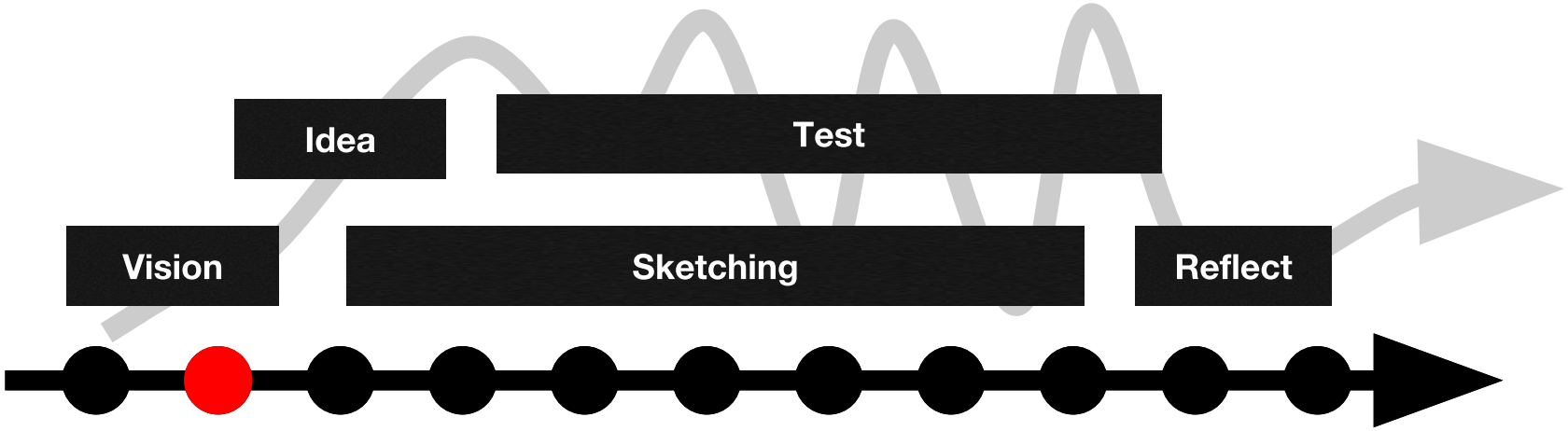
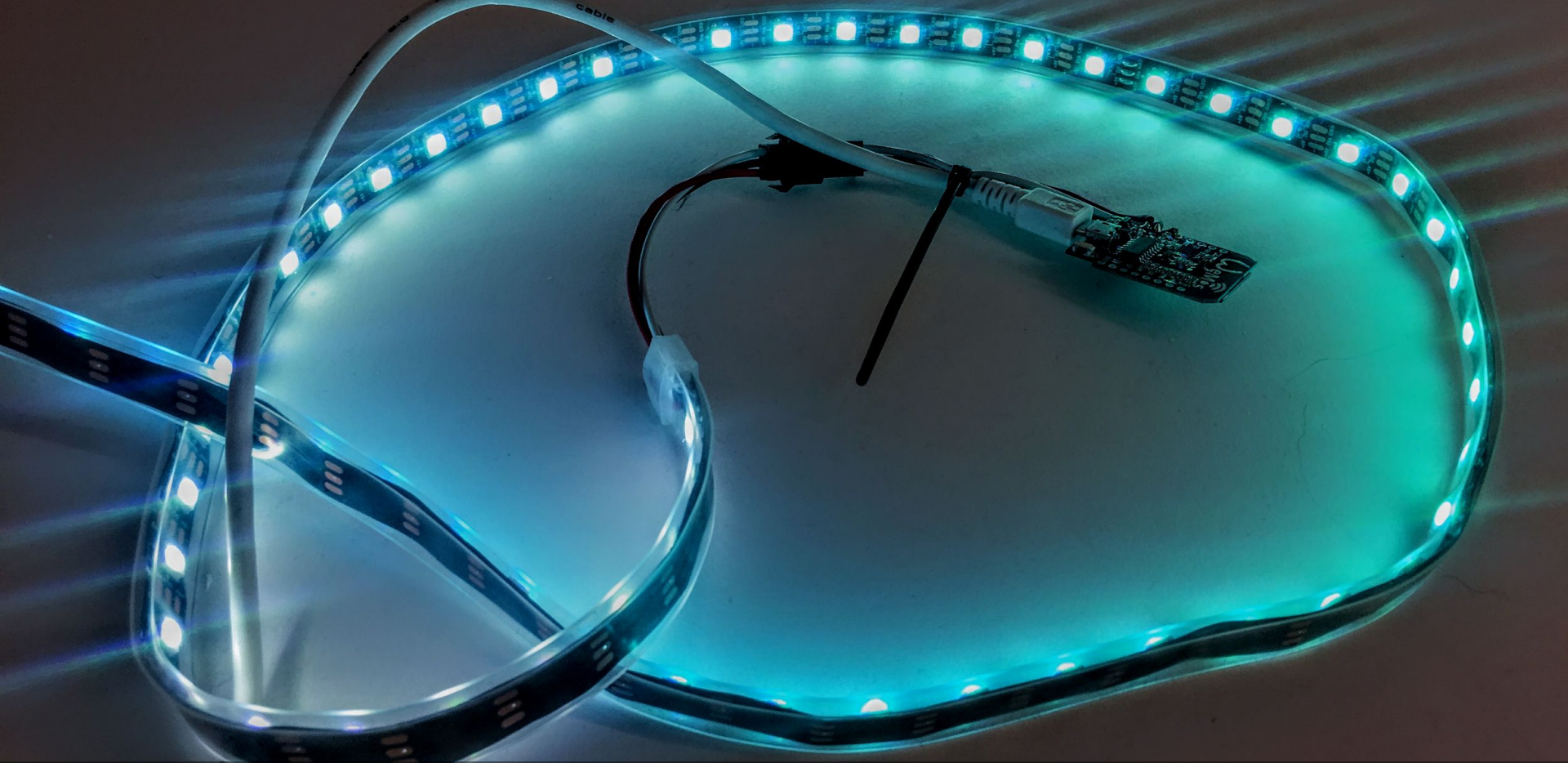
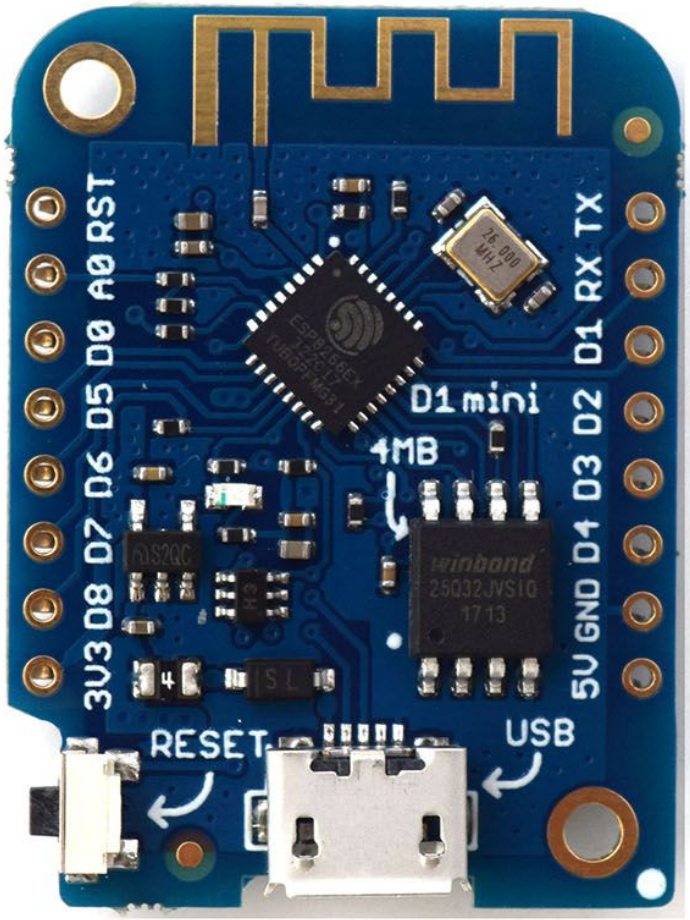

Idea
Test
Vision
Sketching
Reflect

First introduction to light programming
Energy awareness
Inspiration sharing
Make it interactive
Grouping
Cardboard experiment



First introduction to light programming

- Websocket
- HTTP Server
- Captive portal
- DHCP Server
- Access point



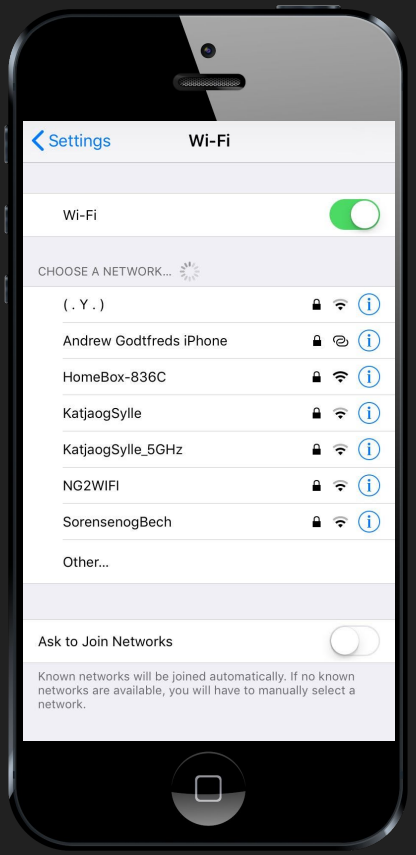
Websocket

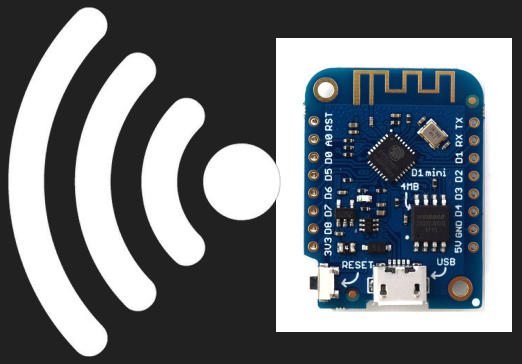
HTTP Server

Captive portal

DHCP Server

Access point





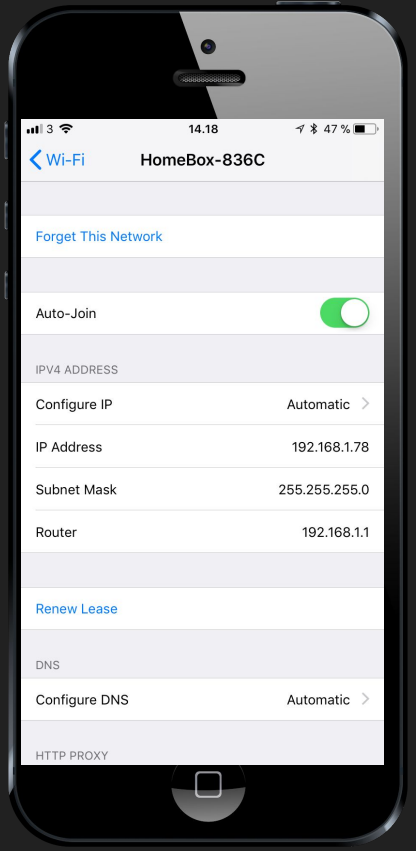
Websocket

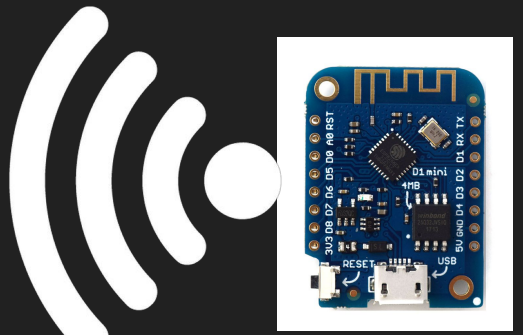
HTTP Server

Captive portal

DHCP Server

Access point





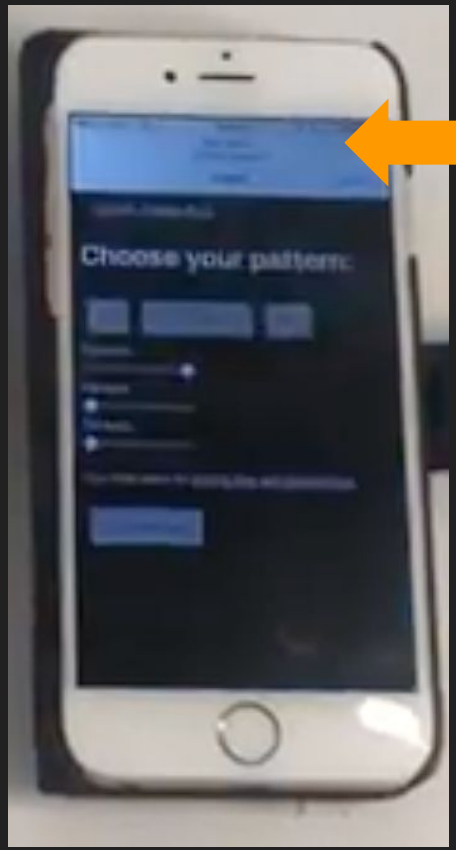
Websocket

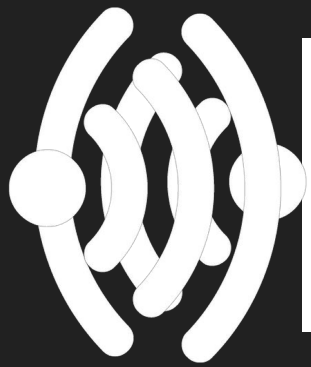
HTTP Server

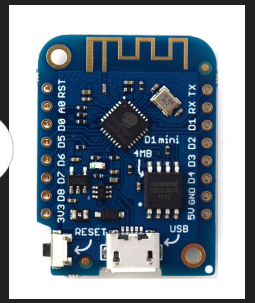
Captive portal

DHCP Server

Access point







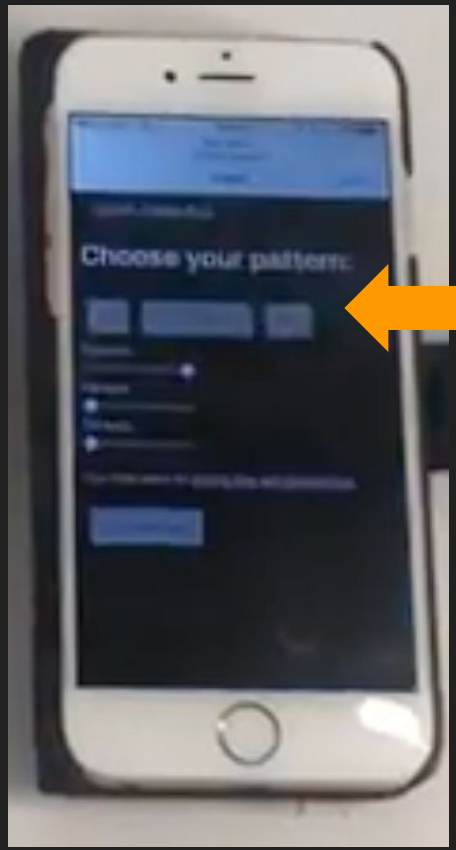
Websocket

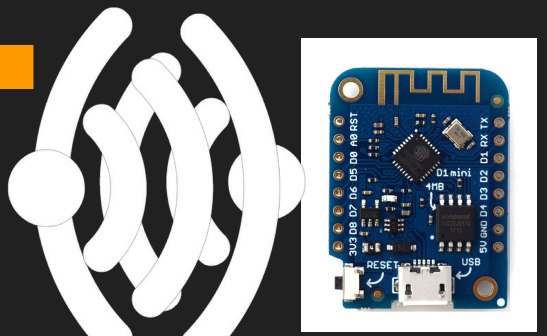
HTTP Server

Captive portal

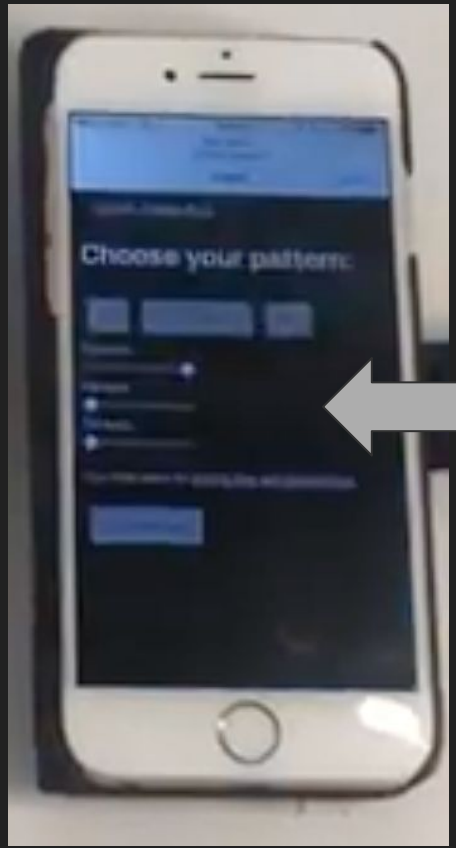
DHCP Server

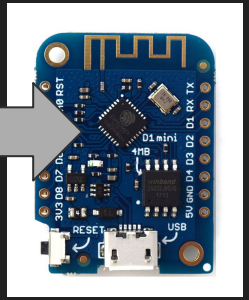
Access point



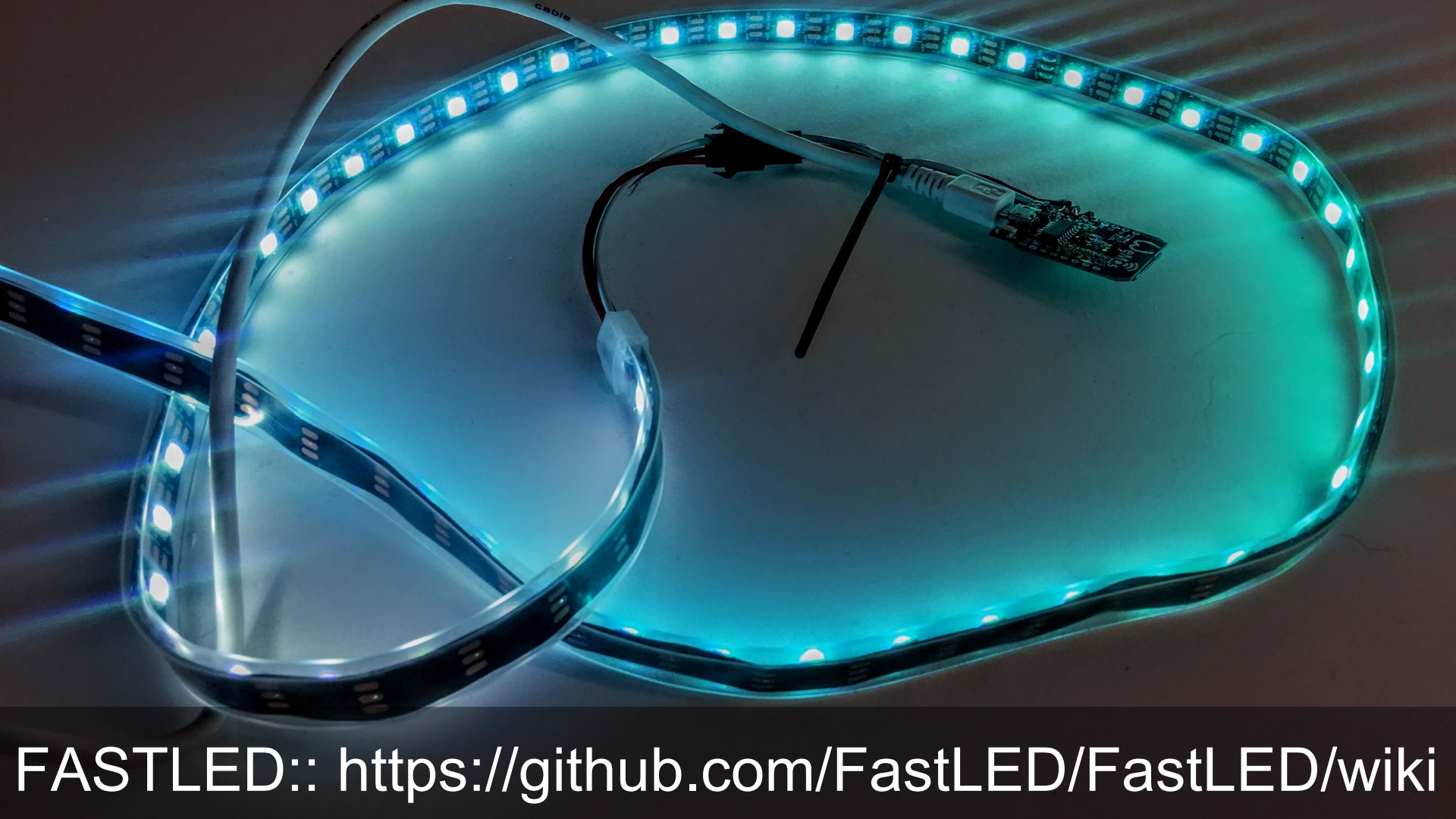


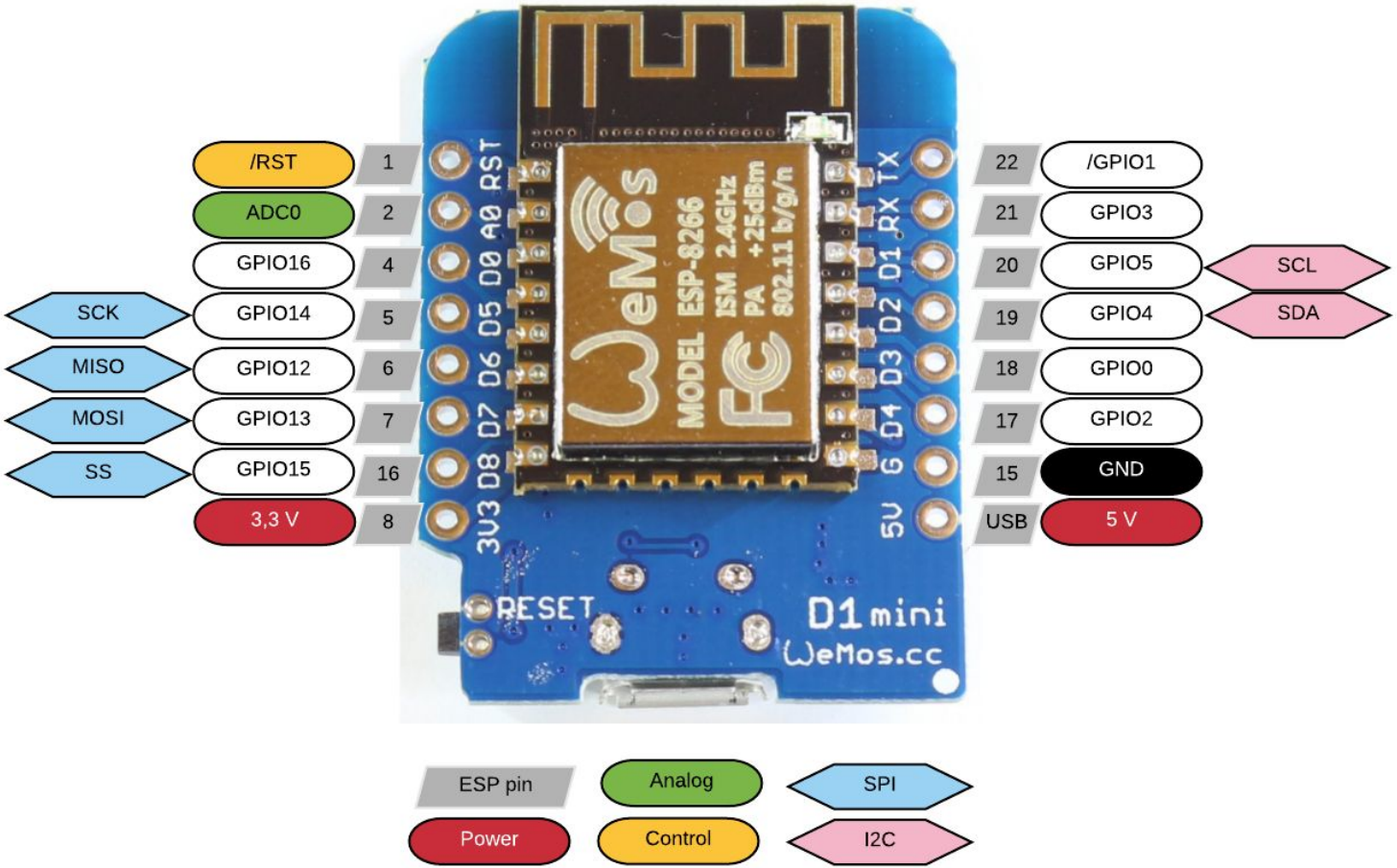
- Websocket
- HTTP Server
- Captive portal
- DHCP Server
- Access point

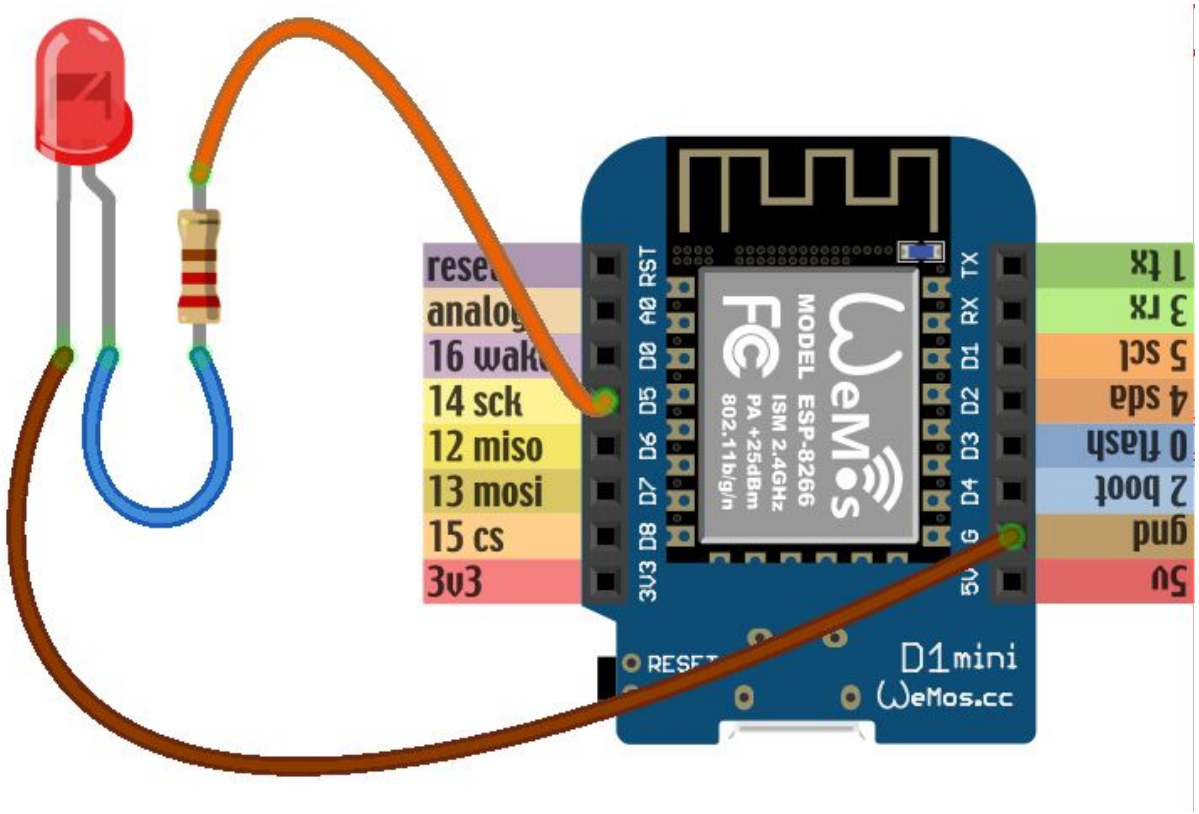


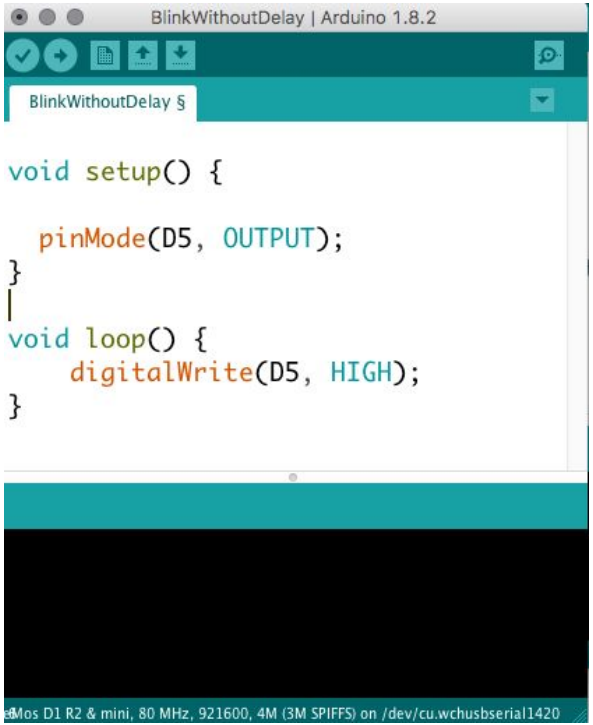


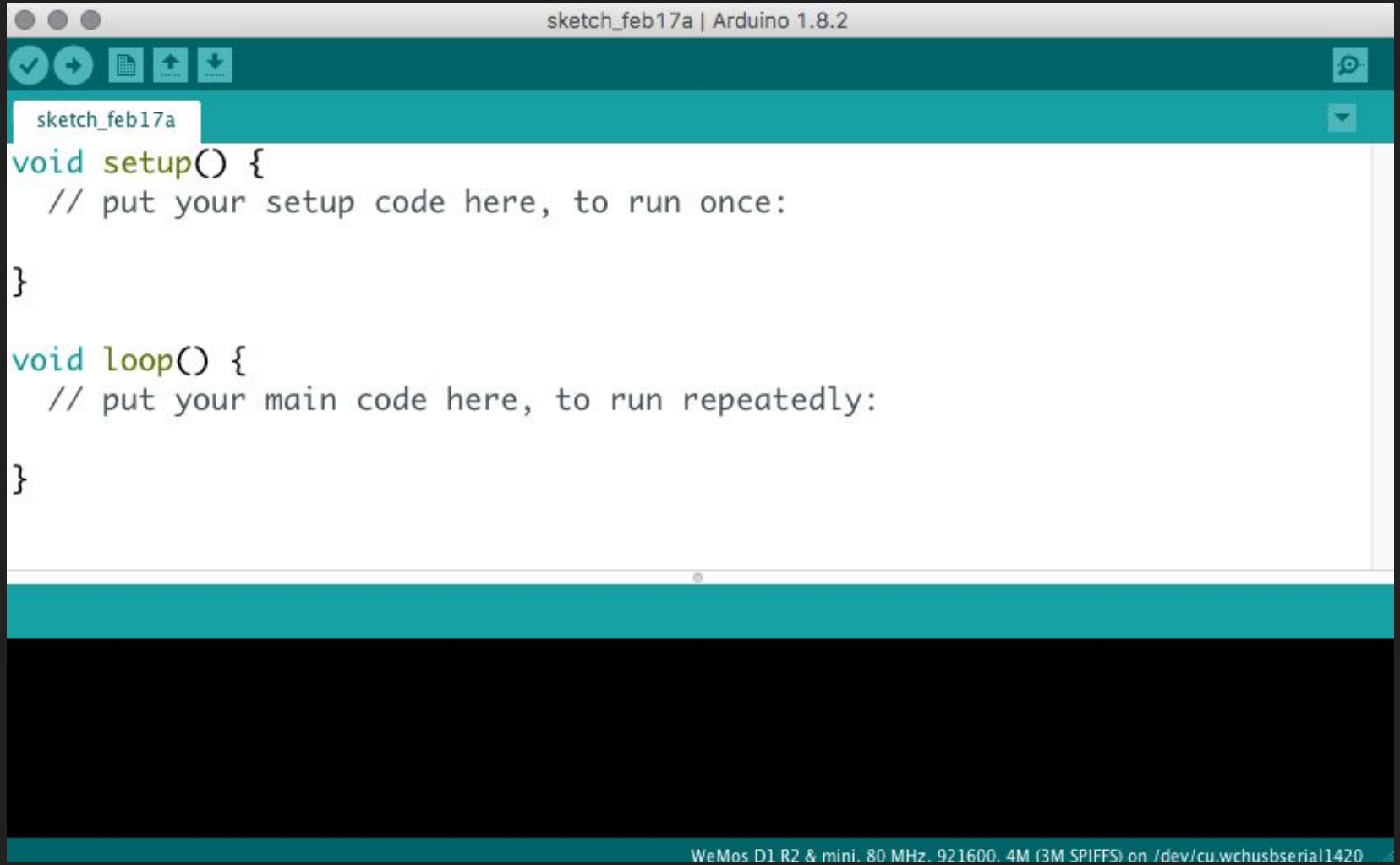
Websocket	Real-time communication
HTTP Server	Hosts HTML content
Captive portal	Forces browser window (DNS)
DHCP Server	IP address to mobile
Access point	Wifi-connection to mobile


FASTLED:: https://github.com/FastLED/FastLED/wiki


/RST
1
ADC0
2
GPIO16
4
SCK
GPIO14
5
MISO
GPIO12
6
MOSI
GPIO13
7
SS
GPIO15
16
3,3 V
8
22
/GPIO1
21
GPIO3
20
GPIO5
SCL
19
GPIO4
SDA
18
GPIO0
17
GPIO2
15
GND
USB
5 V
RST
A0
D0
D5
D6
D7
D8
3V3
RX
TX
D1
D2
D3
D4
G
5V
MODEL ESP-8266
ISM 2.4GHz
PA +25dBm
802.11 b/g/n
RESET
D1 mini
WeMos.cc
ESP pin
Analog
SPI
Power
Control
I2C


reset
analog
16 wak
14 sck
12 miso
13 mosi
15 cs
3v3
1 tx
3 rx
5 scl
4 sda
0 flash
2 boot
gnd
5v
RST
A0
D0
D5
D6
D7
D8
3V3
TX
RX
D1
D2
D3
D4
G
5V
MODEL ESP-8266
ISM 2.4GHz
PA +25dBm
802.11b/g/n
D1mini
WeMos.cc


BlinkWithoutDelay | Arduino 1.8.2
BlinkWithoutDelay §
void setup() {
pinMode(D5, OUTPUT);
}
void loop() {
digitalWrite(D5, HIGH);
}
eMos D1 R2 & mini, 80 MHz, 921600, 4M (3M SPIFFS) on /dev/cu.wchusbserial1420


sketch_feb17a | Arduino 1.8.2
sketch_feb17a
void setup() {
// put your setup code here, to run once:
}
void loop() {
// put your main code here, to run repeatedly:
}
WeMos D1 R2 & mini, 80 MHz, 921600, 4M (3M SPIFFS) on /dev/cu.wchusbserial1420

ioGlow_v5_scaled | Arduino 1.8.2

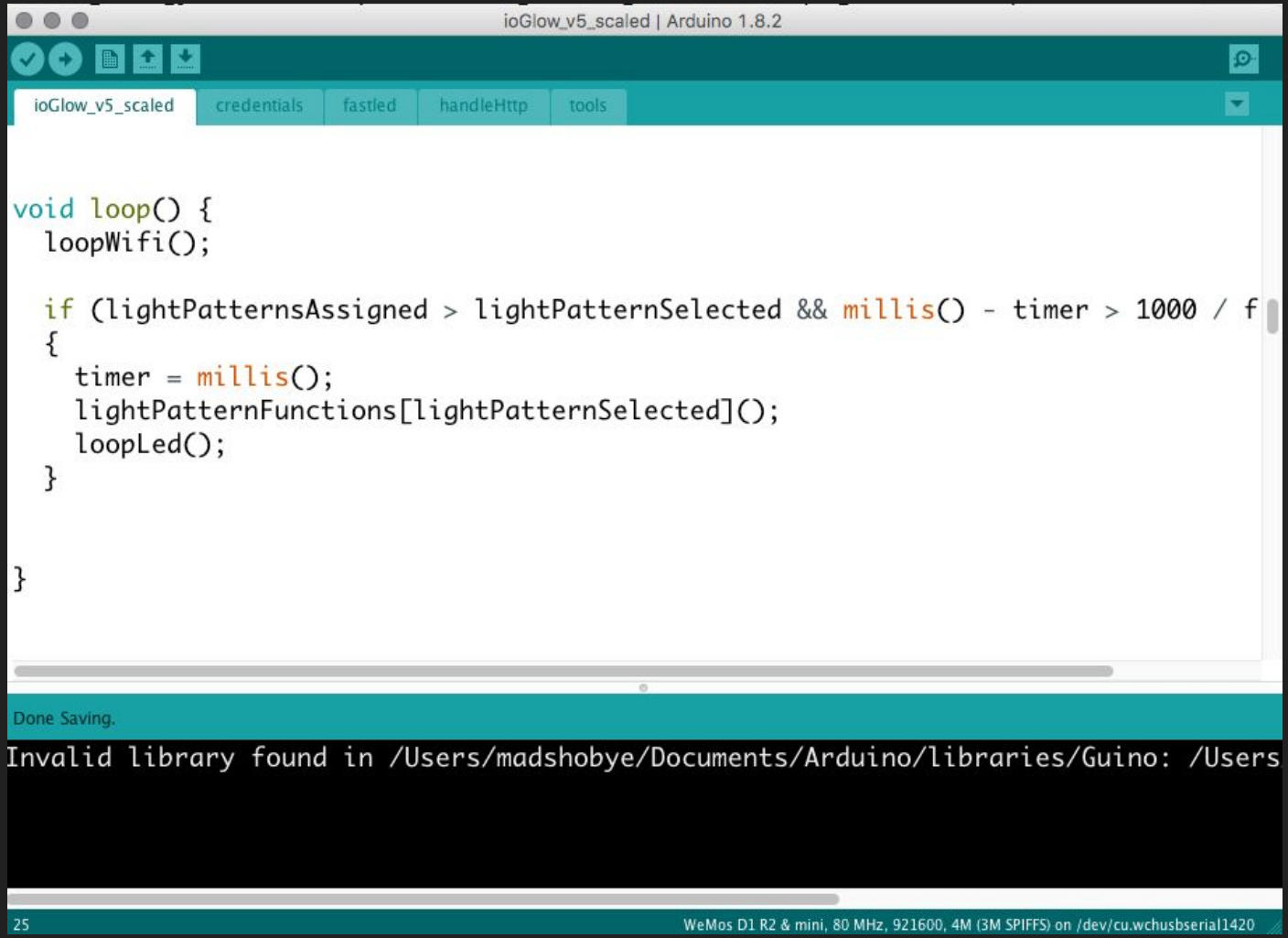
ioGlow_v5_scaled | credentials | fastled | handleHttp | tools

```
void setup() {

  setupLed();

  delay(1000);
  Serial.begin(115200);
  Serial.println();

  //Serial.setDebugOutput(true);
  setupWifi();
  addLightPattern(off, "Off");
  addLightPattern(red, "Red");
  addLightPattern(rgb, "RGB");
  addLightPattern(hsv, "HSV");
  addLightPattern(chase, "Chase");
  addLightPattern(cylon, "cylon");
  addLightPattern(freePattern, "Free Pattern");


  if (ULTRASONIC)
  {
    addLightPattern(interactive, "Interactive");
    usSetup();
  }


}
```

Done Saving.

```
Invalid library found in /Users/madshobye/Documents/Arduino/libraries/Guino: /Users/mads
```

25 WeMos D1 R2 & mini, 80 MHz, 921600, 4M (3M SPIFFS) on /dev/cu.wchusbserial1420


ioGlow_v5_scaled | Arduino 1.8.2
ioGlow_v5_scaled
credentials
fastled
handleHttp
tools
void loop() {
loopWifi();
if (lightPatternsAssigned > lightPatternSelected && millis() - timer > 1000 / f
{
timer = millis();
lightPatternFunctions[lightPatternSelected]();
loopLed();
}
}
Done Saving.
Invalid library found in /Users/madshobye/Documents/Arduino/libraries/Guino: /Users
25
WeMos D1 R2 & mini, 80 MHz, 921600, 4M (3M SPIFFS) on /dev/cu.wchusbserial1420

ioGlow_v5_scaled | Arduino 1.8.2

ioGlow_v5_scaled | credentials | fastled | handleHttp | tools

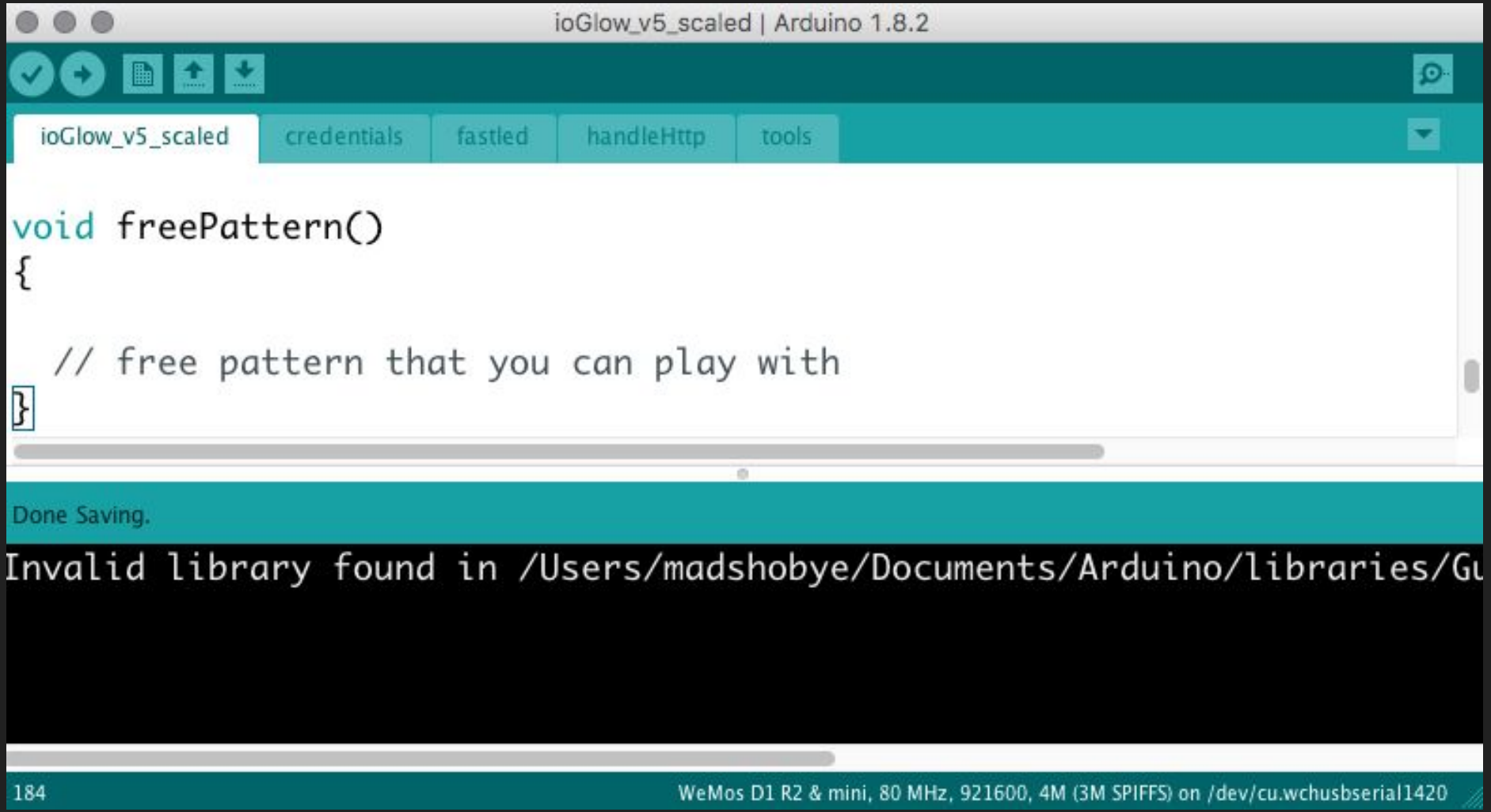
```
float value = 0;
void chase() {
  value = (value + 0.2f) ;
  if(value > NUM_LEDS)
  {
    value = 0;
  }

  for (int i = 0; i < NUM_LEDS; i++)
  {
    if ((int)value == i)
    {
      leds[i] = CRGB(255, 0, 0);
    }
    else
    {
      leds[i].fadeToBlackBy( 100 ); // 25% 64/256th
    }
    yield();
  }
}
```

Done Saving.

```
Invalid library found in /Users/madshobye/Documents/Arduino/libraries/Guino: /Users/madshobye/Documents/Arduino/l
```

141

WeMos D1 R2 & mini, 80 MHz, 921600, 4M (3M SPIFFS) on /dev/cu.wchusbserial1420


ioGlow_v5_scaled | Arduino 1.8.2
ioGlow_v5_scaled
credentials
fastled
handleHttp
tools
void freePattern()
{
// free pattern that you can play with
}
Done Saving.
Invalid library found in /Users/madshobye/Documents/Arduino/libraries/Gu
184
WeMos D1 R2 & mini, 80 MHz, 921600, 4M (3M SPIFFS) on /dev/cu.wchusbserial1420


ioGlow_v5_scaled | Arduino 1.8.2
ioGlow_v5_scaled
credentials
fastled
handleHttp
tools
void freePattern()
{
// free pattern that you can play with
}
Make your own pattern!
/libraries/Gu
184
WeMos D1 R2 & mini, 80 MHz, 921600, 4M (3M SPIFFS) on /dev/cu.wchusbserial1420

First introduction to light programming
Energy awareness
Inspiration sharing
Make it interactive
Grouping
Cardboard experiment

Figure 1. The modern home; littered with electrical appliances while electric meters and fuses, from a design viewpoint, still are at a very immature stage of representation. Images from the interviews.

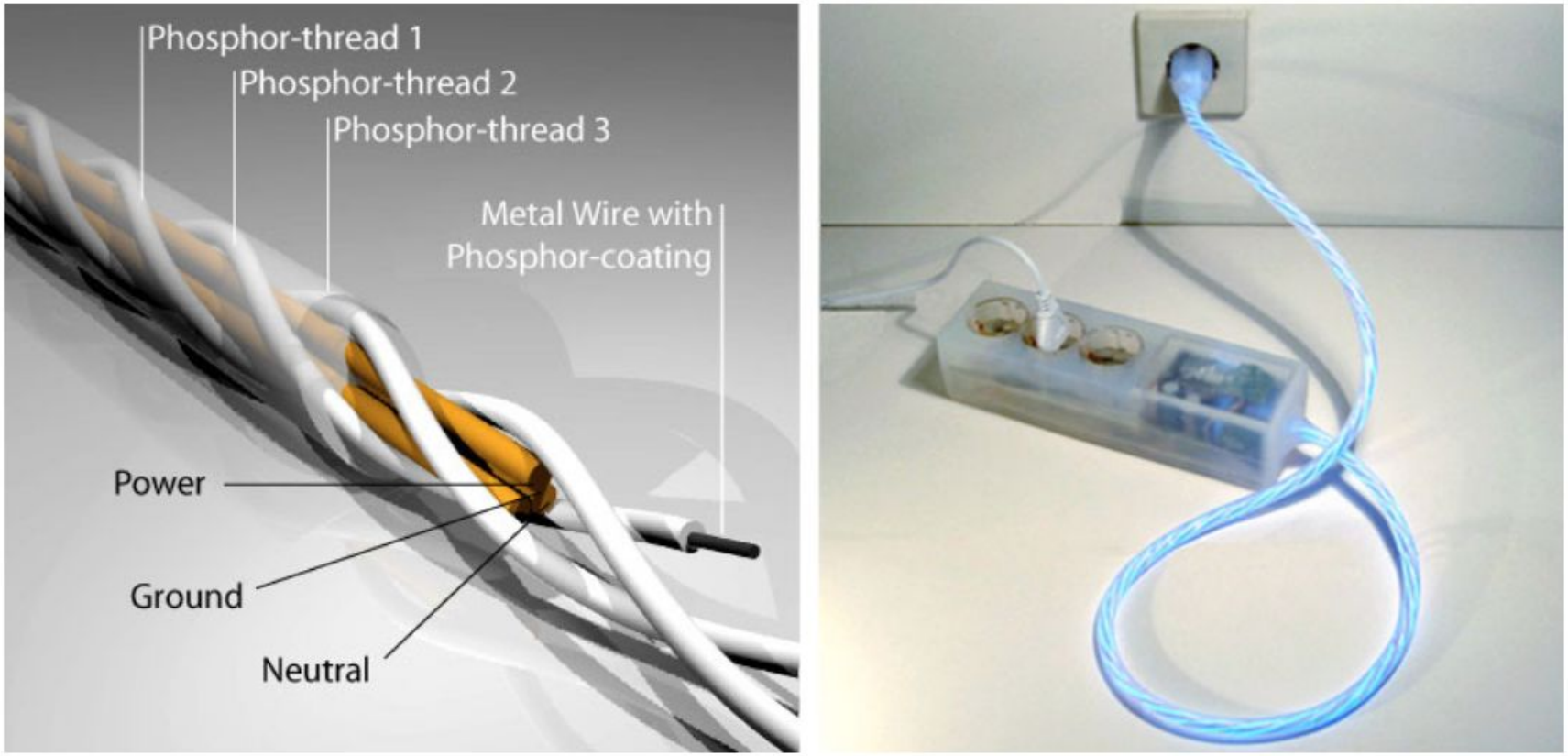


Figure 2. To make the light inside the cord simulate a flowing motion, the three threads are lit one at a time. Silicone protects all the wires .To the left is the working prototype.e

Figure 1: Two of the authors comparing the real-time value (white) with today's max (orange) & min (blue) values. The light spots can be arranged and projected in any direction seen fit.

The dark grey torch, with a white light beam, is a real-time electricity meter that loads new information every 30 seconds, providing almost instant feedback on electricity usage. If the light spot is small, the electricity consumption at the factory is low. If the light spot is large, electricity consumption is high.

Blue beam visualises the smallest amount of electricity (minimum) used during the day.

Orange beam visualises the highest amount of electricity (maximum) used during that day.

12:42

Watt-Lite is an unfamiliar object to the staff in the factories, but the shape of a torch gives a hint of treating it as an explorative device, a detective’s tool that can show what might otherwise be hidden. A regular torch highlights what is hidden in the dark, whereas Watt-Lite highlights the hidden use of electricity - making the invisible visible.

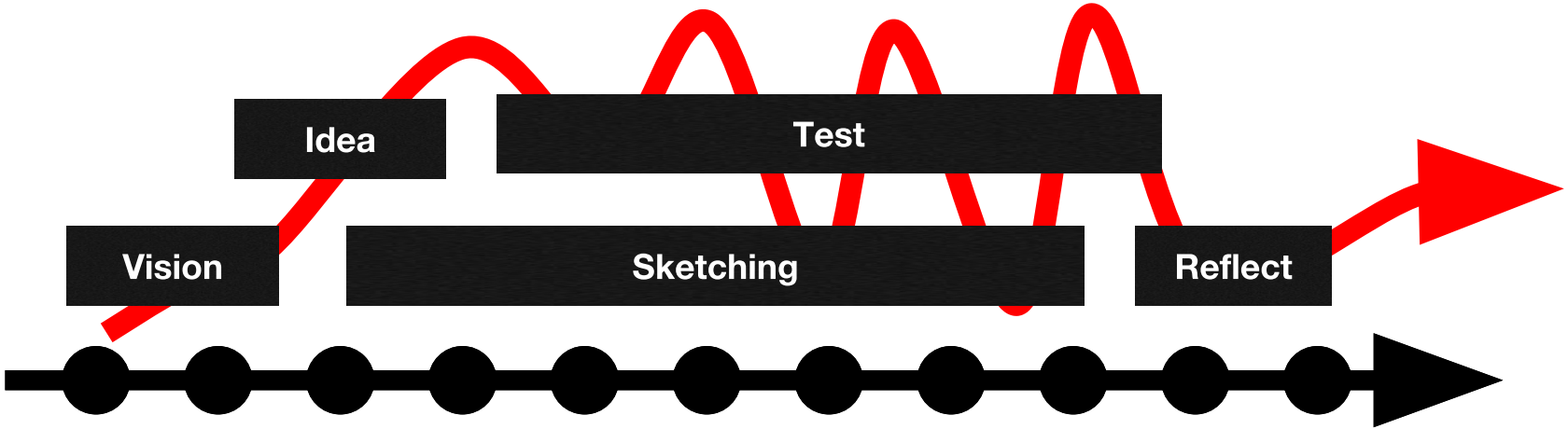
One Theme:

What if people are aware of their energy consumption?

- How do we interact with the information?
- How do we understand what is a lot and a little?
- What behaviour do we want to change?

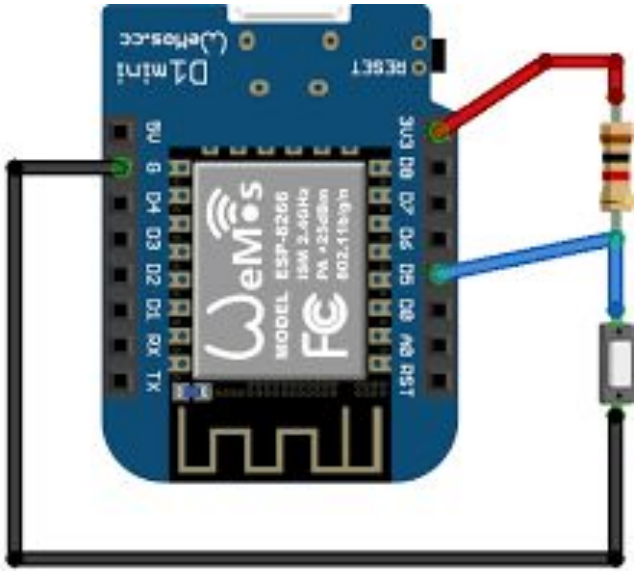
Infinite possibility space!

- No finite solution.
- Form, expression and materials matter.
- Iterative dialogue with the prototype to understand the possibilities.

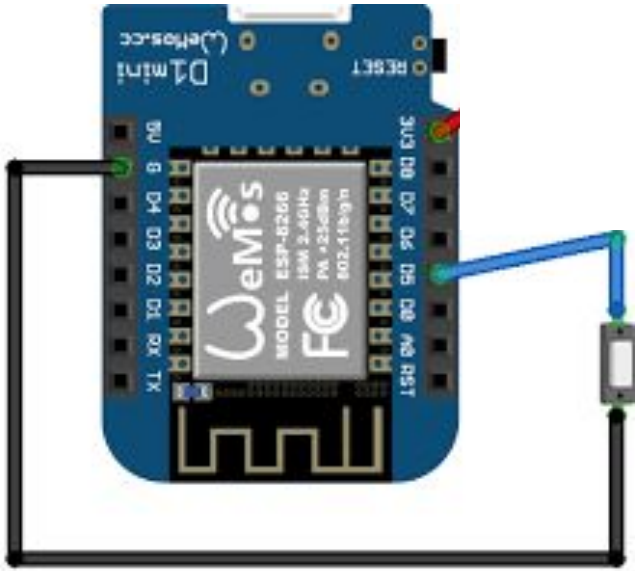

Idea
Test
Vision
Sketching
Reflect

First introduction to light programming
Energy awareness
Inspiration sharing
Make it interactive
Grouping
Cardboard experiment

First introduction to light programming
Energy awareness
Inspiration sharing
Make it interactive
Grouping
Cardboard experiment



External pullup:
pinMode(D6, INPUT);



Internal pullup:
pinMode(D6, INPUT**_PULLUP**);


Flame sensor


Magnet-ring sensor


Laser-transmit

Relay module

Obstacle avoidance sensor


Metal touch sensor


18b20 Temperature sensor


Photo resistor sensor


Joystick PS2


Rotate-encode


Digital-temperature sensor


Infrared-Receive sensor


Analog-temperature sensor

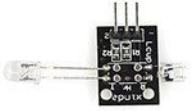

RGB LED


Microphone sensor


Passiver buzzer


Humiture sensor


Two-color commoncathode LED



Finger-Pulse Sensor module


Magnetic spring


Tilt-Swith


Analogy-hall sensor


Knock sensor


Common-Cathode RED&GREEN LED module


Linear-Hall sensor


Active buzzer


Hall sensor

Colorful Auto-flash


High-Sensitive voice sensor


Push button


Light break sensor


Hydrargyrum-switch sensor

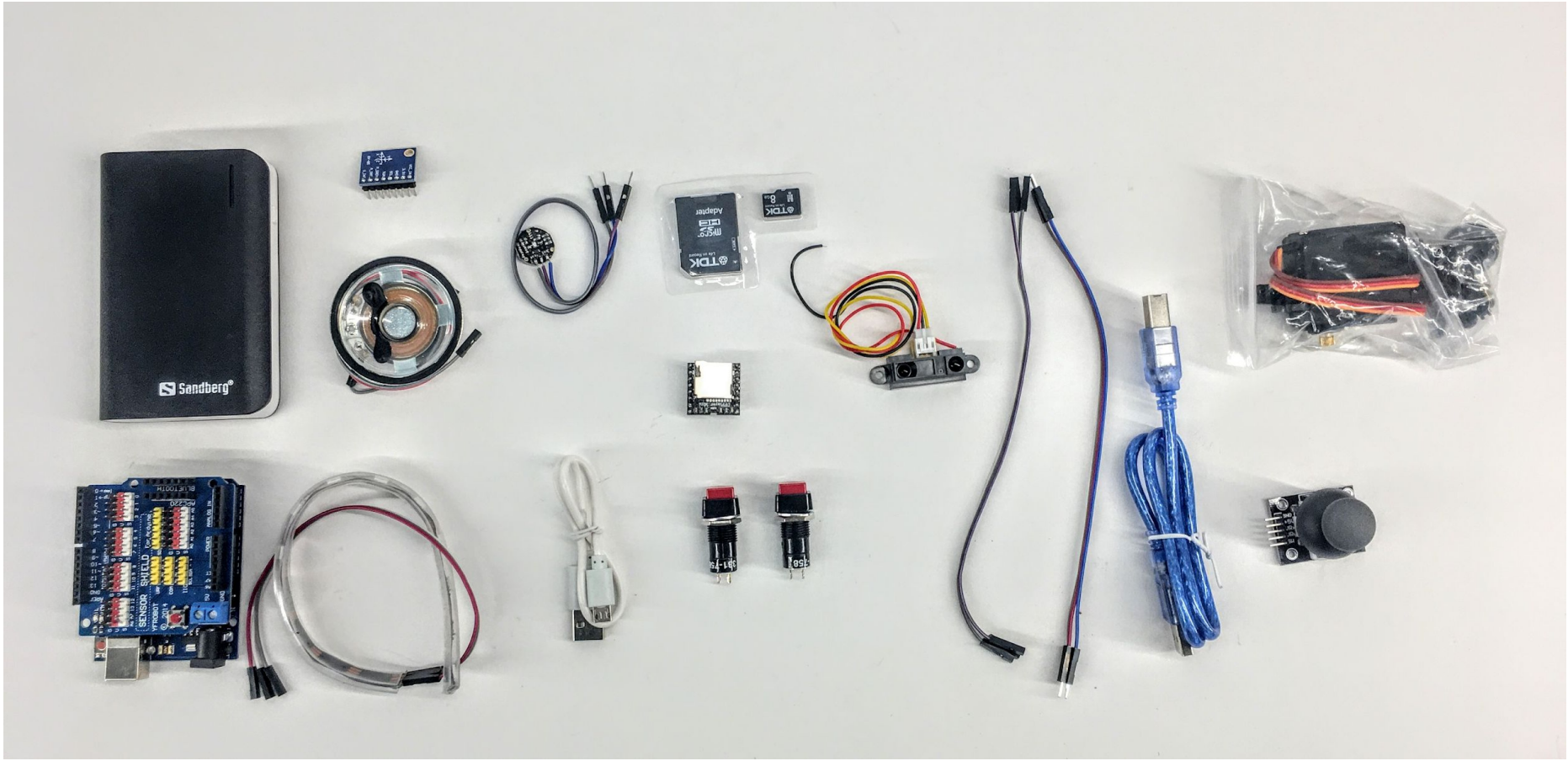

Magic-ring


Tracking sensor


Shock-switch sensor


RGB LED module


Infrared-transmit


Sandberg
TDK
Micro SD
Adapter
SENSOR SHIELD
BLUETOOTH

First introduction to light programming
Energy awareness
Inspiration sharing
Make it interactive
Grouping
Cardboard experiment

First introduction to light programming
Energy awareness
Inspiration sharing
Make it interactive
Grouping
Cardboard experiment