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# **BRUTE FORCE**

— **ELECTRONICS-PROGRAMMING-ROBOTICS** —

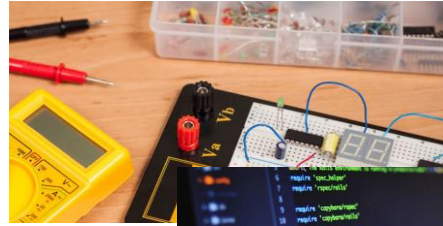
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**BRUTE FORCE**

# Course Overview

- Week 1 – Electronics
- Week 2 – Programming
- Week 3 – Arduino
- Week 4 – Robotics



An Introduction to the Arduino



# Tutorial 2

## Robot Motion Control

# Focus

- Robot controlling
- Forward and reverse directions
- Turning left and right
- Speed control
- Creating and calling functions





# Forward and Reverse

- Robots need to be controlled to go forward and go backward.
- This will be done in the code.
- We shall build up on the previous program
- We shall use the driver to drive motors for the forward direction and then the backward direction separately.
- The code is as follows...



# Code

```
sketch_jun29a $
```

```
int ENA=9;
int in1=11;
int in2=10;
int ENB=6;
int in3=3;
int in4=4;

void setup() {
  pinMode (ENA, OUTPUT);
  pinMode (in1, OUTPUT);
  pinMode (in2, OUTPUT);
  pinMode (ENB, OUTPUT);
  pinMode (in3, OUTPUT);
  pinMode (in4, OUTPUT);
}
```

```
}

void loop() {
  digitalWrite (ENA, HIGH);
  digitalWrite (in1, LOW);
  digitalWrite (in2, HIGH);
  digitalWrite (ENB, HIGH);
  digitalWrite (in3, HIGH);
  digitalWrite (in4, LOW);

  digitalWrite (ENA, HIGH);
  digitalWrite (in1, HIGH);
  digitalWrite (in2, LOW);
  digitalWrite (ENB, HIGH);
  digitalWrite (in3, LOW);
  digitalWrite (in4, HIGH);
}
```

# Turning right and left

- In order for the robot to turn either left or right, the wheels are to rotate in different directions.
- Here we shall do the turnings separately as well



# Code for turnings

r

```
void loop() {  
    digitalWrite (ENA, HIGH);  
    digitalWrite (in1, LOW);  
    digitalWrite (in2, HIGH);  
    digitalWrite (ENB, HIGH);  
    digitalWrite (in3, LOW);  
    digitalWrite (in4, HIGH);  
  
    digitalWrite (ENA, HIGH);  
    digitalWrite (in1, HIGH);  
    digitalWrite (in2, LOW);  
    digitalWrite (ENB, HIGH);  
    digitalWrite (in3, HIGH);  
    digitalWrite (in4, LOW);  
}
```

# Combining

- Now we shall create a program that combines all of the above.
- The robot must go forward, then backward, turn right and also turn left.
- We shall do this by a system of functions and delays.
- Functions can be created above the “void setup” or below the “void loop”



# Stop function

sketch\_jun29b §

```
void stop_fn(){  
  digitalWrite (ENA, LOW);  
  digitalWrite (in1, LOW);  
  digitalWrite (in2, LOW);  
  digitalWrite (ENB, LOW);  
  digitalWrite (in3, LOW);  
  digitalWrite (in4, LOW);  
}
```



# Forward and reverse functions

sketch\_jun29b \$

```
void forward() {  
    digitalWrite (ENA, HIGH);  
    digitalWrite (in1, LOW);  
    digitalWrite (in2, HIGH);  
    digitalWrite (ENB, HIGH);  
    digitalWrite (in3, HIGH);  
    digitalWrite (in4, LOW);  
}
```

sketch\_jun29b \$

```
void reverse() {  
    digitalWrite (ENA, HIGH);  
    digitalWrite (in1, HIGH);  
    digitalWrite (in2, LOW);  
    digitalWrite (ENB, HIGH);  
    digitalWrite (in3, LOW);  
    digitalWrite (in4, HIGH);  
}
```

# Left and right functions

```
void left1(){  
    digitalWrite (ENA, HIGH);  
    digitalWrite (in1, LOW);  
    digitalWrite (in2, HIGH);  
    digitalWrite (ENB, HIGH);  
    digitalWrite (in3, LOW);  
    digitalWrite (in4, HIGH);  
}
```

sketch\_jun29b \$

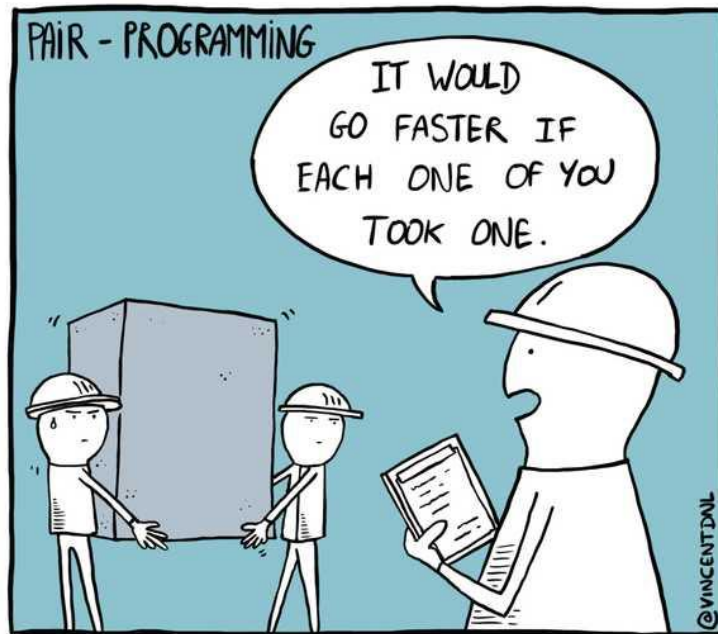
```
void right(){  
    digitalWrite (ENA, HIGH);  
    digitalWrite (in1, HIGH);  
    digitalWrite (in2, LOW);  
    digitalWrite (ENB, HIGH);  
    digitalWrite (in3, HIGH);  
    digitalWrite (in4, LOW);  
}
```

# Calling the functions

## .The functions

sketch\_jun29b \$

```
void loop() {  
  forward();  
  stop_fn();  
  reverse();  
  stop_fn();  
  left1();  
  stop_fn();  
  right();  
  stop_fn();  
}
```

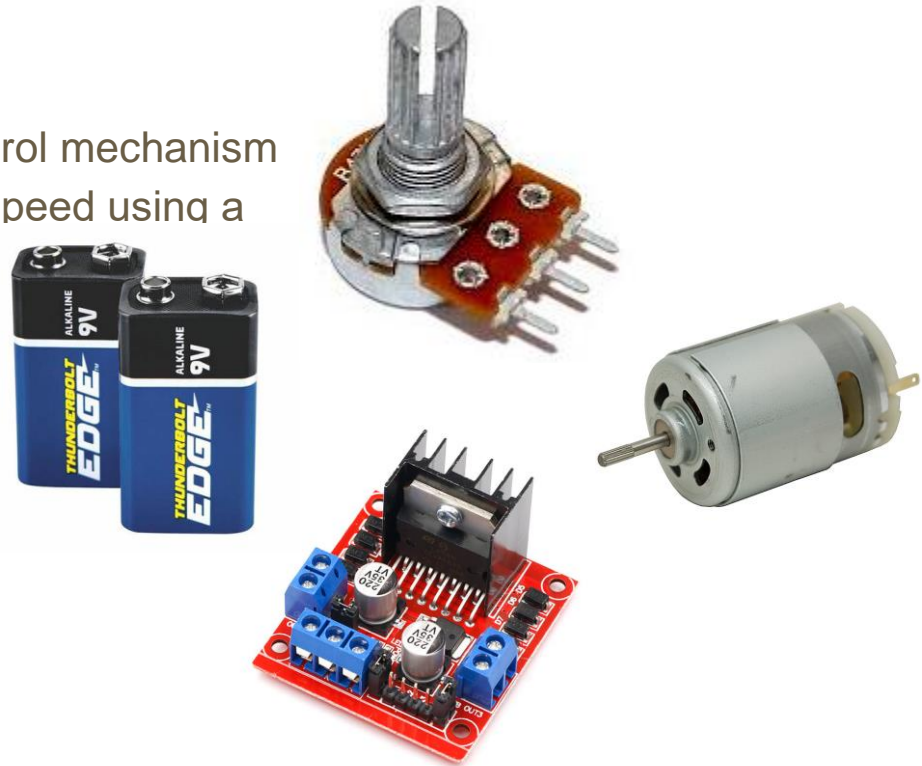


# Speed control

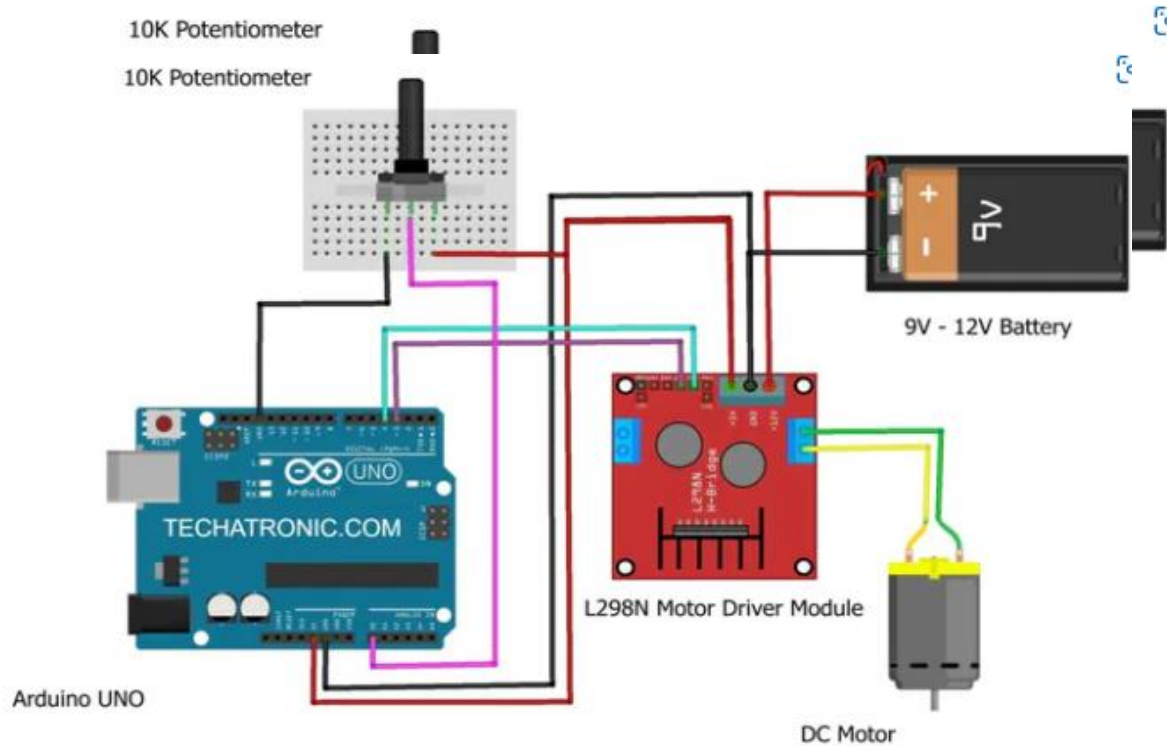
- Now we shall add on another control mechanism
- Here we shall control the robot's speed using a potentiometer.

## Components needed

- Malkon
- DC motor
- Jumper wires and a breadboard
- 9 volts battery
- 10K potentiometer
- L298n motor driver



# Connections



# The code!

---

```
void setup() {
  Serial.begin(9600);
  pinMode(3, OUTPUT); // Motor pin 1
  pinMode(4, OUTPUT); // Motor pin 2
  digitalWrite(4, LOW); // Normally Low on this
  pinMode(A0, INPUT); // 10k Potentiometer
}

void loop() {
  int s = analogRead(A0); // 10k Potentiometer
  int z = map(s, 0, 1024, 0, 255);
  Serial.println(z);
  analogWrite(3, z);
}
```

**THANK YOU ARDUINO GEEKS!**

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**FORCE**  
MAKERS SPACE

IGNITING CREATIVITY - LEARN BY DOING