

Instructions:



ILLUMINATA



Instructions version 1a.

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INTRODUCTION

The MonkMakes Illuminata is designed to make it super-easy to attach a high brightness bulb to a Raspberry Pi, Pico, Arduino, ESP32 or other microcontroller board.

- 3V to 6V operation. 5V preferred.
- Built-in MOSFET for PWM and on/off control
- 1W input power at 6V
- Pre-soldered pin headers (GND, Control and +V)
- Breadboard friendly
- Laser-cut diffuser (superglue required)
- Cool Aluminum PCB heatsink
- M2.5 mounting holes

Most microcontrollers and single board computers (SBCs) like the Raspberry Pi have digital outputs that can only supply current of a few milliamps. This means that you can only use them with a low power LED, but if you want to control a high power LED light bulb then you need to use the microcontroller or SBC's output pin to switch the LED light bulb on and off (using a transistor). The illuminata includes a transistor to switch its three high brightness LEDs on and off. This is why the Illuminata has three pins. Two are for power and the third is the control pin that switches the lamp on and off.

In the following sections you will find instructions for using this board with:

- The Raspberry Pi 4 (Python)
- The Raspberry Pi Pico (MicroPython)
- Arduino (Arduino C)

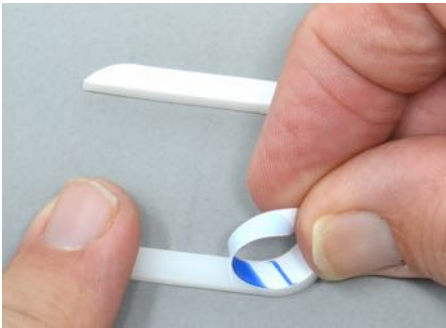
ASSEMBLY

The Illuminata is supplied as a kit, comprising the Illuminata PCB itself and a two piece laser-cut diffuser, that is attached by glue (not supplied) to the Illuminata.

If you want to use the mounting holes to attach the Illuminata to something, then make sure you put the M2.5 machine screws through the holes **before** you glue on the diffuser top in step 4.

WARNING: Super-glue can very easily stick your fingers. This is not an activity to be carried out by a child and adults should take great care when following the instructions below. Wearing disposable gloves is recommended.

Step 1. Carefully peel the backing film off both sides of both pieces of the diffuser plastic.



Step 2. Carefully draw out a thin line of glue around the bottom, right and top sides of the PCB as marked out in orange below.



Then press the backwards-C shaped diffuser piece onto the PCB taking care not to get any glue on your fingers. Leave it to set for a couple of minutes before carrying out the next step.

Step 3. Optional. If you are going to use the Illuminata's mounting holes, then now is the last chance to put screws (not supplied) through the holes before you glue the diffuser top on.

Step 4. Run another line of glue along the diffuser as shown below, and then press the top diffuser piece into place.



HOW IT WORKS

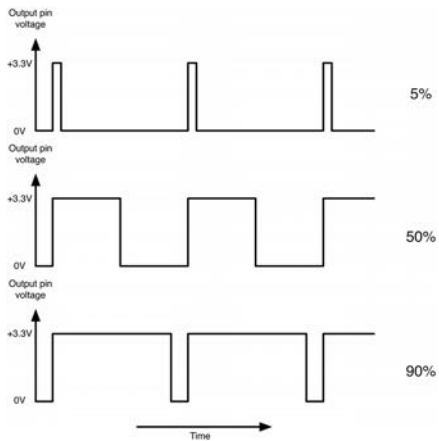
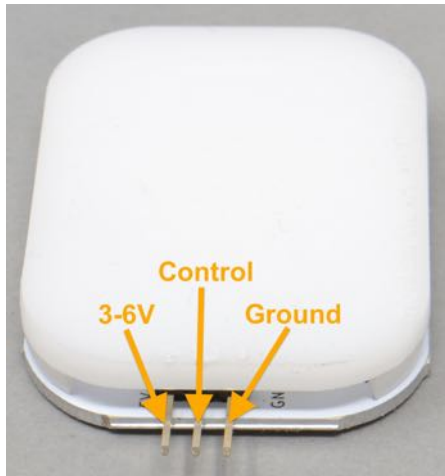
The MonkMakes Illuminata expects between 3V and 6V between the Ground pin (marked GND) and the positive supply pin (marked 5V).

5V is ideal, as it will light quite brightly and 5V is available on most boards (Arduino, Raspberry Pi, Pico etc.)

The Illuminata will not actually light until the center control pin is higher than about 1.5V relative to its GND connection. So, this control pin will normally be connected to a digital output on your microcontroller or Raspberry Pi.

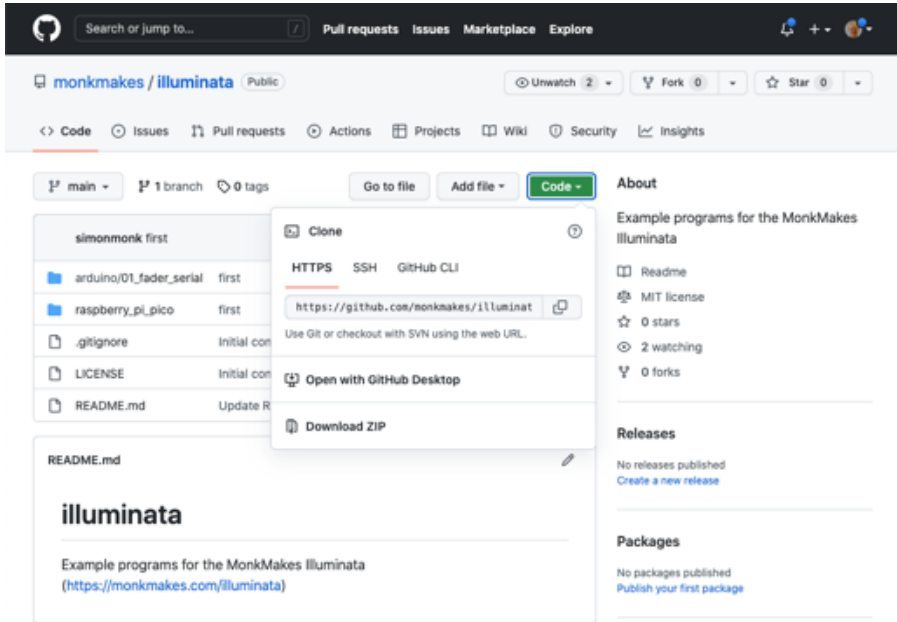
As well as turning the illuminata on and off, you can also control its brightness by connecting the Control pin to a PWM (Pulse Width Modulation) output pin.

A PWM output supplies a train of pulses to the control pin. The duration of these pulses is varied to vary the apparent brightness of the Illuminata. So a short pulse will make the illuminata appear dim, but if the pulse is long, so that it is above the 1.5V threshold for most of the cycle, then the Illuminata will appear bright.



DOWNLOADING THE EXAMPLES

To download the ZIP archive containing example programs for all platforms, visit <https://github.com/monkmakes/illuminata>



Click on the **Code** button, select Download ZIP and then extract the downloaded ZIP archive.

If you are familiar with git and would prefer to download the examples using the command line, then you can do so with the command:

```
$ git clone https://github.com/monkmakes/illuminata.git
```

With the extracted archive, you will find folders called:

- `arduino` – Arduino, ESP32 and other boards that can be programmed with the Arduino IDE
- `raspberry_pi` – Raspberry Pi Python examples
- `raspberry_pi_pico` – MicroPython examples for the Raspberry Pi Pico

RASPBERRY PI

The MonkMakes Illuminata makes a great companion to the Raspberry Pi projects when you need to light something up! The Raspberry Pi (even very old models) can supply more than enough current at 5V for the Illuminata, and the 3.3V GPIO pins are fine for controlling it.

Connecting

Connect your Raspberry Pi to the MonkMakes Illuminata using female to female jumper wires as shown below. It's much easier to work out which pin is which if you use a GPIO template like the Raspberry Leaf (<https://monkmakes.com/leaf>).



The connections are:

- GND to GND
- 5V on the Raspberry Pi to + on the Plant Monitor
- 18 on the Raspberry Pi to RX_IN on the Plant Monitor

If you have a Raspberry Pi 400, then you can still connect it to the Illuminata. You'll just need to be careful that you get the right pins.

Be careful when attaching the jumper leads to the Illuminata. Do not push them in too hard, or you may break the header pins off the circuit board.

The files you downloaded earlier as a ZIP archive include programs for various different platforms into a folder called illuminata, so open a terminal session and change to the right directory for the Raspberry Pi examples by entering the command:

```
$ cd ~/illuminata/raspberry_pi
```

Before you can run the example on the Raspberry Pi, you will need to install the GUIZero and GPIO zero modules with the commands:

```
$ pip3 install guizero
$ pip3 install gpiozero
```

You can now run the example program example 01_slider.py which uses a slider control to set the brightness of the Illuminata.

```
$ python3 01_slider.py
```



RASPBERRY PI PICO AND PICO W

The connections are as follows for a Pico or Pico W:

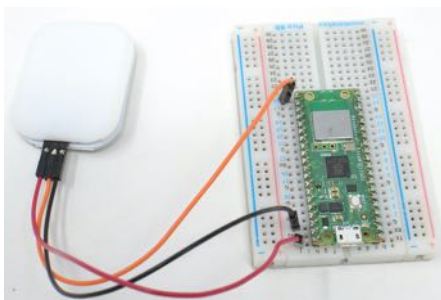
- GND to GND
- 5V on the Pico to 5V on the Illuminata
- 16 on the Pico to Control on the Illuminata

Be careful when attaching the jumper leads to the Illuminata. Do not push them in too hard, or you may break the header pins off the circuit board.

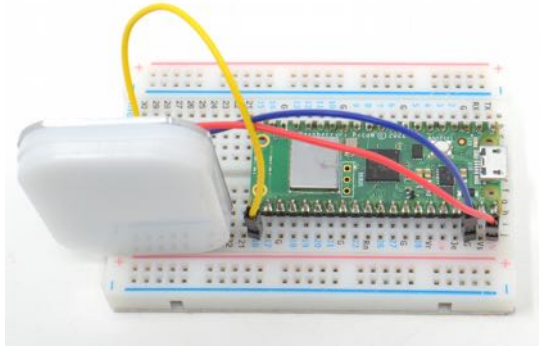
You can use female-to-female jumper wires to connect the Illuminata to a Pico as shown below.



Or, you can put your Pico in breadboard and connect it with female-to-male jumper wires. Using Breadboard for Pico (https://www.monkmakes.com/pico_bb) will make it very much easier to identify which pin of the Pico is which.



or, you can just mount the Illuminata end-on on the breadboard and use male-to-male jumper wires to make the connection.



Open Thonny on your computer and from the files that you downloaded earlier, load the file 01_fader_shell.py from the raspberry_pi_pico folder.

```
Thonny - /Volumes/GoogleDrive/My Drive/Products/_GENERAL_ELECTRONICS/illuminata/code/ill...  
01_fader_shell.py  
1 from machine import Pin, PWM  
2  
3 illuminata = PWM(Pin(16))  
4 illuminata.freq(1000)  
5  
6 while True:  
7     brightness = float(input("Enter brightness (0 to 10):"))  
8     illuminata.duty_u16(int(brightness * 6553.4))  
  
Shell  
MicroPython v1.19.1 on 2022-08-11; Raspberry Pi Pico W with RP2040  
Type "help()" for more information.  
>>> %Run -c $EDITOR_CONTENT  
Enter brightness (0 to 10):5  
Enter brightness (0 to 10):10  
Enter brightness (0 to 10):0  
Enter brightness (0 to 10):  
MicroPython (Raspberry Pi Pico)
```

Run the program and you will see a prompt in the Shell area to enter the brightness as a number between 0 (off) and 10 (full brightness).

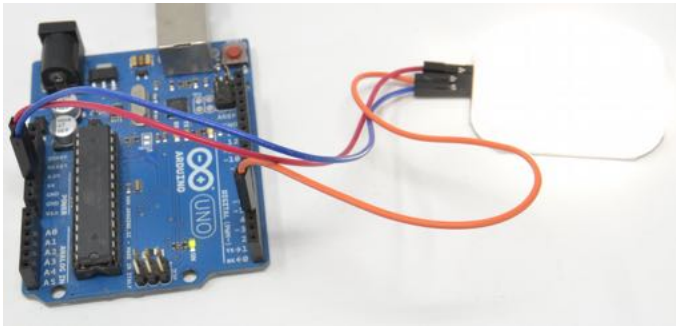
ARDUINO

In this section, we will assume the use of an Arduino Uno, but, in fact pretty much any Arduino or Arduino IDE compatible board (such as an ESP32 board) can be adapted to work with this example code.

The connections are as follows:

- GND on the Arduino to GND on the Illuminata
- 5V on the Arduino to 5V on the Illuminata
- Pin 3 on the Arduino to (or any PWM capable pin) to Control on the Illuminata

Be careful when attaching the jumper leads to the Illuminata. Do not push them in too hard, or you may break the header pins off the circuit board.



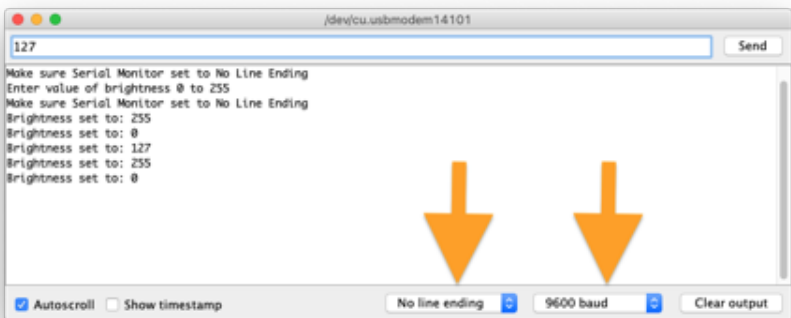
In the examples that you downloaded earlier, you will find a folder called arduino. and within that a folder called 01_fader_serial.

Open the file 01_fader_serial.ino in the Arduino IDE.



```
1 /*
2  * Example sketch for the MorisMakes Illuminata
3  * https://morismakes.com/illuminata
4  */
5
6 const int illuminataPin = 3;
7
8 void setup() {
9   pinMode(illuminataPin, OUTPUT);
10  Serial.begin(9600);
11  Serial.println("Enter value of brightness 0 to 255");
12  Serial.println("Make sure Serial Monitor set to No Line Ending");
13 }
14
15 void loop() {
16   if (Serial.available()) {
17     int brightness = Serial.parseInt();
18     analogWrite(illuminataPin, brightness);
19     Serial.print("Brightness set to: ");
20     Serial.println(brightness);
21   }
22 }
```

Upload the program onto your Arduino and then open the Serial Monitor. Set the baud rate to 9600 and make sure that it is set to *No line ending*.



Enter different value of brightness and you should see the brightness of the Illuminata change.

TROUBLESHOOTING

Problem: I've connected power to the Illuminata's GND and 5V pins, but it is not lit.?

Solution: That's correct, the Illuminata won't illuminate until the Control pin is connected to more than 1.5V (logic high). Try connecting the Control pin to the positive supply of the illuminata and it should light.

Problem: The illuminata is connected to my microcontroller, but is not lighting, even though I am setting the Control pin to logic high using a GPIO pin.

Solution: Make sure that the pin in your code is the same as the pin you have physically connected. Also, jumper wires can become faulty. Try substituting the wires.

Problem: The illuminata is a little bit flickery, when used with my Raspberry Pi.

Solution: That's to be expected. The Raspberry Pi's PWM does not maintain consistent pulses.

Problem: I've stuck my fingers together with super glue.

Solution: We told you to be careful! Go and get some medical help. They have solvents that will release your fingers without pulling any layers of skin off.

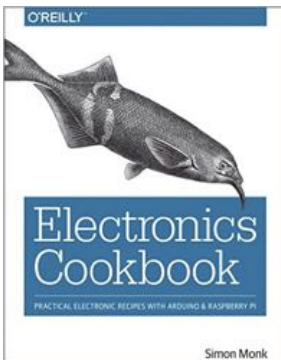
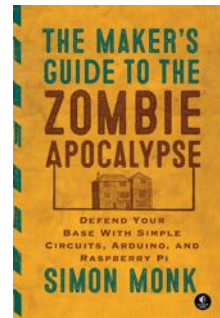
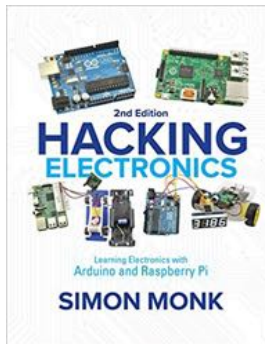
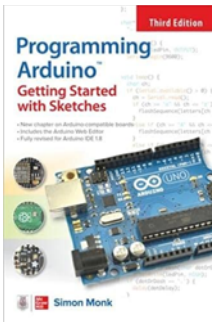
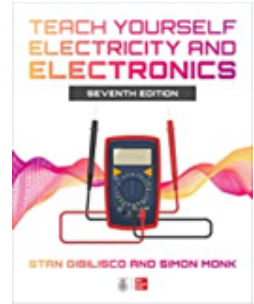
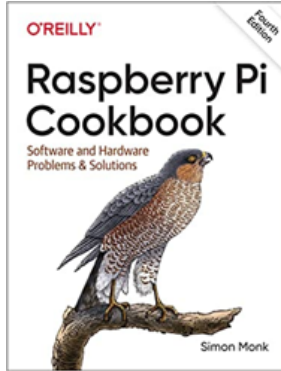
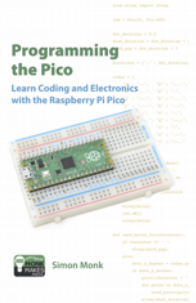
SUPPORT

You can find the Product's information page here:
<https://monkmakes.com/illuminata> including a datasheet for the product.

If you need further support, please email support@monkmakes.com.

BOOKS

The designer of this product (Simon Monk) also writes books about electronics. You may find some of these interesting.



MONKMAKES

As well as the illuminata, MonkMakes makes all sorts of kits and gadgets to help with your electronics projects. Find out more, as well as where to buy here: <https://monkmakes.com> you can also follow MonkMakes on Twitter @monkmakes.

