Εκπαίδευση STEAM Arduino 2ο μέρος

ΚΑΜΟΥΤΣΗΣ ΚΩΝΣΤΑΝΤΙΝΟΣ

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Τμήμα Μηχανικών Παραγωγής και Διοίκησης, ΔΙΠΑΕ

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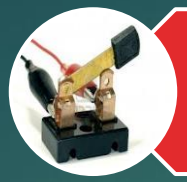
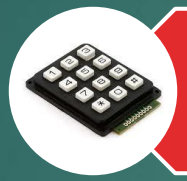
6 ΣΗΜΑΝΤΙΚΕΣ ΕΝΝΟΙΕΣ

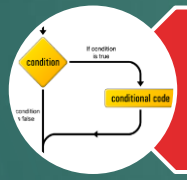


digitalWrite()

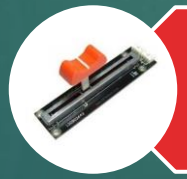
analogWrite()



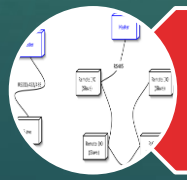
digitalRead()



if() statements / Boolean



analogRead()



Serial communication

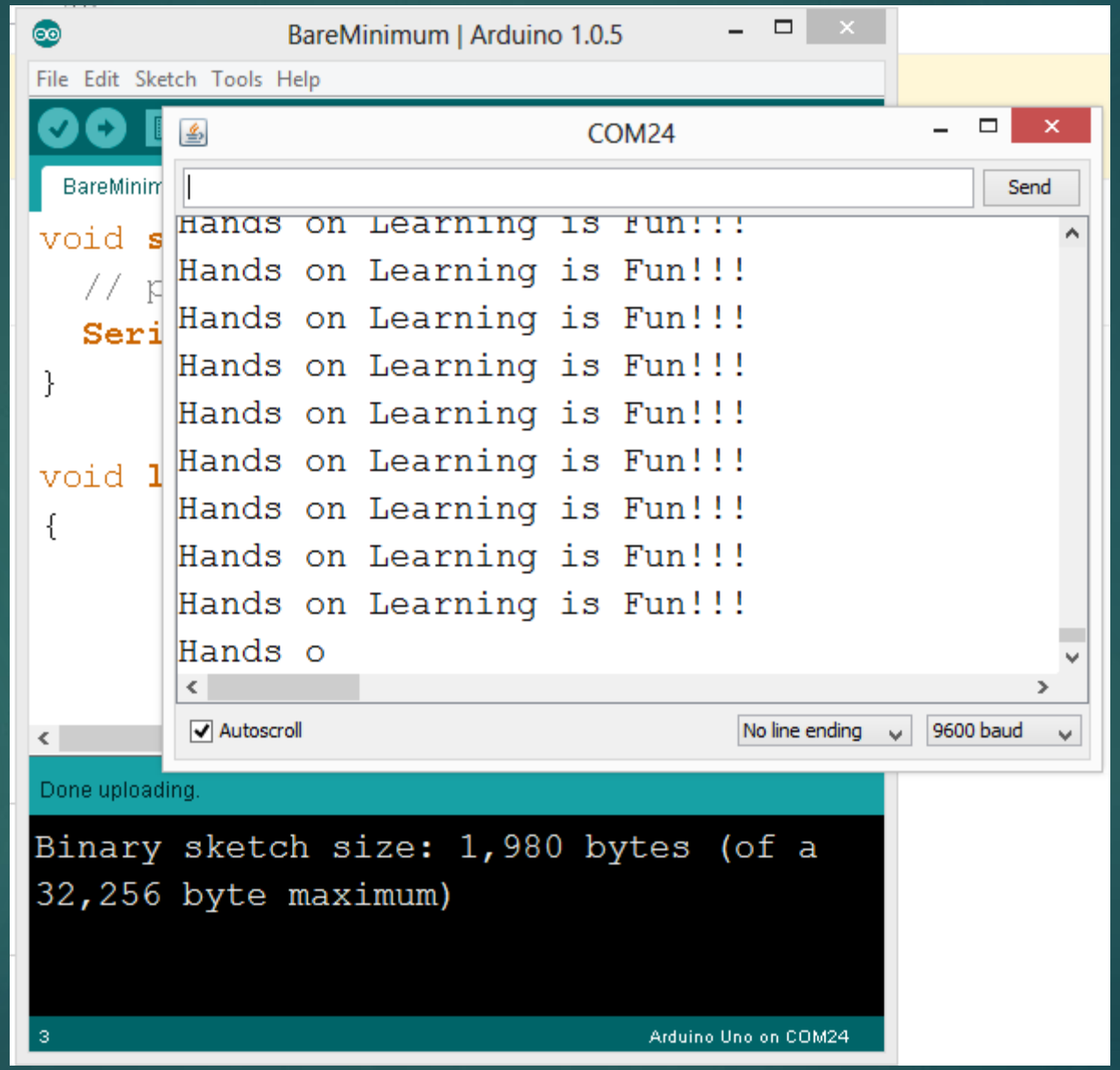
Analog Sensors

Παραδείγματα:

Sensors	Μετρούμενο μέγεθος
Mic	Ένταση ήχου
Photoresistor	Ένταση φωτός
Potentiometer	Θέση δρομέα
Temp Sensor	θερμοκρασία
Flex Sensor	κάμψη
Accelerometer	επιτάχυνση

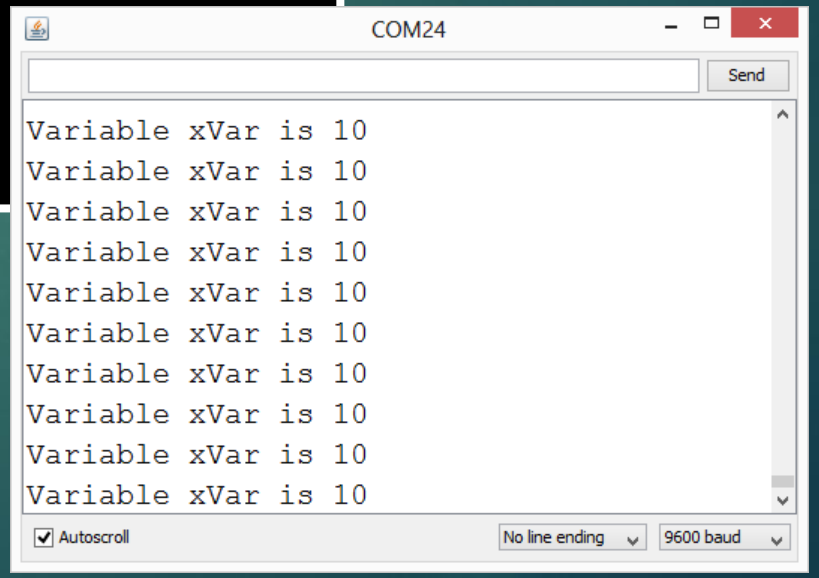
Σειριακή επικοινωνία, Serial Communication Απεικόνιση μηνυμάτων


```
void loop ( )
{
      Serial.print("Hands on ");
      Serial.print("Learning ");
      Serial.println("is Fun!!!");
}
```


BareMinimum | Arduino 1.0.5
File Edit Sketch Tools Help
BareMinim
void s
// p
Seri
}
void l
{
COM24
Send
Hands on Learning is Fun!!!
Hands on Learning is Fun!!!
Hands on Learning is Fun!!!
Hands on Learning is Fun!!!
Hands on Learning is Fun!!!
Hands on Learning is Fun!!!
Hands on Learning is Fun!!!
Hands on Learning is Fun!!!
Hands on Learning is Fun!!!
Hands o
Autoscroll
No line ending
9600 baud
Done uploading.
Binary sketch size: 1,980 bytes (of a 32,256 byte maximum)
3
Arduino Uno on COM24

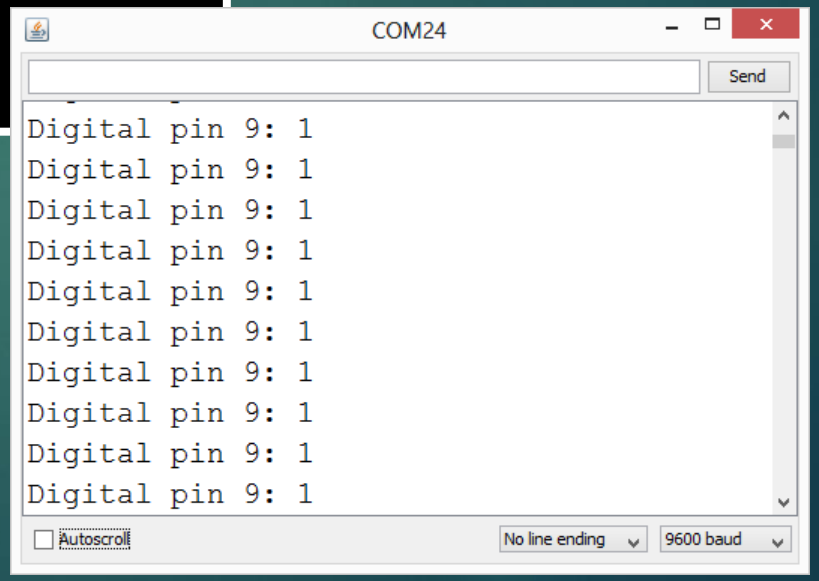
Serial Communication: Serial Debugging - Αποσφαλμάτωση

```
void loop()
{
   int xVar = 10;
   Serial.print ( “Variable xVar is ” ) ;
   Serial.println ( xVar ) ;
}
```

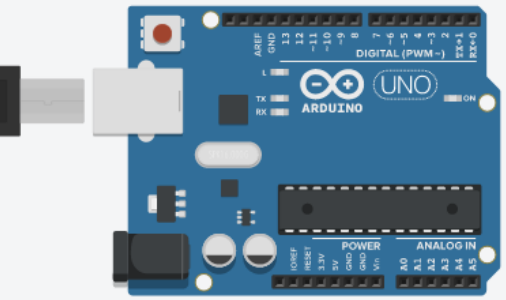


Serial Communication: Serial Troubleshooting - έλεγχος

```
void loop ( )
{
   Serial.print ("Digital pin 9: ");
   Serial.println (digitalRead(9));
}
```



Παράδειγμα 1:



Blocks + Text

Output
Control
Input
Math
Notation
Variables

set built-in LED to HIGH

set pin 0 to HIGH

set pin 3 to 0

rotate servo on pin 0 to 0 degree

play speaker on pin 0 with tone 60

print to serial monitor Hands on without newline

print to serial monitor Learning without newline

print to serial monitor is Fun!!! with newline

wait 2 secs

1 (Arduino Uno R3)

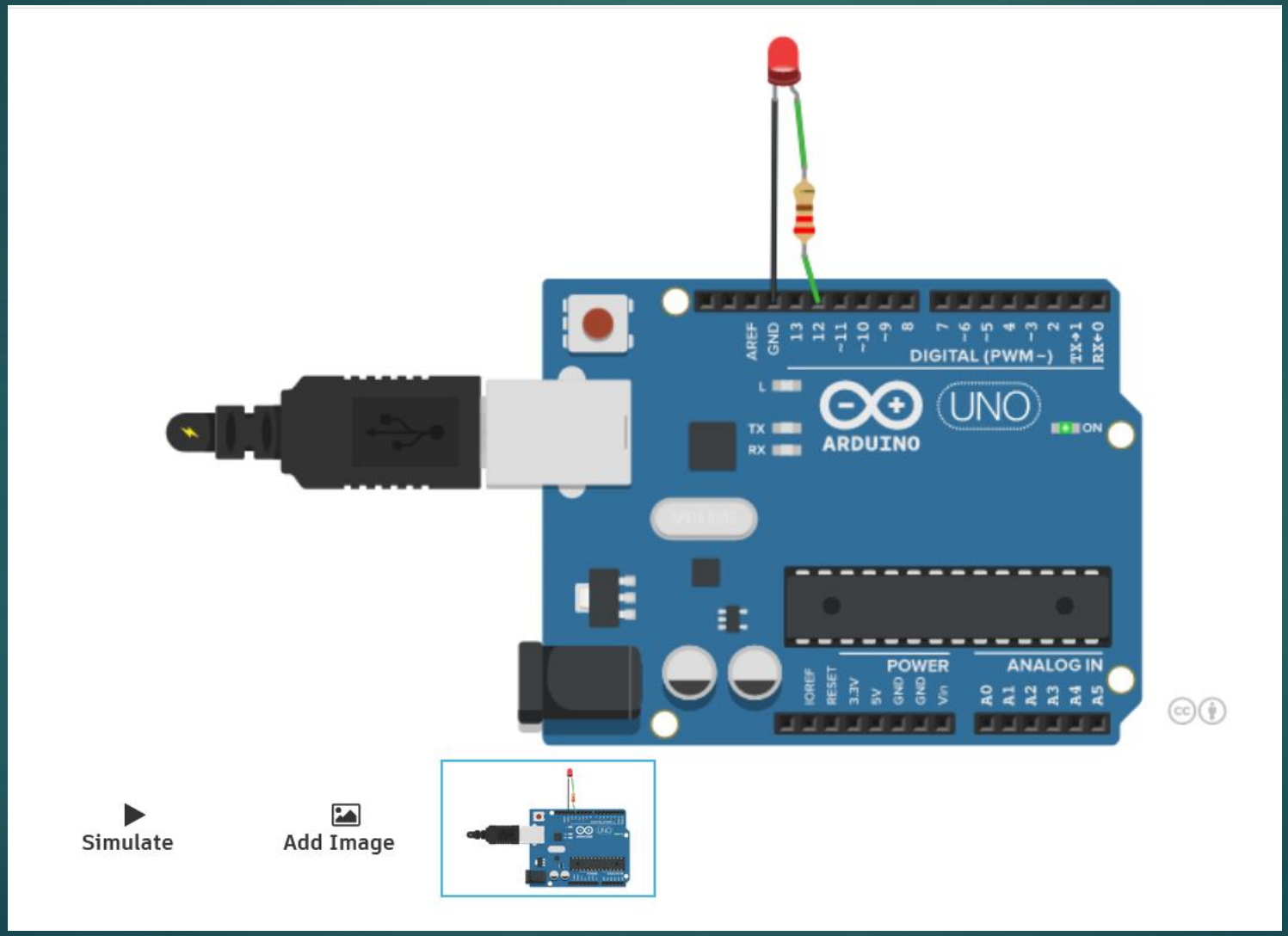
```
1  void setup()
2  {
3    Serial.begin(9600);
4
5  }
6
7  void loop()
8  {
9    Serial.print("Hands on ");
10   Serial.print("Learning ");
11   Serial.println("is Fun!!!");
12   delay(2000); // Wait for 2000 millisecond(s)
13 }
```

Serial Monitor

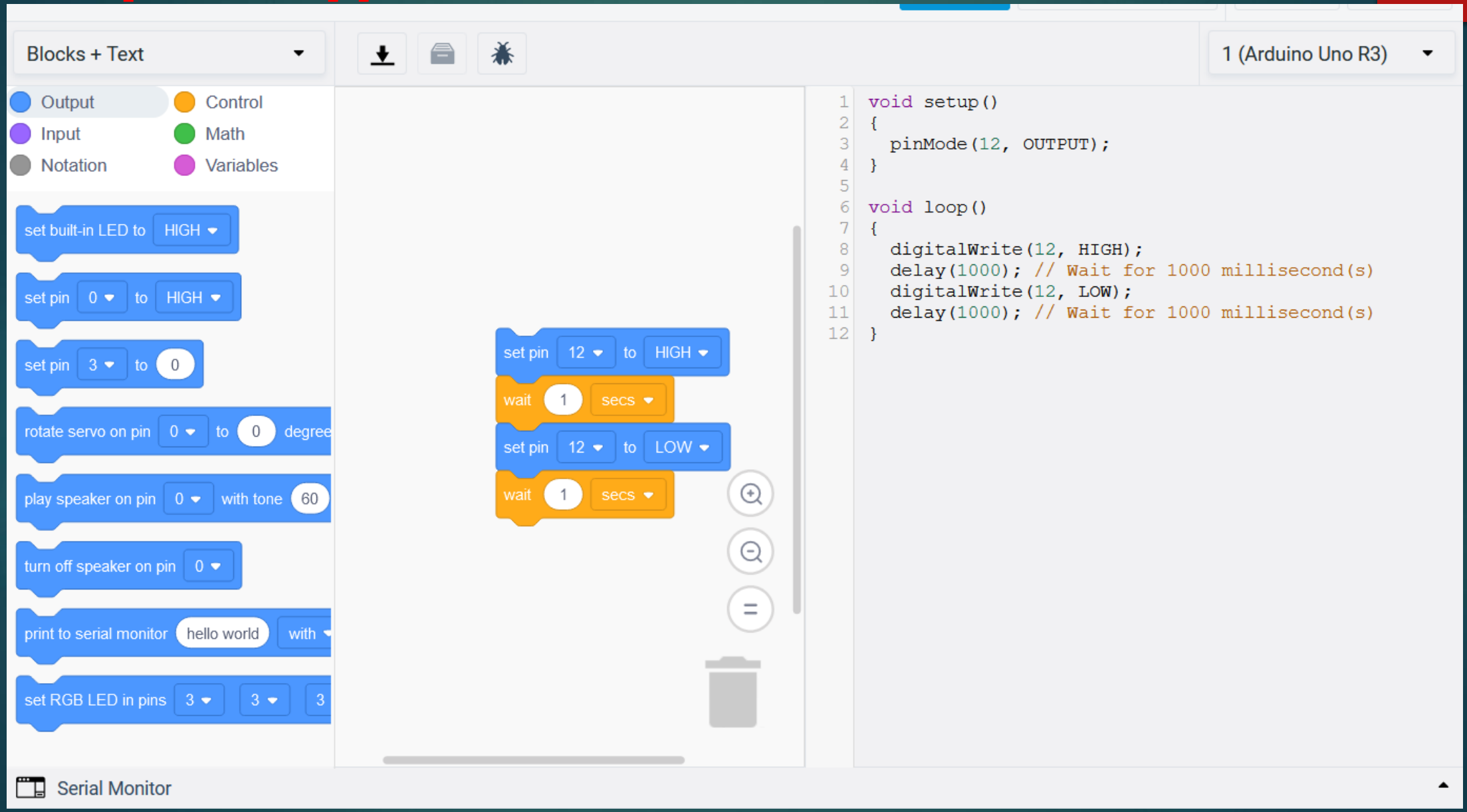
```
Hands on Learning is Fun!!!
Hands on Learning is Fun!!!
Hands on Learning is Fun!!!
Hands on Learning is Fun!!!
Hands on Learning is Fun!!!
Hands on Learning is Fun!!!
Hands on Learning is Fun!!!
```

Send Clear

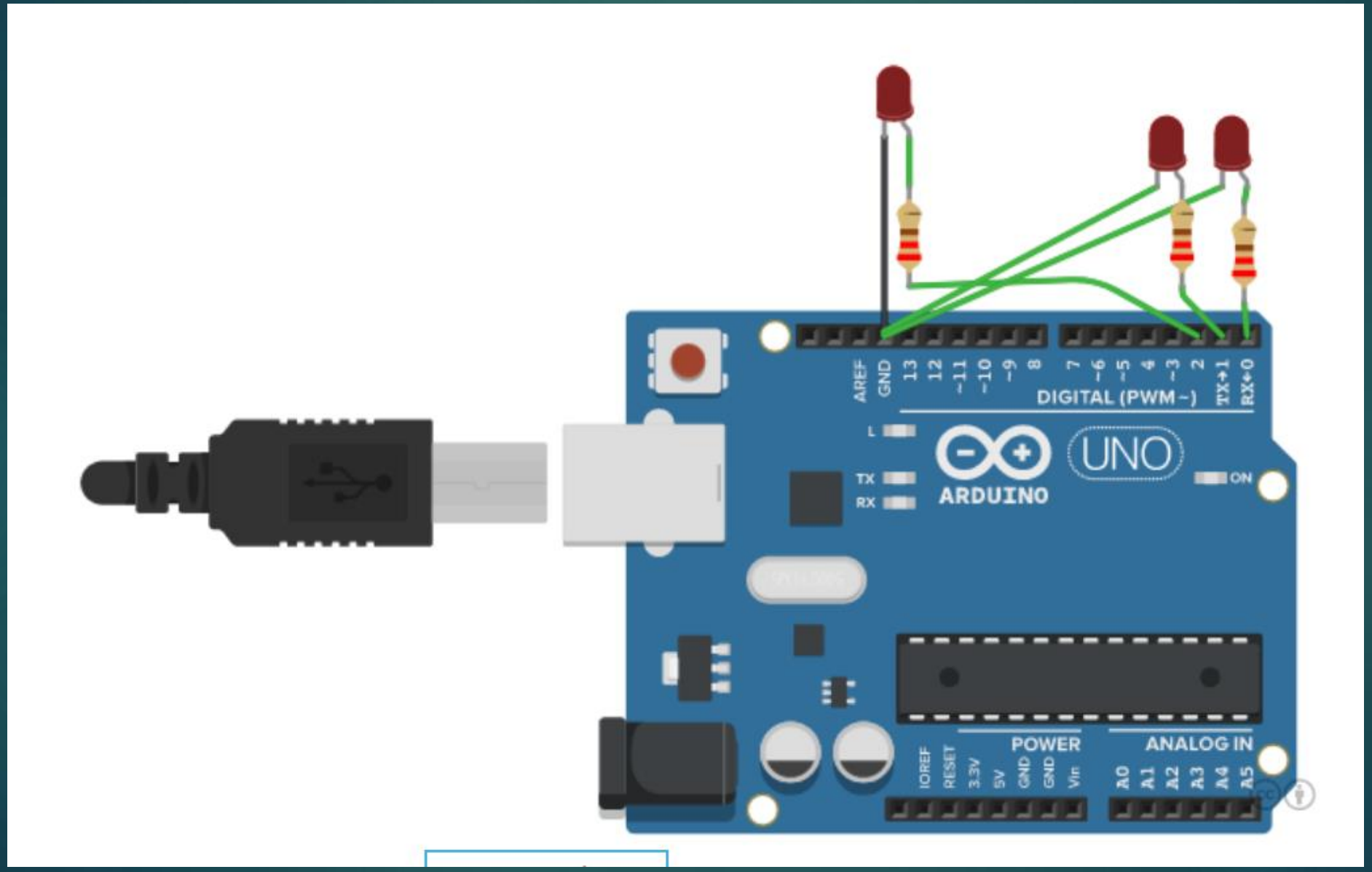
Παράδειγμα 2:



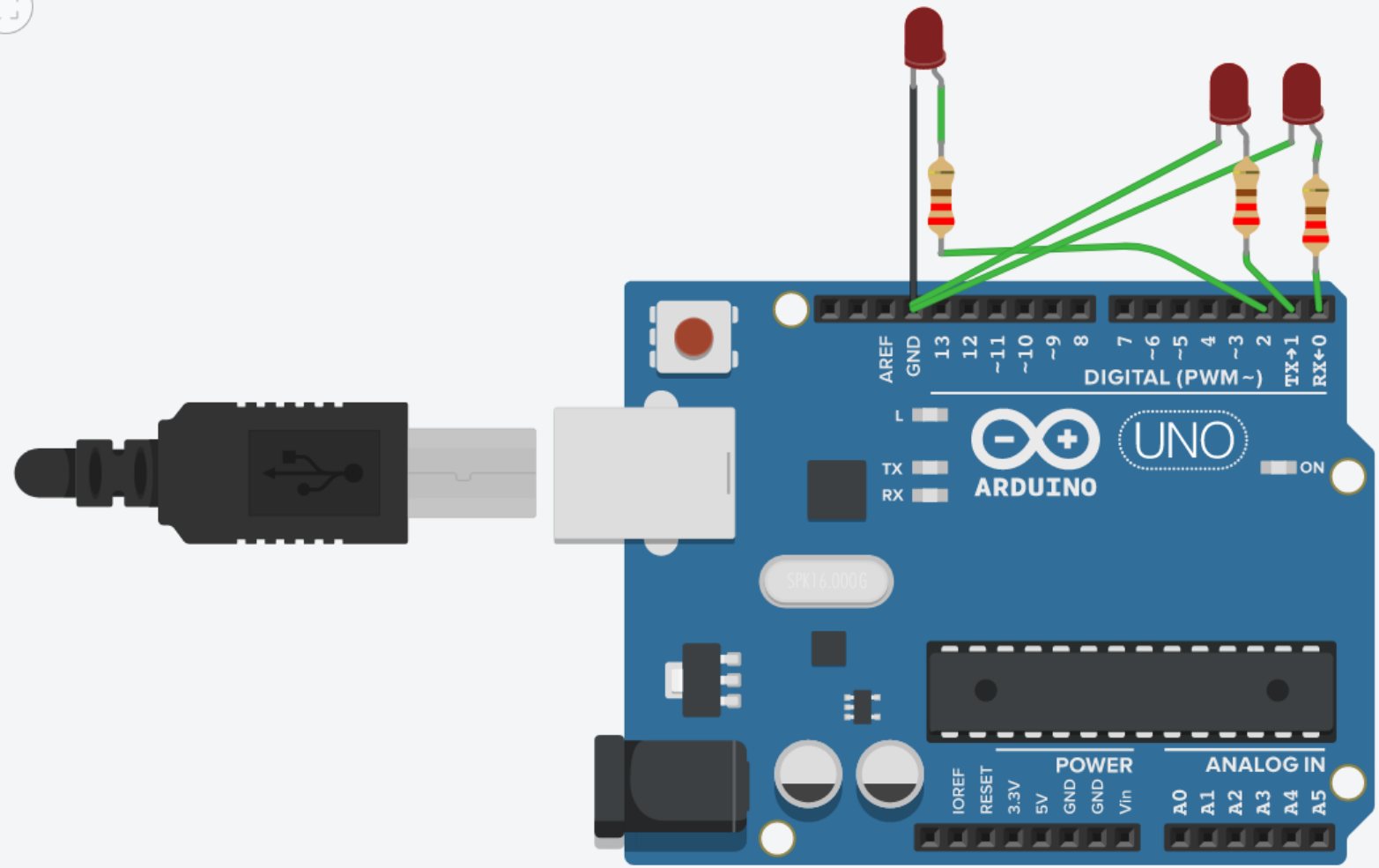
Παράδειγμα 2:



Παράδειγμα 3:



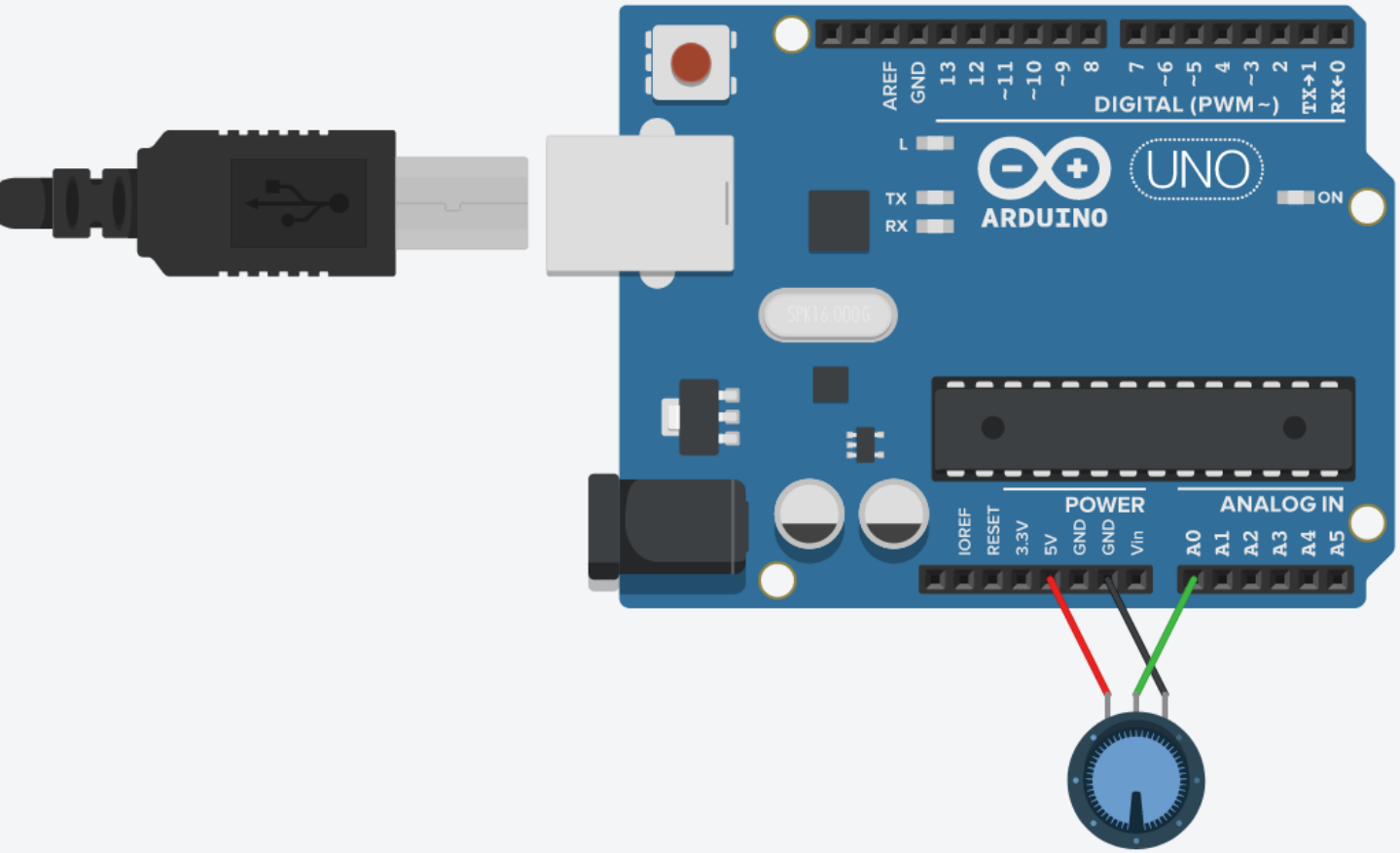
Παράδειγμα 3:



Text

```
1  int i;
2  void setup()
3  {
4
5  //  Serial.begin(9600);
6    for (i=0;i<3;i++)
7    {
8    pinMode(i, OUTPUT);
9    }
10 }
11
12 void loop()
13 {
14
15   for (i=0;i<3;i++)
16   {
17   digitalWrite(i, HIGH);
18 //  Serial.print("ON");
19 //  Serial.print(i);
20 //  Serial.println();
21   delay(2000); // Wait for 2000 millisecond(s)
22   digitalWrite(i, LOW);
23   }
24
25 }
```

Παράδειγμα 3b:

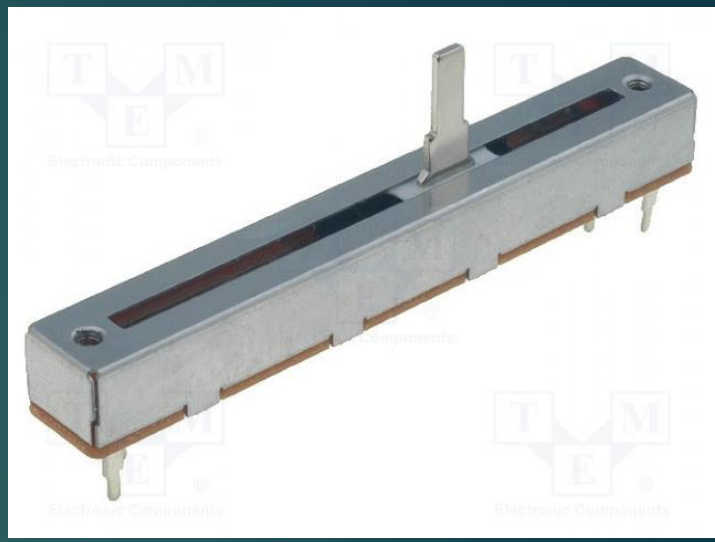


Text

1 (Arduino Uno R3)

```
1  // the setup routine runs once when you press reset:
2  void setup() {
3    // initialize serial communication at 9600 bits per second:
4    Serial.begin(9600);
5  }
6
7  // the loop routine runs over and over again forever:
8  void loop() {
9    // read the input on analog pin 0:
10   int sensorValue = analogRead(A0);
11   // print out the value you read:
12   Serial.println(sensorValue);
13   delay(1);        // delay in between reads for stability
14 }
15
```

ΠΟΤΕΝΣΙΟΜΕΤΡΟ



ΠΟΤΕΝΣΙΟΜΕΤΡΟ

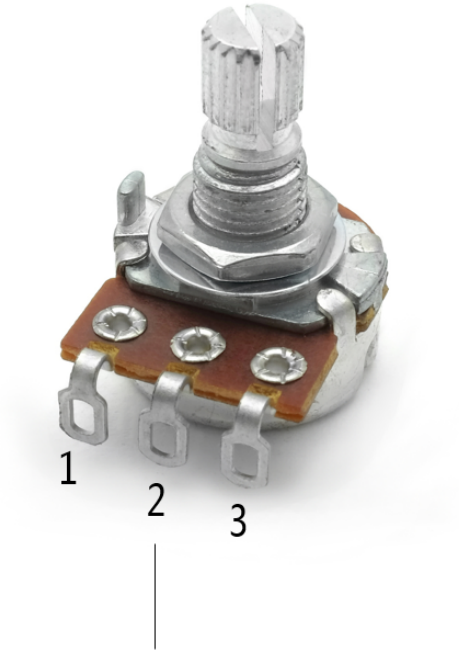
(α) Άνθρακα (Carbon)
Σε αυτά η πίστα αποτελείται από συμπαγή άνθρακα ή επίστρωση άνθρακα πάνω σε μονωτικό υλικό.

(β) Σύρματος (wire wound)
Σε αυτά η πίστα αποτελείται από σύρμα χρωμιονικελίνης τυλιγμένο πάνω σε μονωτικό υλικό.

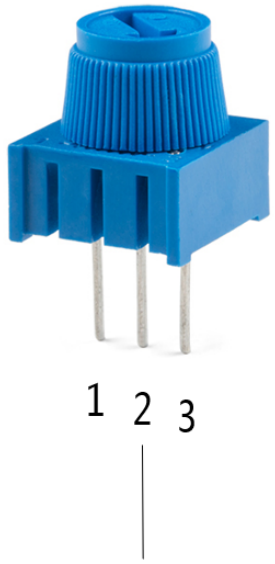
(γ) Φιλμ μετάλλου (Cermet thin film)
Σε αυτά η πίστα είναι ένα παχύ στρώμα μεταλλικού φιλμ κολλημένο πάνω σε κεραμικό υλικό.

ΠΟΤΕΝΣΙΟΜΕΤΡΟ

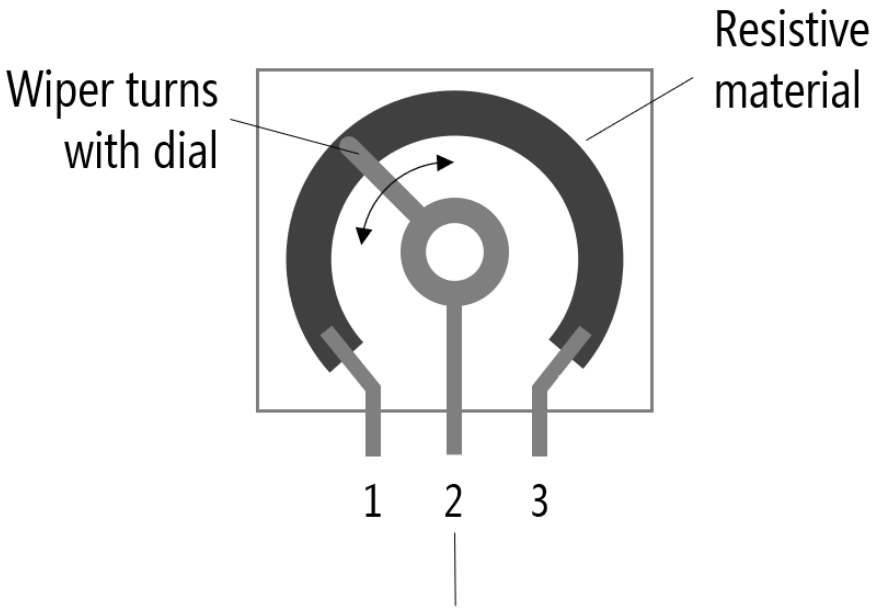
PANEL MOUNT POT 10KΩ



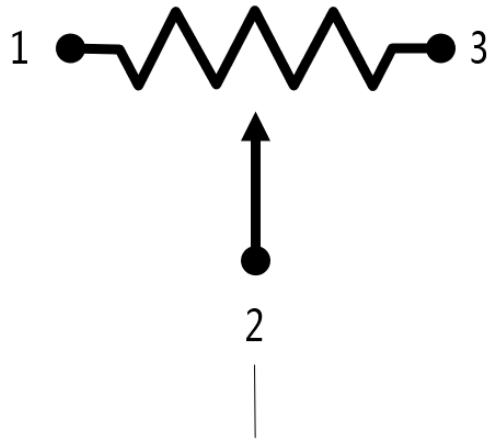
TRIM POT 10KΩ



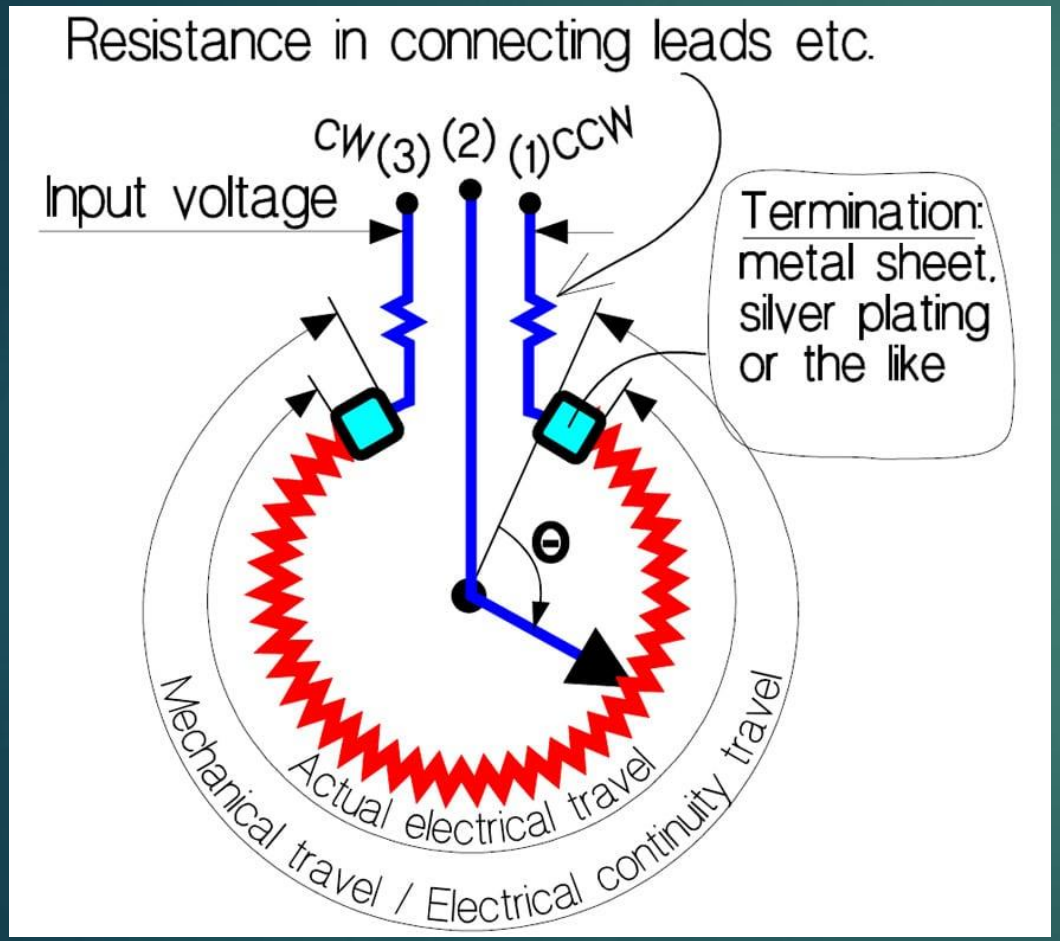
FUNCTIONAL DIAGRAM

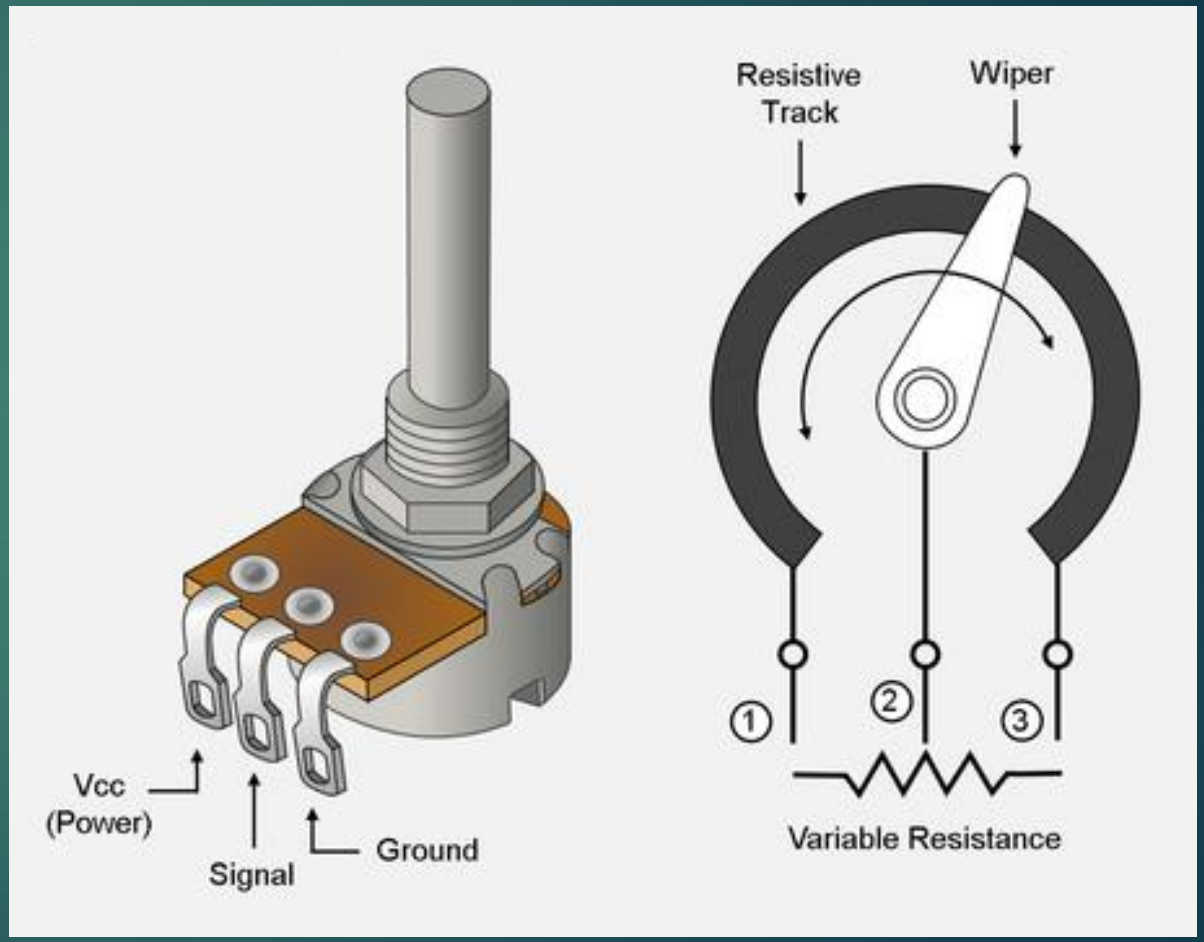


SCHEMATIC SYMBOL

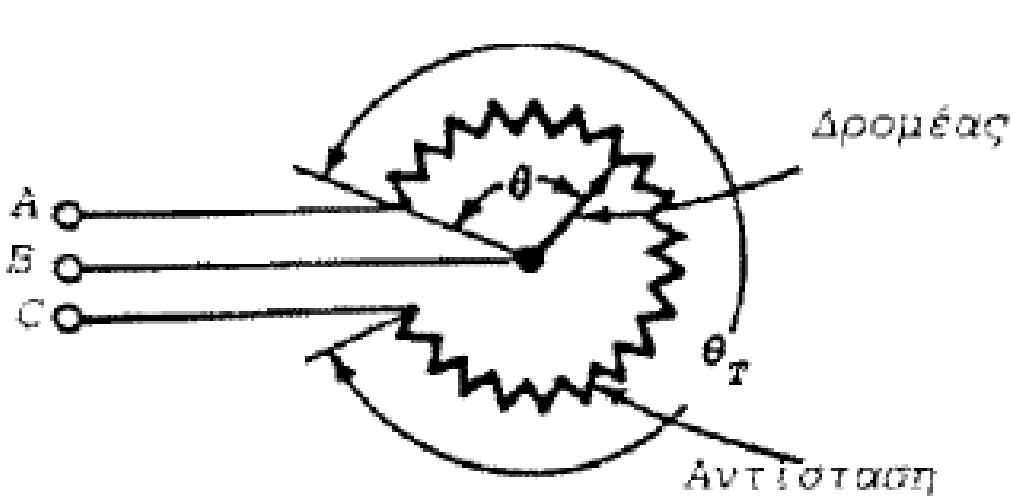


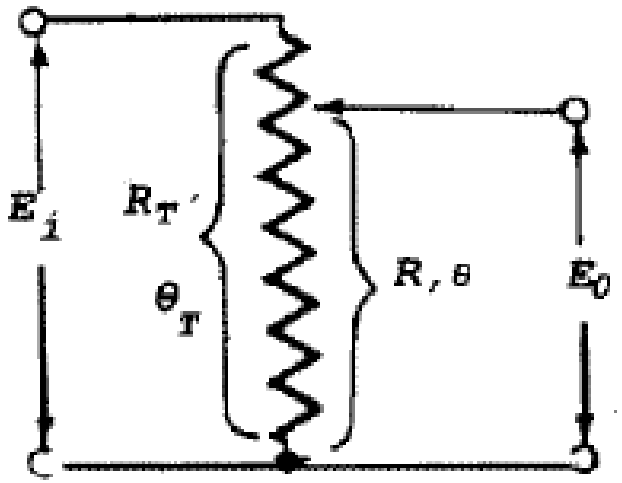
ΠΟΤΕΝΣΙΟΜΕΤΡΟ





ΠΟΤΕΝΣΙΟΜΕΤΡΟ





α) β)

Σχήμα 2-3: Ποτενσιόμετρο: α) φυσική σχεδίαση και β) σχηματική σχεδίαση

$$\frac{R}{R_T} = \frac{\theta}{\theta_T}$$

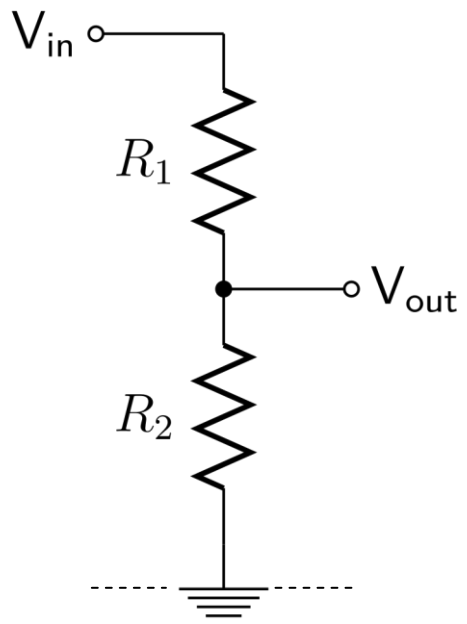
$$\frac{E_0}{E_i} = \frac{R}{R_T} = \frac{\theta}{\theta_T}$$

ή $E_0 = \frac{\theta}{\theta_T} E_i$

ΠΟΤΕΝΣΙΟΜΕΤΡΟ

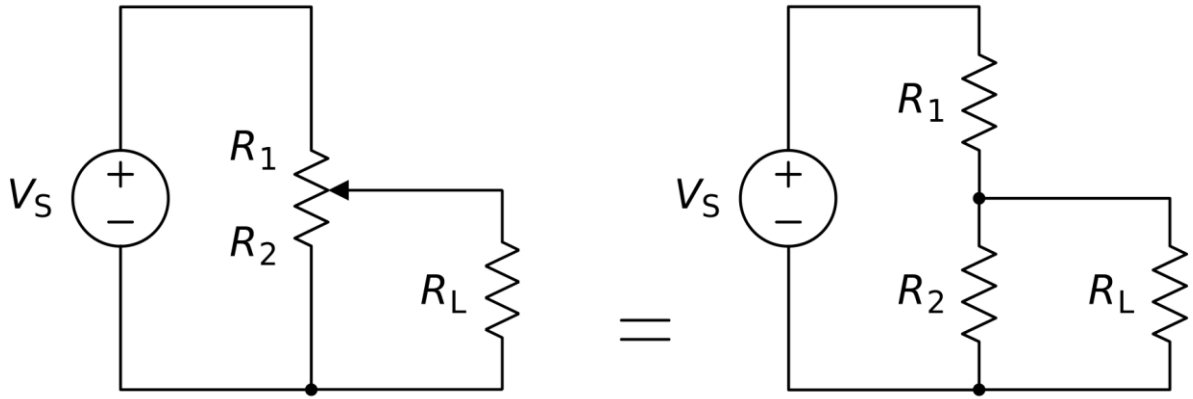
- Το ποτενσιόμετρο είναι ένας διαιρέτης τάσης.

Διαιρέτης τάσης
Υποβιβάζει την τάση



$$V_{\text{out}} = \frac{R_2}{R_1 + R_2} \cdot V_{\text{in}}$$

Ποτενσιόμετρο
Σχηματικό διάγραμμα



- $R_L >> R_2$ → $V_L = \frac{R_2}{R_1 + R_2} \cdot V_s$

- Γενικά → $V_L = \frac{R_2 R_L}{R_1 R_L + R_2 R_L + R_1 R_2} \cdot V_s$