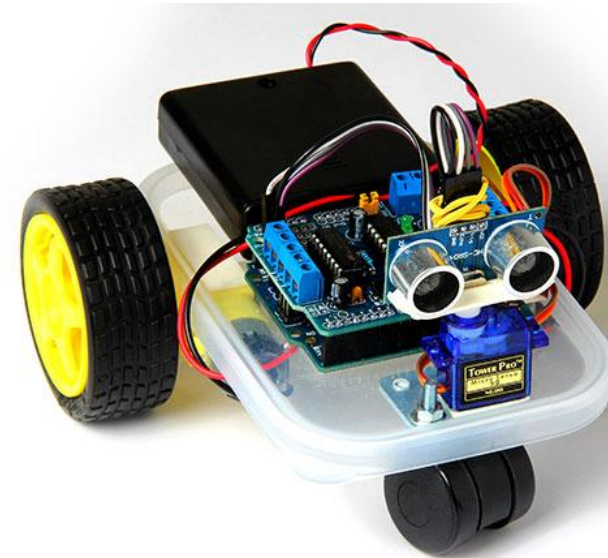




EP486 Microcontroller Applications

Topic 9

Ultrasonic Sensor



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HC-SR04 Ping distance sensor

- It detects the distance of the closest object in front of the sensor (from 2 cm up to 3m).
- It works by sending out a burst of ultrasound and listening for the echo when it bounces off of an object.
- The Arduino board sends a short pulse to **trigger** the detection, then listens for a pulse on the **echo** pin using the **pulseIn()** function.
- The duration of this second pulse is equal to the time taken by the ultrasound (~ 340 m/s) to travel to the object and back to the sensor.
- DataSheet:
<http://www.parallax.com/dl/docs/prod/acc/28015-PING-v1.3.pdf>



Note on pulseIn() Function

- <http://arduino.cc/en/Reference/PulseIn>
- Reads a pulse (either HIGH or LOW) on a pin. For example, if value is HIGH, pulseIn() waits for the pin to go HIGH, starts timing, then waits for the pin to go LOW and stops timing. Returns the length of the pulse in microseconds.

```
int pin = 7;
unsigned long duration;
void setup() {
    pinMode(pin, INPUT);
}
void loop() {
    duration = pulseIn(pin, HIGH);
}
```

HC-SR04 Ping distance sensor (code)

```
int echoPin = 7;
int trigPin = 8;
unsigned long duration;
float distance; // Duration used to calculate distance

void setup() {
  Serial.begin(9600);
  pinMode(trigPin, OUTPUT);
  pinMode(echoPin, INPUT);
}

void loop() {
  digitalWrite(trigPin, LOW);
  delayMicroseconds(2);
  digitalWrite(trigPin, HIGH);
  delayMicroseconds(10);
  digitalWrite(trigPin, LOW);
  duration = pulseIn(echoPin, HIGH);
  // Calculate the distance (in cm) based on the speed of sound.
  distance = duration/58.2;
  Serial.print("Distance = ");
  if (distance > 200 || distance < 2) Serial.print(-1.0);
  else                               Serial.print(distance);
  Serial.println(" cm");
  delay(1000);
}
```

*	VCC	to	arduino	5V
*	GND	to	arduino	GND
*	Echo	to	Arduino	pin 7
*	Trig	to	Arduino	pin 8