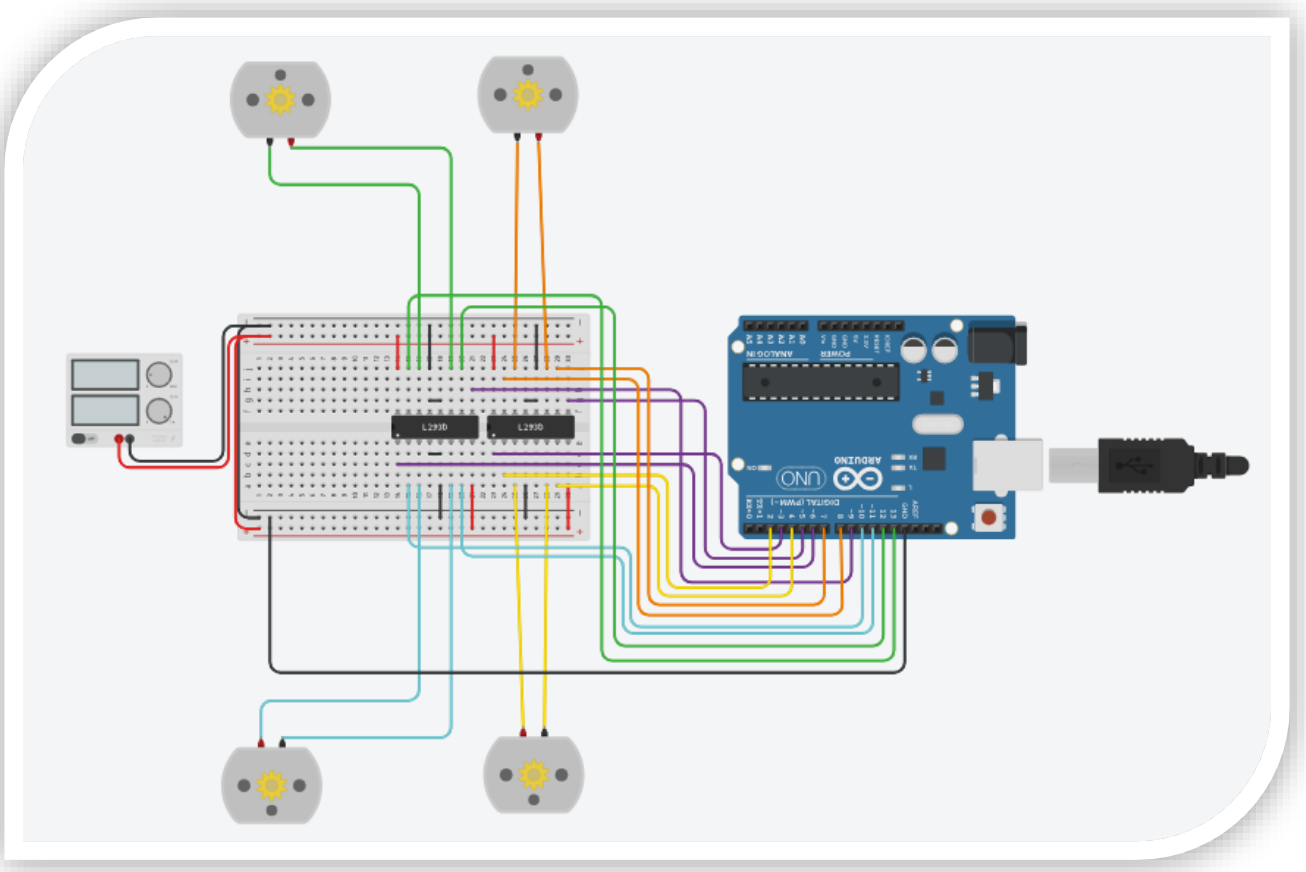


- The system uses H-bridge model L293D which has 4 channels, 2 for each motor.
- Each motor is connected to 2 output channels while 2 input pins are connected to the microcontroller. And 2 enable pins for controlling the speed of the rotation
- The model concept works on the H-bridge which reversed the direction by reversing the connection of a 4 connected transistors for each motor.



Components:

- The L293D module has:
  - 4 output pins (2pins for each motor)
  - 4 input pins
  - 2 enable pins (for controlling the speed of each motor)
  - 2 power pins
  - 4 ground pins
- 4 Dc motors
- 5v power supply
- Arduino board or similar development boards
- Bread board
- Some jumper wires



Coding:

```
//Pin configuration
//Motor1
#define En1 3
#define IN1 2
#define IN2 4

//Motor2
#define En2 5
#define IN3 7
#define IN4 8

//Motor3
#define En3 6
#define IN5 10
#define IN6 11

//Motor4
#define En4 9
#define IN7 12
#define IN8 13

//Pins setup
void setup()
{
 for(char i=2;i<=13;i++)
   pinMode(i,OUTPUT);
}
```

```
//Code Execution for motor control "will be changed"
void loop()
{
 Forward(1);
 delay(3000);
 Left(1);
 delay(3000);
 Backward(1);
 delay(3000);
}

//Backward motion
void Backward(char speed)
{
 digitalWrite(IN1, HIGH);
 digitalWrite(IN2, LOW);
 analogWrite(En1, speed);
 digitalWrite(IN3, HIGH);
 digitalWrite(IN4, LOW);
 analogWrite(En2, speed);
 digitalWrite(IN5, HIGH);
 digitalWrite(IN6, LOW);
 analogWrite(En3, speed);
 digitalWrite(IN7, HIGH);
 digitalWrite(IN8, LOW);
 analogWrite(En4, speed);
}
```

```
//Forward motion
void Forward(char speed)
{
 digitalWrite(IN1, LOW);
 digitalWrite(IN2, HIGH);
 analogWrite(En1, speed);
 digitalWrite(IN3, LOW);
 digitalWrite(IN4, HIGH);
 analogWrite(En2, speed);
 digitalWrite(IN5, LOW);
 digitalWrite(IN6, HIGH);
 analogWrite(En3, speed);
 digitalWrite(IN7, LOW);
 digitalWrite(IN8, HIGH);
 analogWrite(En4, speed);
}

//Left motion
void Left(char speed)
{
 digitalWrite(IN1, LOW);
 digitalWrite(IN2, HIGH);
 analogWrite(En1, speed);
 digitalWrite(IN3, HIGH);
 digitalWrite(IN4, LOW);
 analogWrite(En2, speed);
 digitalWrite(IN5, LOW);
 digitalWrite(IN6, HIGH);
 analogWrite(En3, speed);
 digitalWrite(IN7, HIGH);
 digitalWrite(IN8, LOW);
 analogWrite(En4, speed);
}

//Right motion
void Right(char speed)
{
 digitalWrite(IN1, HIGH);
 digitalWrite(IN2, LOW);
 analogWrite(En1, speed);
 digitalWrite(IN3, LOW);
 digitalWrite(IN4, HIGH);
 analogWrite(En2, speed);
 digitalWrite(IN5, HIGH);
 digitalWrite(IN6, LOW);
 analogWrite(En3, speed);
 digitalWrite(IN7, LOW);
 digitalWrite(IN8, HIGH);
 analogWrite(En4, speed);
}
```