Programming the Arduino

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2011 May 14
11:30-1:30

Today we'll be covering:

- Syntax
- Branches
- Loops
- Functions
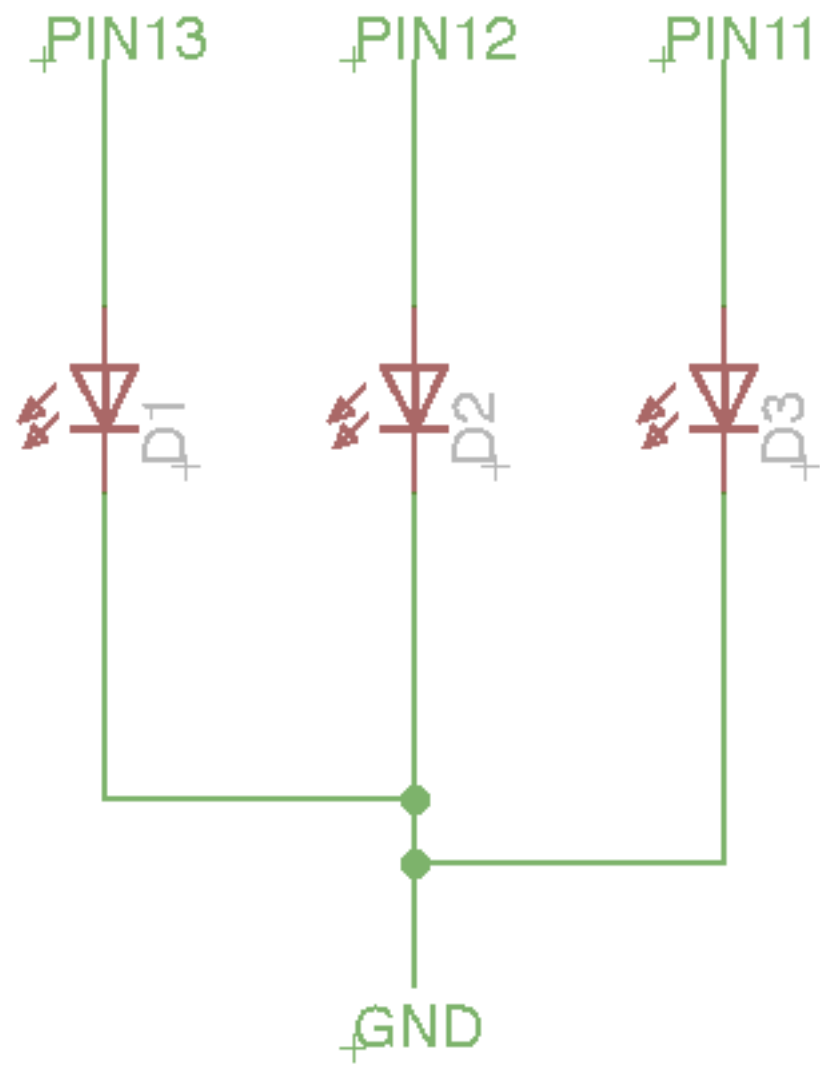- Classes

Structure and Syntax

Magic Words

Storing information

That's enough talking.
Let's make stuff

Controlling LEDs with "if"

PIN13   PIN12   PIN11

D1   D2   D3

GND

Put functionality in your functions

```arduino
#define GREEN 13
#define ORANGE 12
#define RED 11

void setup()
{
  Serial.begin(9600);

  pinMode(13, OUTPUT);
  pinMode(12, OUTPUT);
  pinMode(11, OUTPUT);
}

void loop()
{
  if (Serial.available()) {
    char command = Serial.read();
    if (command == 'g') {
      toggle_LED(GREEN);
    }
    else if (command == 'o') {
      toggle_LED(ORANGE);
    }
    else if (command == 'r') {
      toggle_LED(RED);
    }
    else {
      //stoplight
      while (Serial.available() == false) {
        digitalWrite(RED, HIGH);
        digitalWrite(ORANGE, LOW);
        digitalWrite(GREEN, LOW);
        delay(2000);
        digitalWrite(RED, LOW);
        digitalWrite(ORANGE, LOW);
        digitalWrite(GREEN, HIGH);
        delay(1000);
        digitalWrite(RED, LOW);
        digitalWrite(ORANGE, HIGH);
        digitalWrite(GREEN, LOW);
        delay(1000);
        digitalWrite(RED, HIGH);
        digitalWrite(ORANGE, LOW);
        digitalWrite(GREEN, LOW);
        delay(1000);
      }
    }
  }
}


//new function to toggle an LED
void toggle_LED(int LED_num) {
  if (digitalRead(LED_num))
  {
    digitalWrite(LED_num, LOW);
  } else
  {
    digitalWrite(LED_num, HIGH);
  }
}
```

```cpp
#define GREEN 13
#define ORANGE 12
#define RED 11

void setup() {
  Serial.begin(9600);

  pinMode(GREEN, OUTPUT);
  pinMode(ORANGE, OUTPUT);
  pinMode(RED, OUTPUT);
}

int green_on = 0;
int orange_on = 0;
int red_on = 0;

int red_on_time = 0;
int green_on_time = 0;
int orange_on_time = 0;

void loop() {
  if (Serial.available()) {
   char command = Serial.read();
   if (command == 'g') {
      green_on = 1;
      green_on_time = millis();
   }
   if (command == 'o') {
      orange_on = 1;
      orange_on_time = millis();
   }
   if (command == 'r') {
      red_on = 1;
      red_on_time = millis();
   }
  }

  Serial.print(millis() - green_on_time);
  Serial.print(", ");
  Serial.print(millis() - orange_on_time);
  Serial.print(", ");
  Serial.println(millis() - red_on_time);

  digitalWrite(RED, red_on);
  digitalWrite(GREEN, green_on);
  digitalWrite(ORANGE, orange_on);

  if (millis() - red_on_time > 1000) {
    red_on = 0;
  }

  if (millis() - orange_on_time > 1000) {
    orange_on = 0;
  }

  if (millis() - green_on_time > 1000) {
    green_on = 0;
  }
}
```