Introducing Robotics

Module A Unit #6 Three LEDs
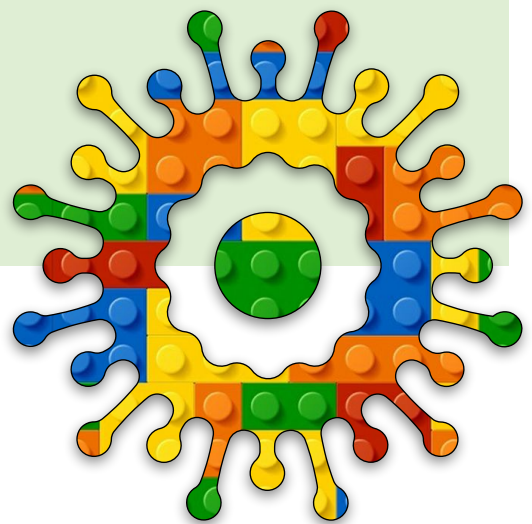
Module A Unit #6 Three LEDs

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.

Sketch A6.1 three LEDs

Starting a new sketch to make sure they all work OK.

```
void setup()
{
  pinMode(11, OUTPUT);
  pinMode(10, OUTPUT);
  pinMode(9, OUTPUT);
}


void loop()
{
  digitalWrite(11, HIGH);
  digitalWrite(10, HIGH);
  digitalWrite(9, 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.

Blinking them in turn.

```
void setup()
{
  pinMode(11, OUTPUT);
  pinMode(10, OUTPUT);
  pinMode(9, OUTPUT);
}


void loop()
{
  digitalWrite(11, HIGH);
  delay(1000);
  digitalWrite(11, LOW);
  digitalWrite(10, HIGH);
  delay(1000);
  digitalWrite(10, LOW);
  digitalWrite(9, HIGH);
  delay(1000);
  digitalWrite(9, LOW);
}
```

📝 Notes

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

🌻 Challenges

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.

❗ Suggest starting a new sketch.

Using a `for()` loop to cycle through them, starting with the green on pin 9, both in `setup()`, for `pinMode()` and in `loop()` for `digitalWrite()`.

```
void setup()
{
  for (int i = 9; i <= 11; i++)
  {
    pinMode(i, OUTPUT);
  }
}


void loop()
{
  for (int i = 9; i <= 11; 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. Although it starts with the green first and cycles backwards.

🌻 Challenge

Could you rewrite the sketch so that it starts at red, then yellow, and then green?

In case you didn't work it out, here is the solution. Adjusting the for loop()
so that we start with pin 11 (red LED), then yellow (amber), etc.

```
void setup()
{
  for (int i = 9; i <= 11; i++)
  {
    pinMode(i, OUTPUT);
  }
}


void loop()
{
  for (int i = 11; i >= 9; 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?

Another solution: Now it will select an LED at random. Remove the for() loop and the curly brackets.

```
void setup()
{
  for (int i = 9; i <= 11; i++)
  {
    pinMode(i, OUTPUT);
  }
}


void loop()
{
  int i = random(9, 12);
  digitalWrite(i, HIGH);
  delay(1000);
  digitalWrite(i, LOW);
}
```

📝 Notes

It will select the same one more than once. Notice that it is random between 9 and 12, that is, it is inclusive of 9 but up to 12 but not including 12.

🌻 Challenges

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?

A traffic light behaving itself. In the UK, it is red, red/amber, green, amber, back to red.

```
void setup()
{
  for (int i = 9; i <= 11; i++)
  {
    pinMode(i, OUTPUT);
  }
}


void loop()
{
  digitalWrite(11, HIGH);
  delay(1000);
  digitalWrite(10, HIGH);
  delay(1000);
  digitalWrite(11, LOW);
  digitalWrite(10, LOW);
  digitalWrite(9, HIGH);
  delay(1000);
  digitalWrite(9, LOW);
  digitalWrite(10, HIGH);
  delay(1000);
  digitalWrite(10, LOW);
}
```

📝 Notes

This is the traffic system used in the UK. If you are from another country, then your traffic lights may/will be different.

🌻 Challenges

1. If you are from another country, make your traffic lights behave according to your locality!

2. Could you simplify (make shorter) the code by using an array? Not as easy as you may think?