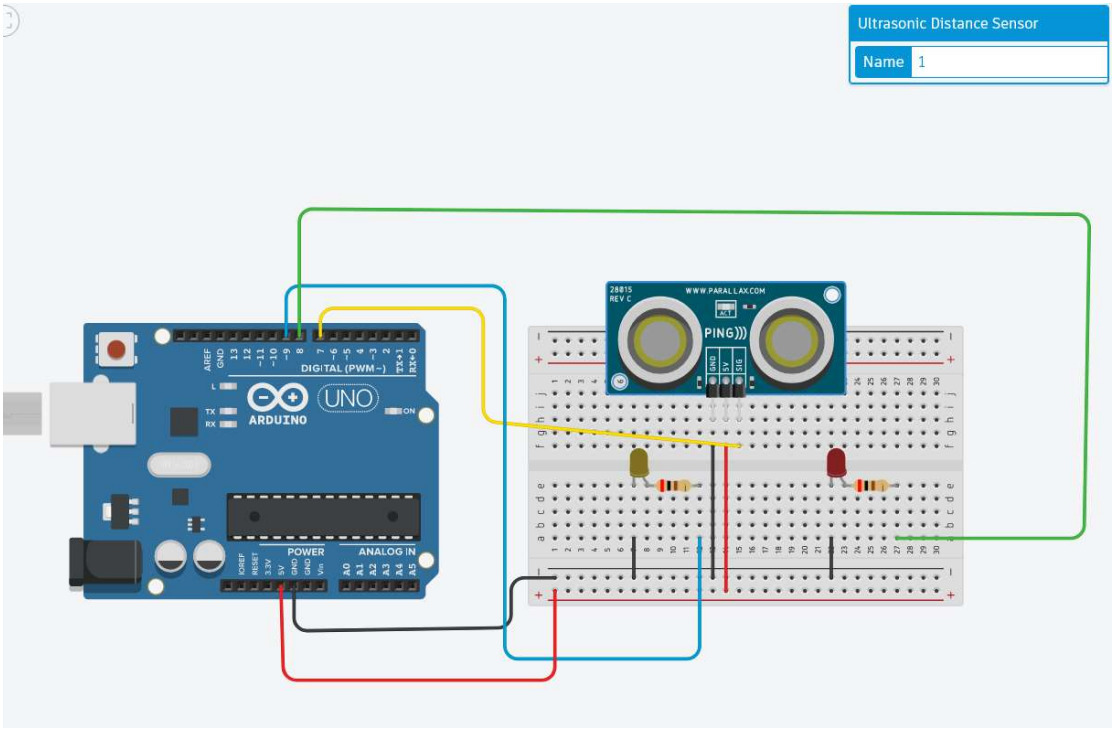
Παπαστάμκος Κωνσταντίνος - Πληροφορική

Γυμνάσιο (προχωρημένες ασκήσεις)

Arduino

Άσκηση 1:

Υπολογισμός απόστασης με χρήση του αισθητήρα ultra sonic. Αν η απόσταση του αντικειμένου είναι μικρότερη των 90 εκ. ανάβει το κίτρινο led, αν είναι μικρότερη των 50 εκ. ανάβει και το κόκκινο led.



Κώδικας

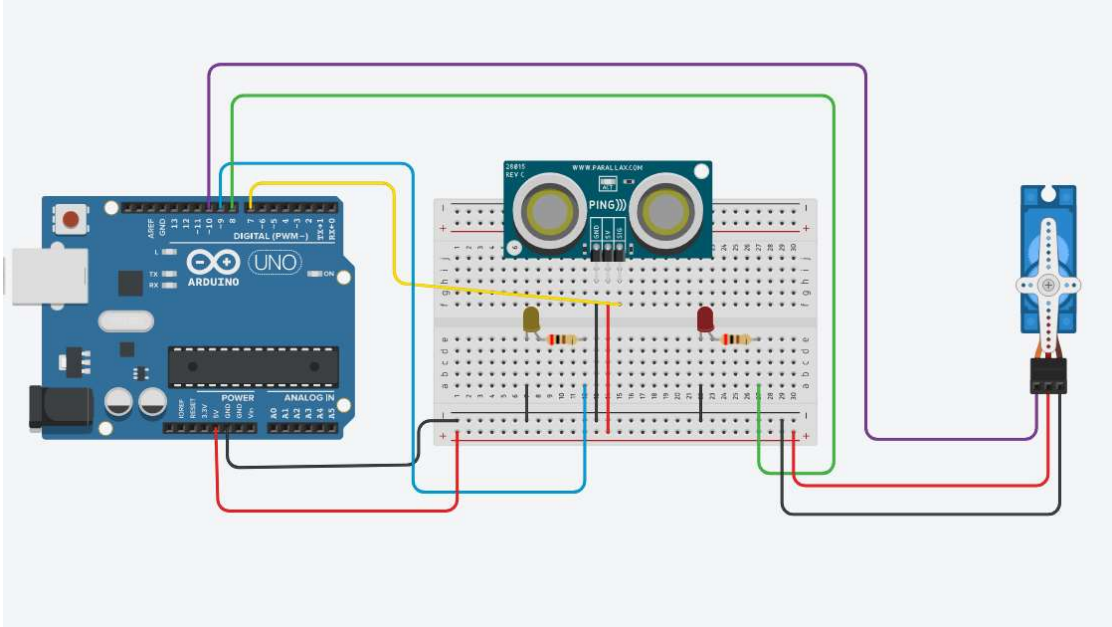
```
// C++ code

const int pingPin = 7;
const int yellowLed = 9, redLed=8;

void setup() {
  // initialize serial communication:
  Serial.begin(9600);
}

void loop() {
  // establish variables for duration of the ping, and the distance result
  // in inches and centimeters:
  long duration, inches, cm;
```

```
  // The PING))) is triggered by a HIGH pulse of 2 or more microseconds.
  // Give a short LOW pulse before hand to ensure a clean HIGH pulse:
  pinMode(pingPin, OUTPUT);
  digitalWrite(pingPin, LOW);
  delayMicroseconds(2);
  digitalWrite(pingPin, HIGH);
  delayMicroseconds(5);
  digitalWrite(pingPin, LOW);

  // The same pin is used to read the signal from the PING))): a HIGH pulse
  // whose duration is the time (in microseconds) from the sending of the ping
  // to the reception of its echo off of an object.

  pinMode(pingPin, INPUT);
  duration = pulseIn(pingPin, HIGH);

  // convert the time into a distance
  inches = microsecondsToInches(duration);
  cm = microsecondsToCentimeters(duration);

  Serial.print(inches);
  Serial.print("in, ");
  Serial.print(cm);
  Serial.print("cm");
  Serial.println();


  pinMode(yellowLed, OUTPUT);
  pinMode(redLed, OUTPUT);

  if (cm < 90 )
    digitalWrite(yellowLed, HIGH);
  else
    digitalWrite(yellowLed, LOW);

  if (cm <= 50)
     digitalWrite(redLed, HIGH);
  else
     digitalWrite(redLed, LOW);



  delay(100);
}

long microsecondsToInches(long microseconds) {
  // According to Parallax's datasheet for the PING))), there are 73.746
  // microseconds per inch (i.e. sound travels at 1130 feet per second).
  // This gives the distance travelled by the ping, outbound and return,
  // so we divide by 2 to get the distance of the obstacle.
  // See: https://www.parallax.com/package/ping-ultrasonic-distance-sensor-downloads/
  return microseconds / 74 / 2;
}
```

```
long microsecondsToCentimeters(long microseconds) {
  // The speed of sound is 340 m/s or 29 microseconds per centimeter.
  // The ping travels out and back, so to find the distance of the object we
  // take half of the distance travelled.

  return microseconds / 29 / 2;
}
```

Άσκηση 2η.

Συνέχεια της άσκησης 1. Χρήση κινητήρα **servo**. Αν η απόσταση του αντικειμένου είναι μικρότερη των 50εκ. από τον αισθητήρα, δίνεται εντολή στον μηχανισμό servo να περιστραφεί 90^{o} μοίρες.



Κώδικας

```
// C++ code

#include <Servo.h>

Servo myservo;

// this constant won't change. It's the pin number of the sensor's output:
const int pingPin = 7;
const int yellowLed = 9, redLed=8;
```

```
void setup() {
  // initialize serial communication:
  Serial.begin(9600);

  myservo.attach(10);  // attaches the servo on pin 10 to the servo object
}

void loop() {
  // establish variables for duration of the ping, and the distance result
  // in inches and centimeters:
  long duration, inches, cm;

  // The PING))) is triggered by a HIGH pulse of 2 or more microseconds.
  // Give a short LOW pulse beforehand to ensure a clean HIGH pulse:
  pinMode(pingPin, OUTPUT);
  digitalWrite(pingPin, LOW);
  delayMicroseconds(2);
  digitalWrite(pingPin, HIGH);
  delayMicroseconds(5);
  digitalWrite(pingPin, LOW);

  // The same pin is used to read the signal from the PING))): a HIGH pulse
  // whose duration is the time (in microseconds) from the sending of the ping
  // to the reception of its echo off of an object.
  pinMode(pingPin, INPUT);
  duration = pulseIn(pingPin, HIGH);

  // convert the time into a distance
  inches = microsecondsToInches(duration);
  cm = microsecondsToCentimeters(duration);

  Serial.print(inches);
  Serial.print("in, ");
  Serial.print(cm);
  Serial.print("cm");
  Serial.println();


  pinMode(yellowLed, OUTPUT);
  pinMode(redLed, OUTPUT);

  if (cm < 90 )
    digitalWrite(yellowLed, HIGH);
  else
    digitalWrite(yellowLed, LOW);

  if (cm <= 50)
  {
     digitalWrite(redLed, HIGH);
     myservo.write(90);
  }
  else
  {
```

```
    digitalWrite(redLed, LOW);
     myservo.write(0);
  }



  delay(100);
}

long microsecondsToInches(long microseconds) {
  // According to Parallax's datasheet for the PING))), there are 73.746
  // microseconds per inch (i.e. sound travels at 1130 feet per second).
  // This gives the distance travelled by the ping, outbound and return,
  // so we divide by 2 to get the distance of the obstacle.
  // See: https://www.parallax.com/package/ping-ultrasonic-distance-sensor-downloads/
  return microseconds / 74 / 2;
}

long microsecondsToCentimeters(long microseconds) {
  // The speed of sound is 340 m/s or 29 microseconds per centimeter.
  // The ping travels out and back, so to find the distance of the object we
  // take half of the distance travelled.
  return microseconds / 29 / 2;
}
```