AIoT 感測物聯系統應用創意競賽

Human Solar Charger

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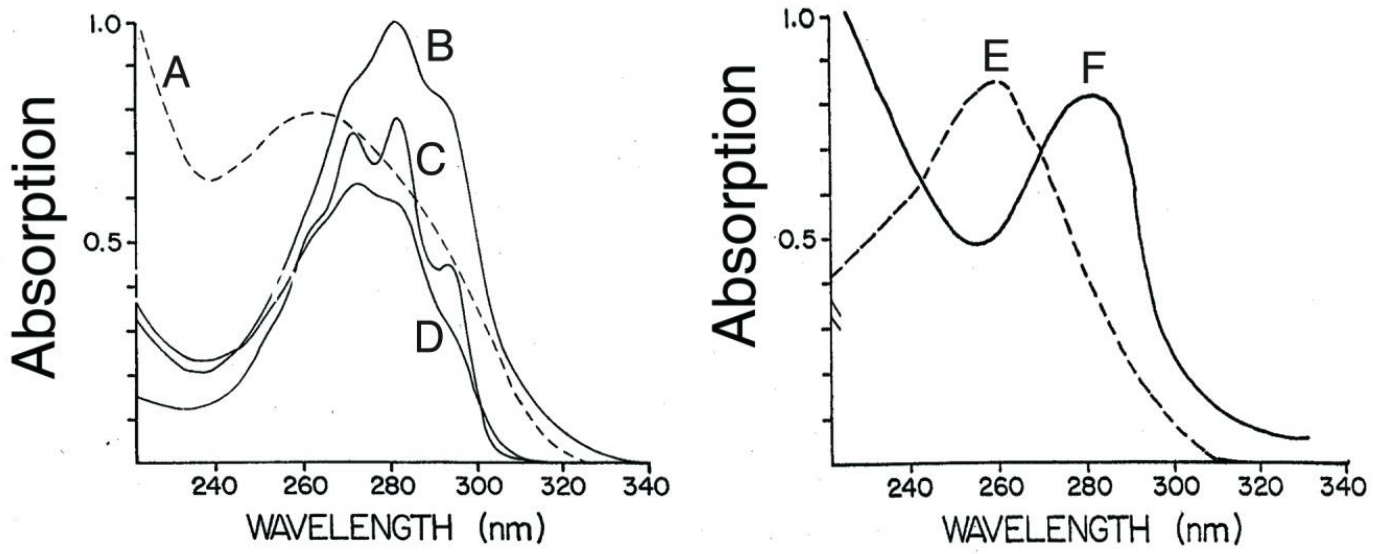
MICAtronics Foundry

Motivation

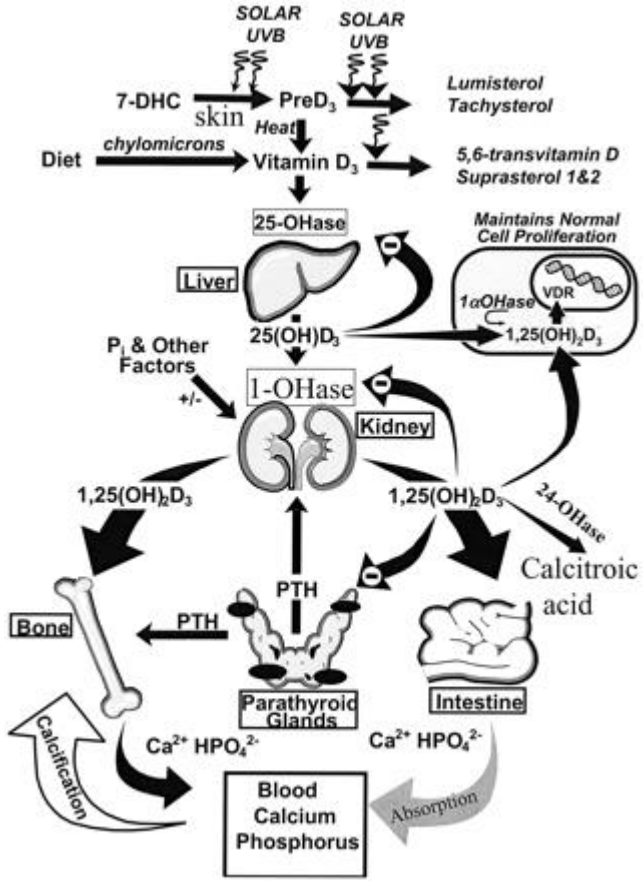
Motivation

Regular sun exposure is the most natural way to get health because UVB rays are essential for making vitamin D.

UV absorption spectra for (A) previtamin D_3, (B) tachysterol, (C) provitamin D_3 (7-dehydrocholesterol), (D) lumisterol, (E) DNA, and (F) albumin.



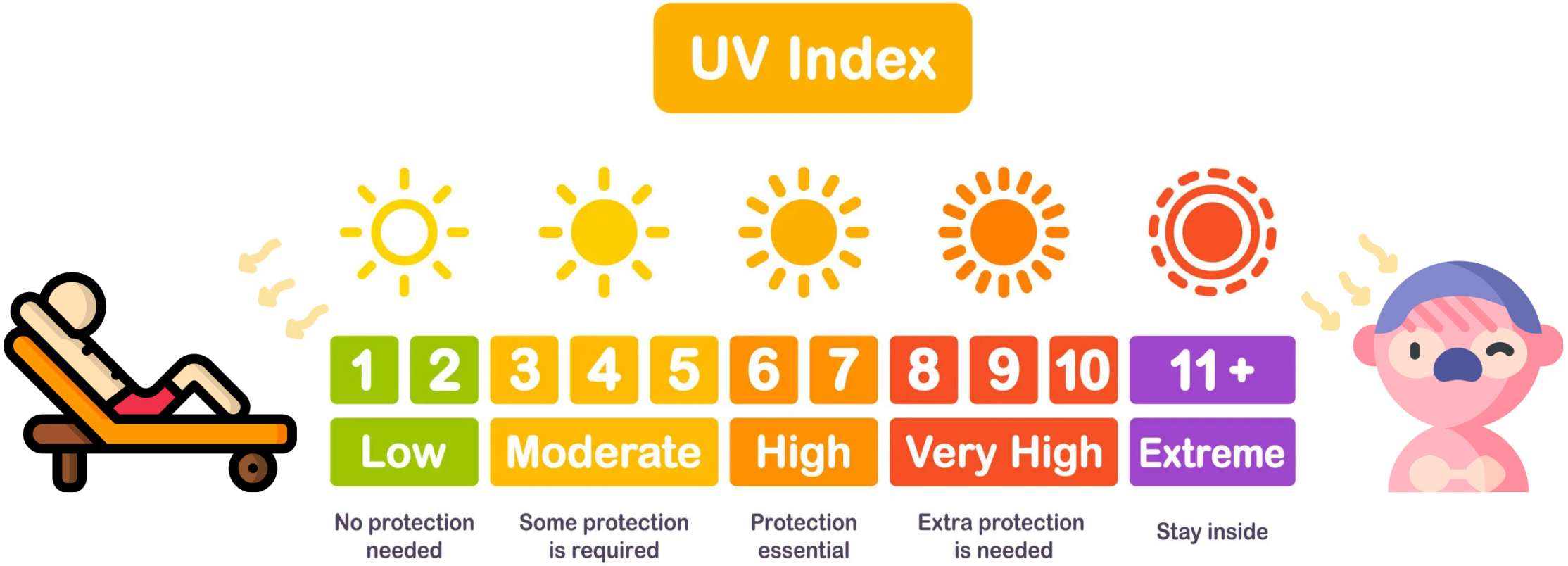
Schematic diagram of cutaneous production of vitamin D and its metabolism and regulation for calcium homeostasis and cellular growth.



Holick, M. F. (2004). Sunlight and vitamin D for bone health and prevention of autoimmune diseases, cancers, and cardiovascular disease. *The American journal of clinical nutrition*, *80*(6), 1678S-1688S.

Wacker, M., & Holick, M. F. (2013). Sunlight and Vitamin D: A global perspective for health. *Dermato-endocrinology*, *5*(1), 51-108.

Motivation


UV Index
1 2 3 4 5 6 7 8 9 10 11+
Low
Moderate
High
Very High
Extreme
No protection needed
Some protection is required
Protection essential
Extra protection is needed
Stay inside

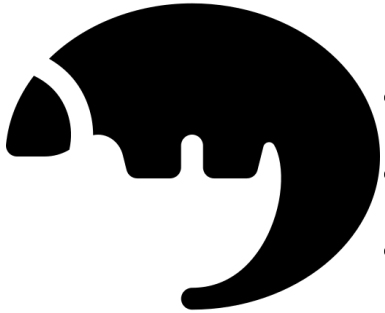
Motivation

Children

- Boost immunity
- Promotes eye health
- Improve brain function

Elder

- Lower blood pressure
- Reduce cancer risk
- Relieves body aches
- Maintain strong bone



Homebody

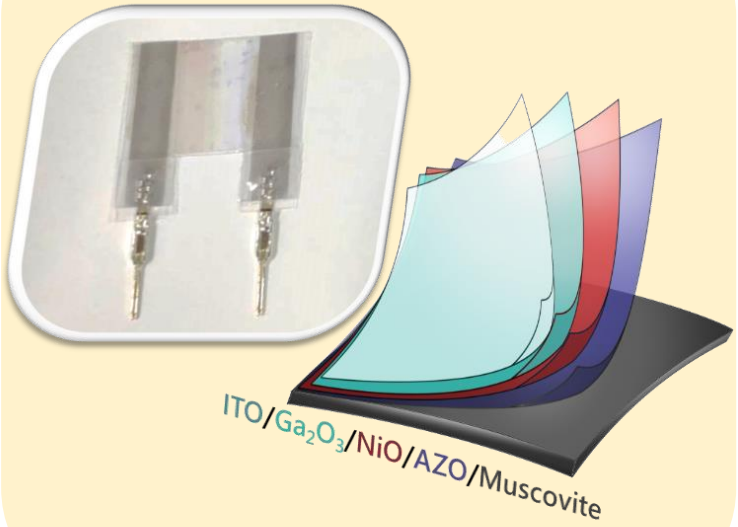
- Improve sleep quality
- Aids weight loss
- Eases mild depression

Sensitive skin

- Aware of sunlight
- Heal skin disorder
- Fights seasonal affective disorder

Procedure

Sensor

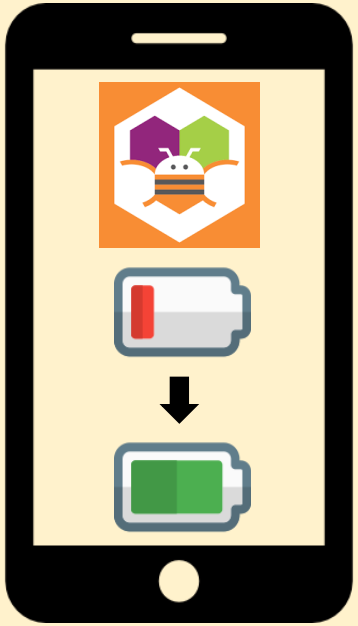


ASP

Data structure

ARDUINO™

UI

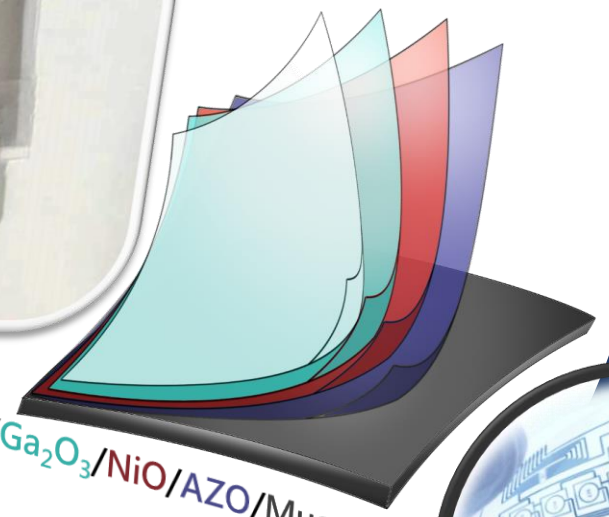


Sensor

DUV Sensing

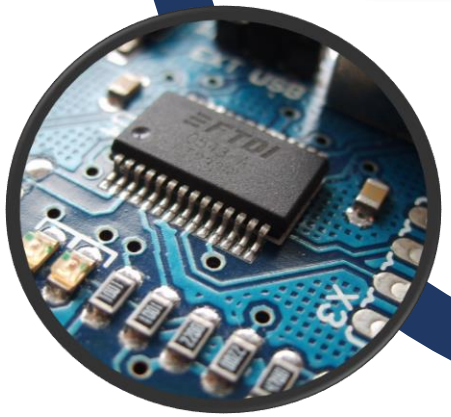
透過深紫外光-光電二極體的幫助，我們可以得知外在環境的紫外線多寡，以電流形式傳給ASP做訊號處理。

Deep UV Photodiode



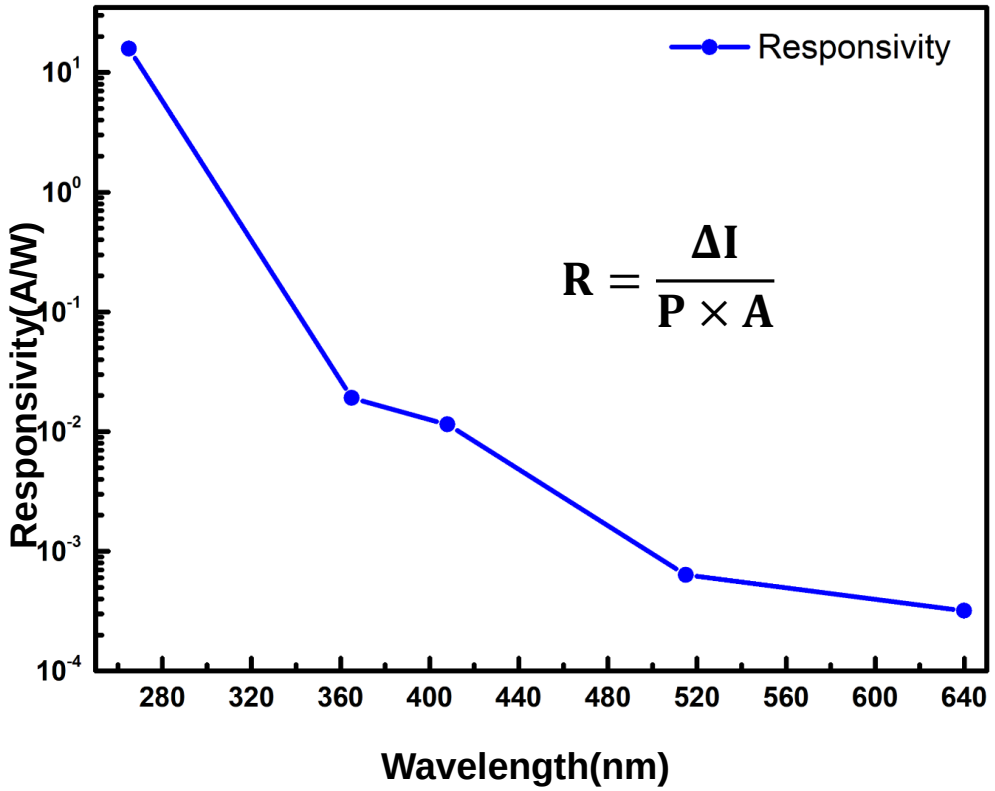
Flexible

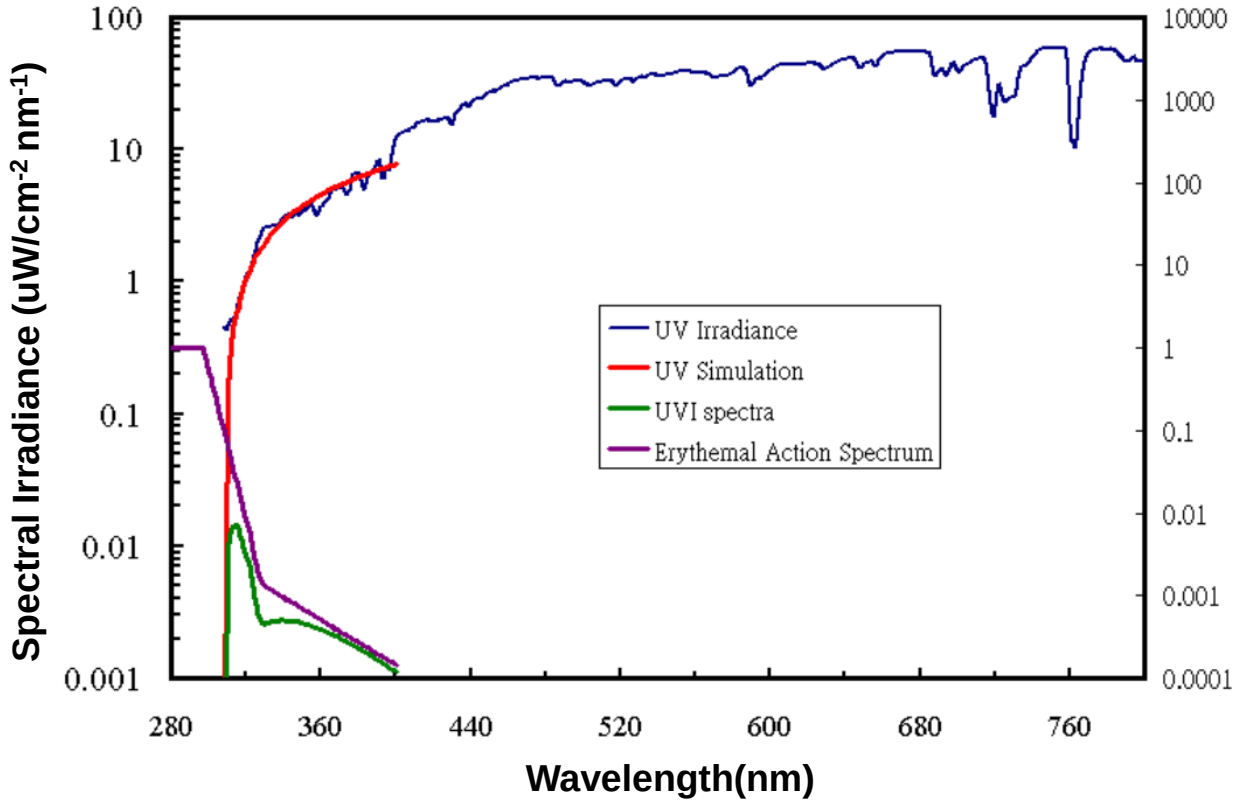
High Power Electronics



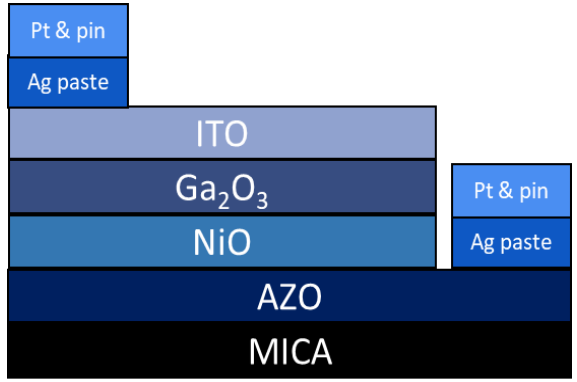
Transparent

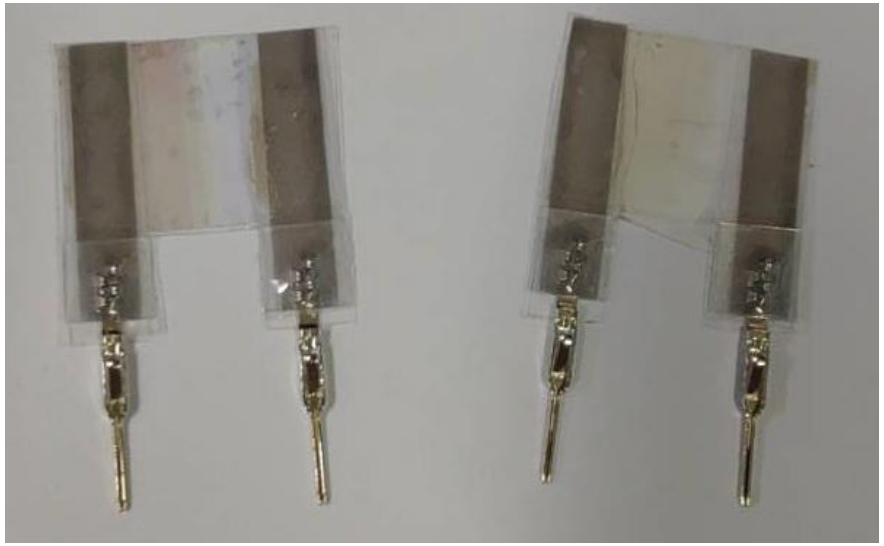
Motivation

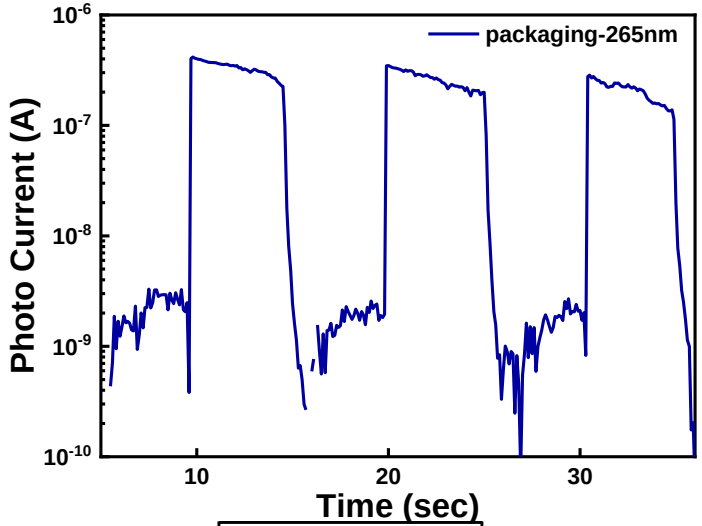

Responsivity
Responsivity(A/W)
10^{1}
10^{0}
10^{-1}
10^{-2}
10^{-3}
10^{-4}
280 320 360 400 440 480 520 560 600 640
Wavelength(nm)
$R = \frac{\Delta I}{P \times A}$


Spectral Irradiance (uW/cm-2 nm-1)
100
10
1
0.1
0.01
0.001
10000
1000
100
10
1
0.1
0.01
0.001
0.0001
280 360 440 520 600 680 760
Wavelength(nm)
UV Irradiance
UV Simulation
UVI spectra
Erythemal Action Spectrum

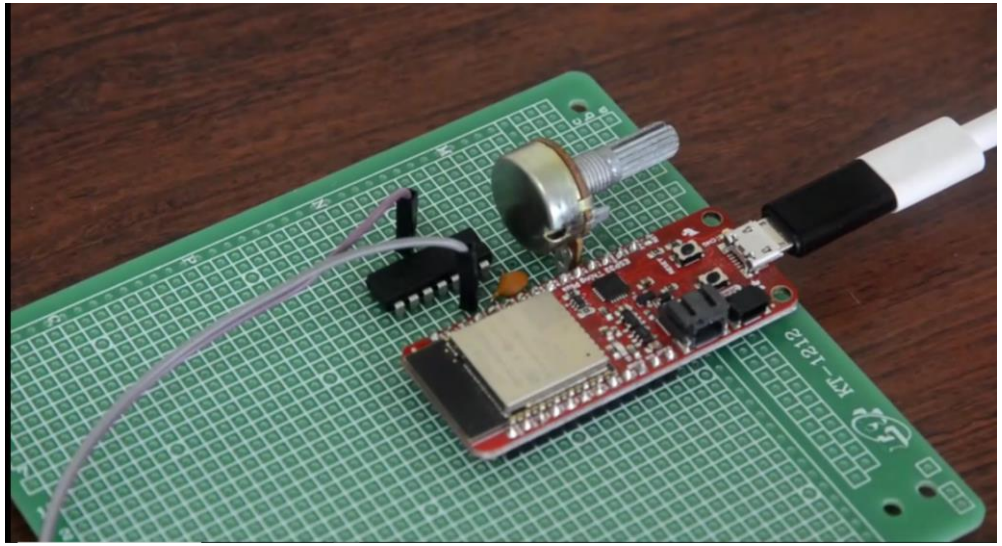
Device

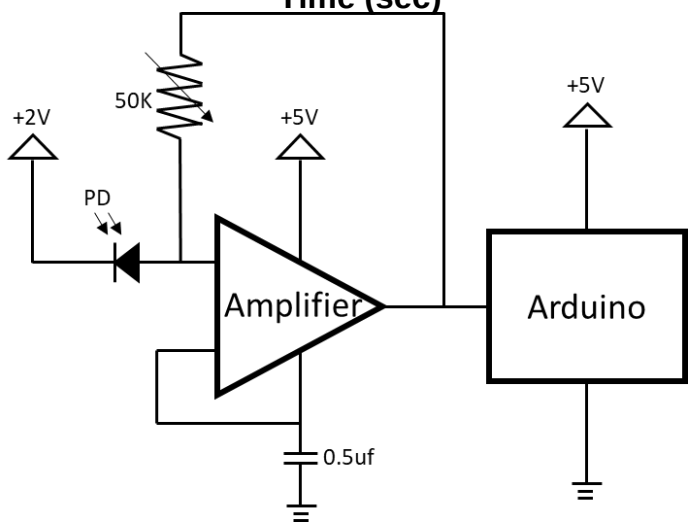






簡易電路的連接與
Arduino ESP32的配合，
能讓我們輕易的抓取電訊號。



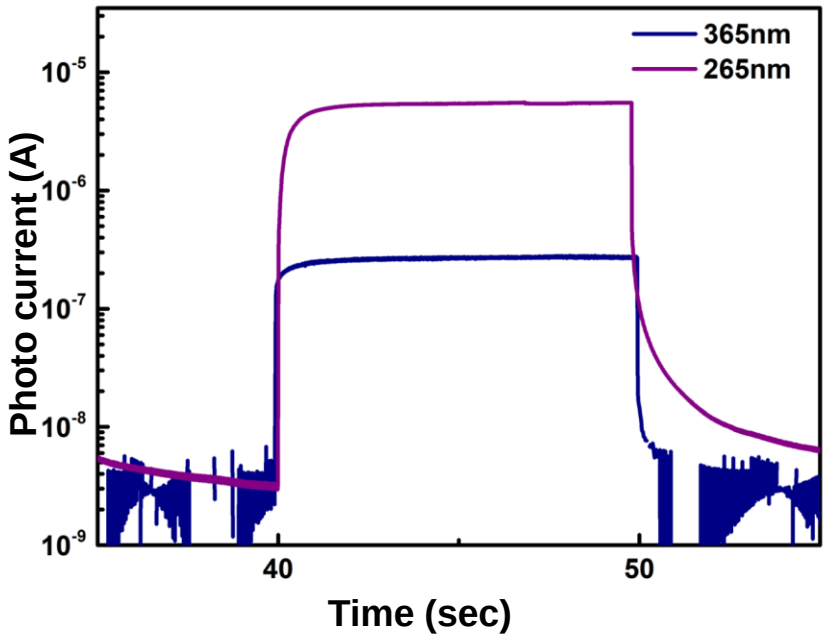


Analog Signal Processor

```
#include <BluetoothSerial.h>
BluetoothSerial BT;//宣告藍芽BT

int potpin = A4;
int val;
int cal;

void setup() {
Serial.begin(9600);
BT.begin("Smartgp55374");
}

void loop() {
// start working...
  val = analogRead(potpin);
  cal= val*0.04;
  Serial.println("==================================");
  BT.println((int)cal);
  delay(200); //休息0.2秒
}
```

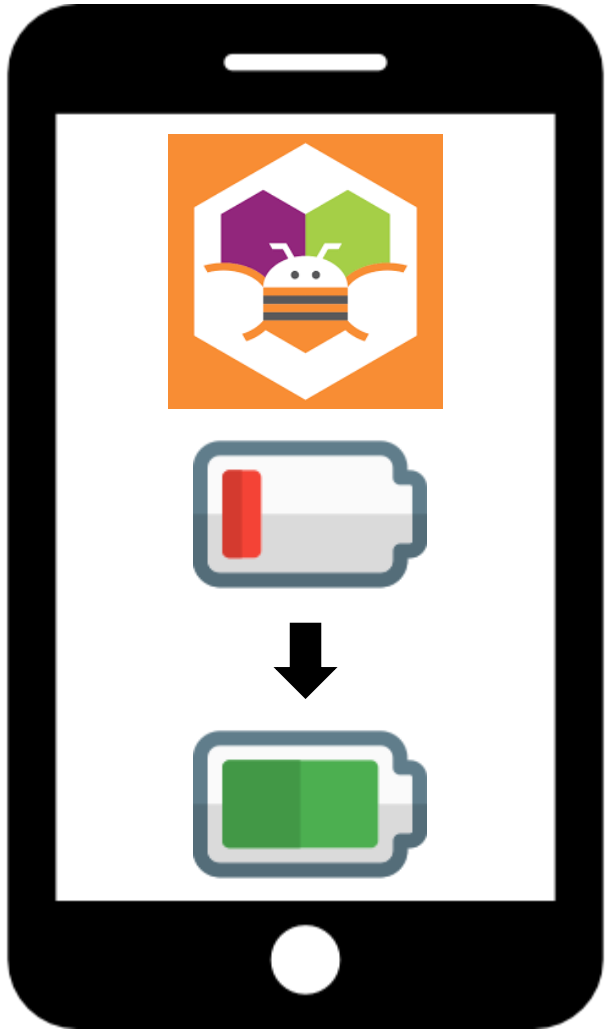
User Interface - Prototype

User Interface



Transfer into UV index

Integral to UVB daily dose



User Interface