Maze Runner : hands-on

The problem statement:

Build an autonomous robot that can traverse a maze with help from IR communication and wall following.

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The task:

Build an autonomous robot that can:

+ Traverse the maze by following walls using IR proximity / Ultrasound sensors.

+ Communicate with the maze using IR remote control protocol and follow the directions given. In case of dead ends, return and take the other path.
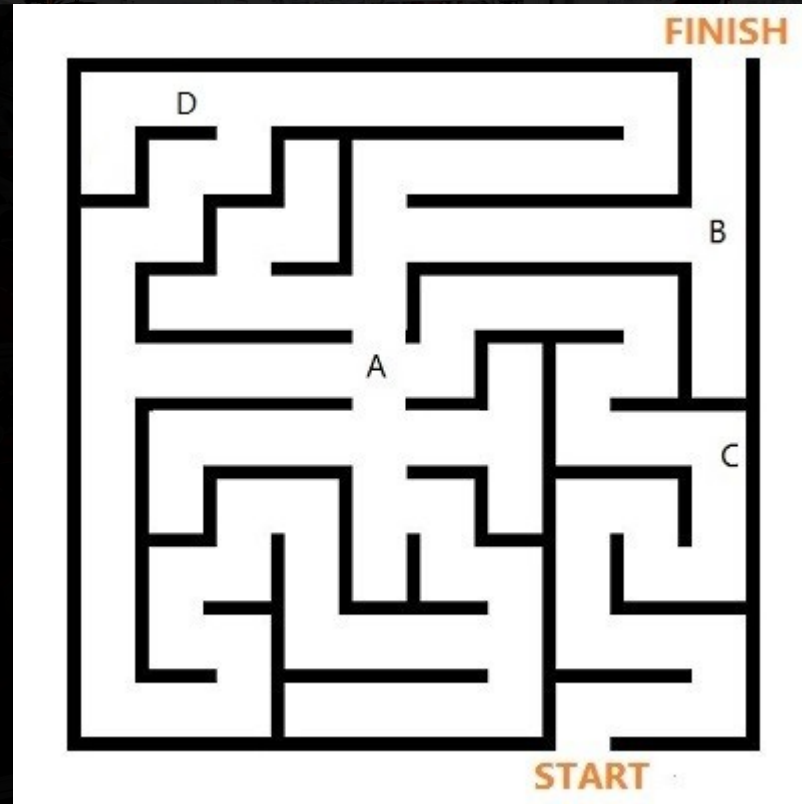
And finally,

+ Reach the exit of the maze before time runs out.

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Arena:

How much do you guys remember?

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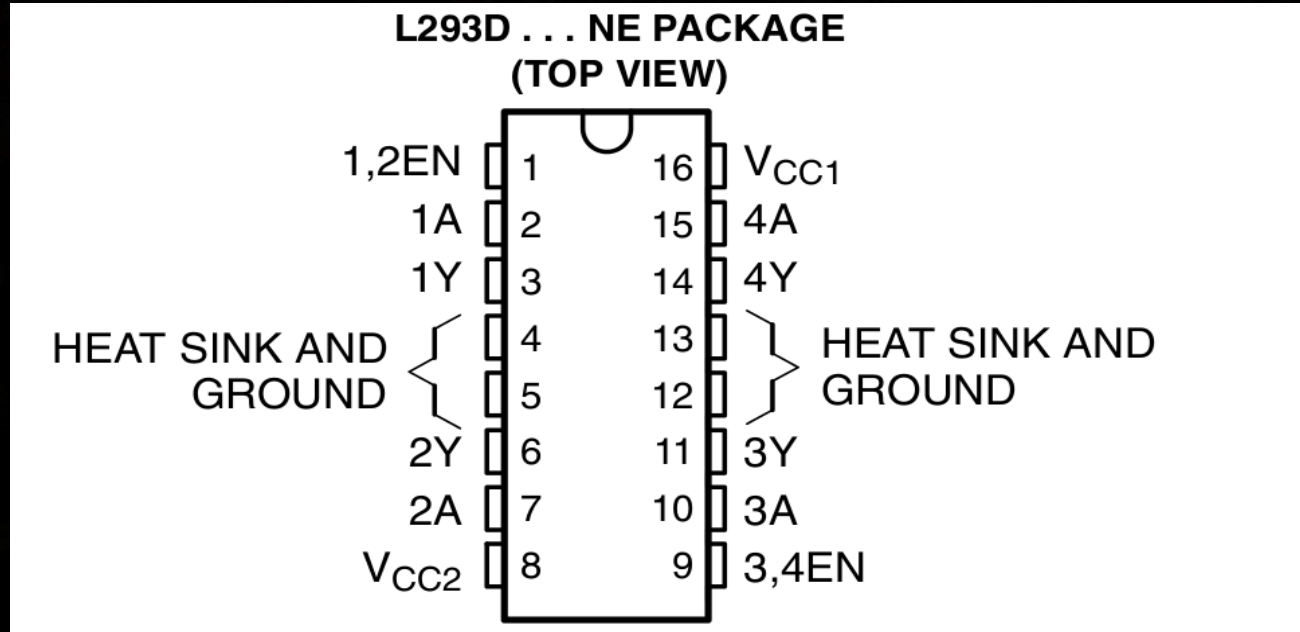## #1/ Connecting the Motor driver:

What is a motor driver?
Basically it is a power amplifier. It converts the 5V output of the arduino board to a 12V output required by the motors to run at max power.

What is the preferred motor driver you should use?

L293d

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#1/ Connecting the Motor driver:

L293D . . . NE PACKAGE
(TOP VIEW)

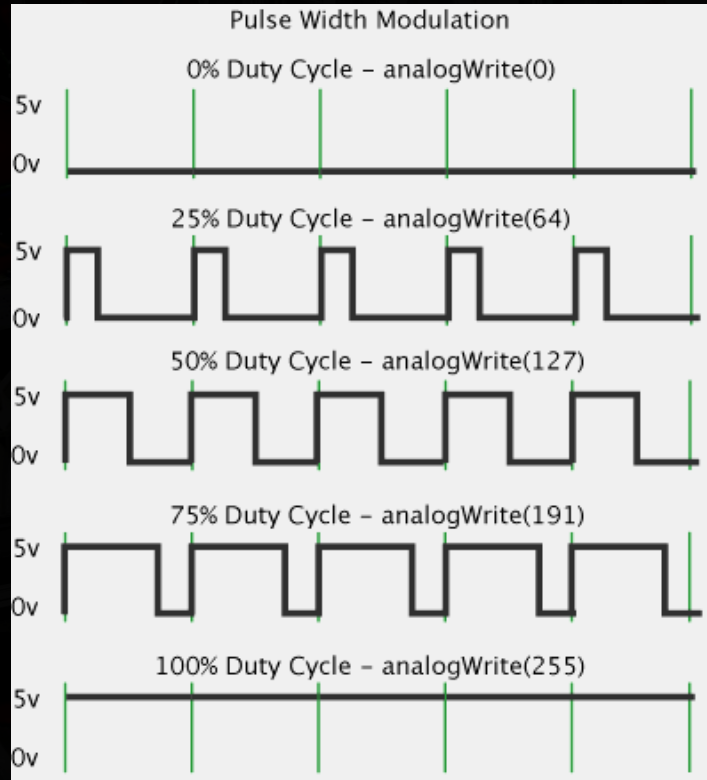|		
1,2EN	1	16 V_{CC1}
1A	2	15 4A
1Y	3	14 4Y
HEAT SINK AND GROUND	4	13 HEAT SINK AND GROUND
	5	12
2Y	6	11 3Y
2A	7	10 3A
V_{CC2}	8	9 3,4EN

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#2/ Speed control using pwm:

What is pwm?
PWM means Pulse Width Modulation. Micro-controllers are digital devices. They cannot produce analog output. In order to produce a range of voltage outputs it uses pwm. What basically happens is instead of giving a continuous high output, it breaks the pulse into several pulse whose width can be varied Depending on the pulse width the average voltage is determined. Using pwm the voltage range (0-5V) is divided into 256 levels in an arduino.

#2/ Speed control using pwm:

What is pwm?

Pulse Width Modulation

0% Duty Cycle – analogWrite(0)

25% Duty Cycle – analogWrite(64)

50% Duty Cycle – analogWrite(127)

75% Duty Cycle – analogWrite(191)

100% Duty Cycle – analogWrite(255)

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#2/ Speed control using pwm:

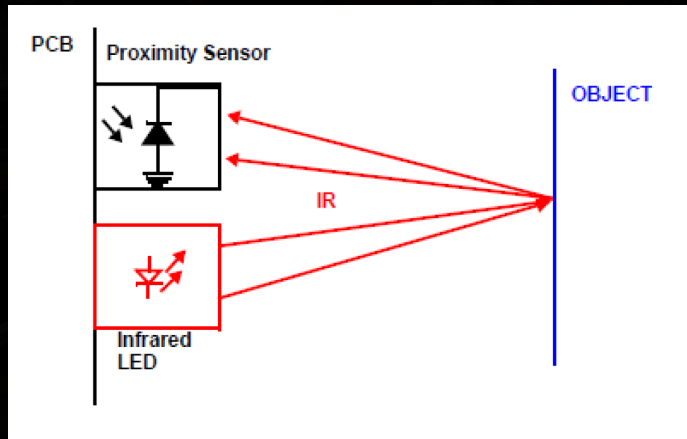**What is arduino function to use for pwm?**

```
analogWrite(pin, power);
```

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#3/ Using a proximity sensor:

What is a proximity sensor?
It is a IR (Infra Red) sensor that detects the presence of any nearby objects.

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#3/ Using a proximity sensor:

How to read from a proximity sensor?

```
int sensor;
sensor =  digitalRead(pin);
```

OR

```
int sensor;
sensor = analogRead(analogpin);
```

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#4/ Using a ultra sound sensor:
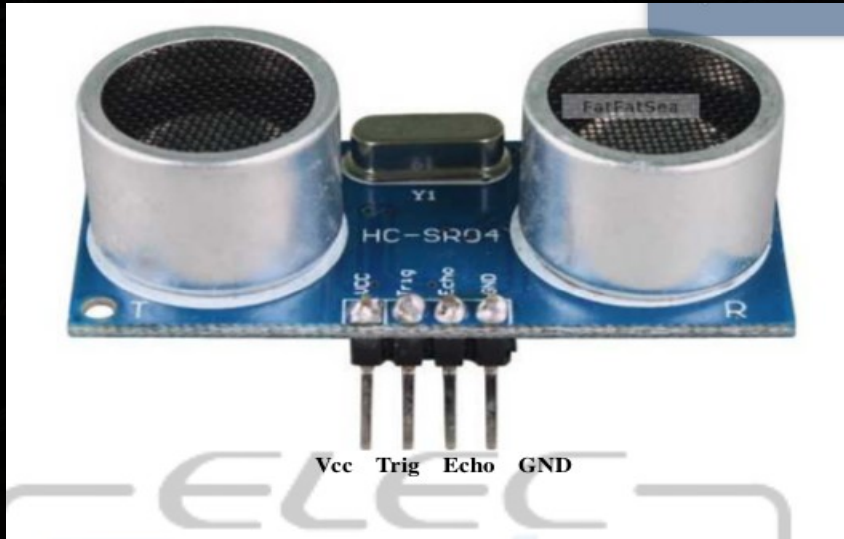
What is a ultra sound sensor?

Ever heard about sonar? Do you know how dolphins find their way inside the water? Well its using ultra high frequency sound which is in audible to human ear. The Ultra Sound sensor uses the same method to calculate the distance from a nearby object.

#4/ Using a ultra sound sensor:

What is a ultra sound sensor?

Vcc   Trig   Echo   GND

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#4/ Using a ultra sound sensor:

How to read from a ultra sound sensor?

```
const double cmsPerMS = 33.205;
digitalWrite(TRIGGER_PIN, HIGH);
delay(1);
digitalWrite(TRIGGER_PIN, LOW);
double Distance = (pulseIn(ECHO_PIN, HIGH, 50000))*cmsPerMS/2000;
```
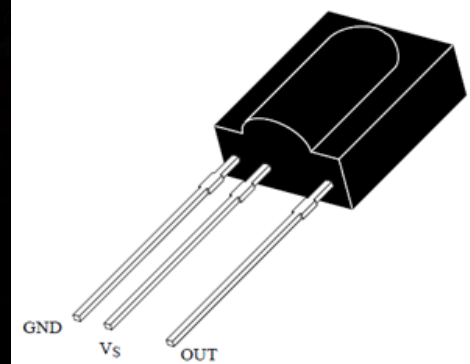
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#5/ Reading IR remote signal:

What sensor to use?

TSOP 1738

#5/ Reading IR remote signal:

How it works?

The remotes we use send out 16bit binary codes. We will be providing the direction using the same method.

You can read the codes using the TSOP sensor.

How to read from TSOP?

Using the library provided

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#5/ Reading IR remote signal:

```
#include <IRremote.h>
int RECV_PIN = 11;
IRrecv irrecv(RECV_PIN);
decode_results results;
void setup()
{
  irrecv.enableIRIn(); // Start the receiver
}
void loop() {
  if (irrecv.decode(&results)) {
    // do someting with the result
    irrecv.resume(); // Receive the next value
  }
}
```