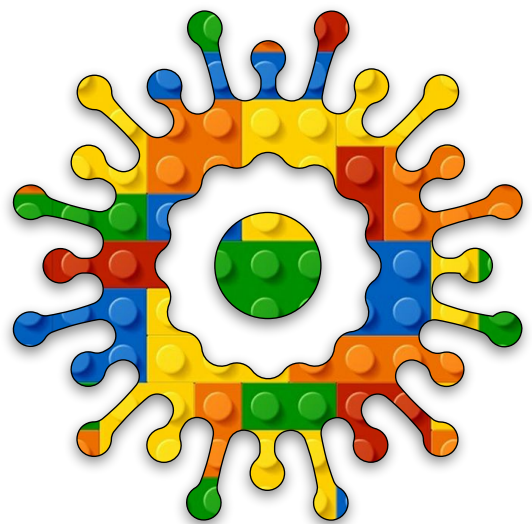


Internet of Things Module A Unit #7 three LEDs





Module A Unit #7 three LEDs

Sketch A7.1	three LEDs
Sketch A7.2	three LED blink
Sketch A7.3	for() loop blink
Sketch A7.4	cycle backwards
Sketch A7.5	random selection



Introduction to three LEDs

Making use of the green and yellow (amber) LEDs on the traffic light. Introducing the concept of having more than one output. This can be applied to many sensors (as many as there are pins). You just have to watch how much power you are drawing, though.



Sketch A7.1 three LEDs

Make sure they all work OK.

```
void setup()
{
  pinMode(2, OUTPUT);
  pinMode(3, OUTPUT);
  pinMode(4, OUTPUT);
}

void loop()
{
  digitalWrite(2, HIGH);
  digitalWrite(3, HIGH);
  digitalWrite(4, HIGH);
}
```



Notes

This is a simple sketch to get each LED to turn on. You may find that the green isn't as bright as the other two colours.



Sketch A7.2 three LED blink

Blinking them in turn.

```
void setup()
{
  pinMode(2, OUTPUT);
  pinMode(3, OUTPUT);
  pinMode(4, OUTPUT);
}

void loop()
{
  digitalWrite(2, HIGH);
  delay(1000);
  digitalWrite(2, LOW);
  digitalWrite(3, HIGH);
  delay(1000);
  digitalWrite(3, LOW);
  digitalWrite(4, HIGH);
  delay(1000);
  digitalWrite(4, LOW);
}
```



Notes

This is a simple sketch to get each LED to blink for one second in turn.



Challenge

1. Although this is nothing more than an extension of the basic blink sketch, make the pattern change to one LED, then two LEDs, and then three LEDs on in sequence.
2. Make the pattern go backwards and forwards.



Sketch A7.3 for() loop blink

! Suggest starting a new sketch.

Using a `for()` loop to cycle through them, starting with the red pin **D2**.

```
void setup()
{
  for (int i = 2; i <= 4; i++)
  {
    pinMode(i, OUTPUT);
  }
}

void loop()
{
  for (int i = 2; i <= 4; i++)
  {
    digitalWrite(i, HIGH);
    delay(1000);
    digitalWrite(i, LOW);
  }
}
```



Notes

This is an improvement on the previous sketch. It uses a `for()` statement to create a simple loop. That cycles through each LED in turn. Starting with the green first.



Challenge

The operation `i++` adds one each time. Conversely, `i--` takes one off each time. Could you rewrite the sketch so that it starts at red, then adds yellow, and then adds green?



Sketch A7.4 cycle backwards

Adjusting the `for loop()` so that we start with pin **D4** (green LED), then yellow (amber), etc.

```
void setup()
{
  for (int i = 2; i <= 4; i++)
  {
    pinMode(i, OUTPUT);
  }
}

void loop()
{
  for (int i = 4; i >= 2; i--)
  {
    digitalWrite(i, HIGH);
    delay(1000);
    digitalWrite(i, LOW);
  }
}
```



Notes

Notice that we sort of swap over some of the `for()` loop and count backwards `i--`.



Challenge

How would you randomly select each one?



Sketch A7.5 random selection

A lot of refactoring. Now it will select an LED at random.

```
void setup()
{
  for (int i = 2; i <= 4; i++)
  {
    pinMode(i, OUTPUT);
  }
}

void loop()
{
  int i = random(2, 5);
  digitalWrite(i, HIGH);
  delay(1000);
  digitalWrite(i, LOW);
}
```



Notes

It will select the same one more than once. Notice that it is random between **2** and **5**, that is, it is inclusive of **2** but up to **5** but not including **5**.



Challenge

1. For a pleasing effect, make the delay much smaller, e.g. **100**.
2. Could you make your traffic light work as it would in real life?