

Radiation Mapper Using DFRobot Beetle ESP32-C6

Explore your surroundings like never before with a Geiger counter-based radiation mapper built using Beetle ESP32-C6.

 Difficult  Facile

 Dur e 2 heure(s)

 Cat gories  lectronique

 Co t 20 USD (\$)

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Introduction

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Mat riaux

Outils

Étape 1 - Overview

In an age where invisible environmental factors matter more than ever, having personal access to real-time radiation data can be both empowering and educational. This project transforms the tiny but powerful **Beetle ESP32-C6** into a **wearable Geiger Counter**, enabling background radiation monitoring, data logging, and potential cloud integration—all in a portable form factor.

Whether you're exploring vintage collectibles, surveying urban areas, or just curious about your surroundings, this compact DIY device is a step toward environmental awareness.



Étape 2 - Components

Component	Purpose
Beetle ESP32-C6	Ultra-compact Wi-Fi/BLE/Zigbee/Matter-capable microcontroller
DFRobot Geiger Counter (SEN0463)	Detects ionizing radiation (alpha, beta, gamma rays)
Jumper Wires	Connect modules securely
Li-Po Battery (Optional)	Enables portable use
USB-C Cable	For programming/debugging
Arduino IDE	Code uploading environment
DFRobot Geiger Library	Handles sensor operations

Étape 3 - Get PCBs for Your Projects Manufactured

You must check out PCBWAY for ordering PCBs online for cheap! You get 10 good-quality PCBs manufactured and shipped to your doorstep for cheap. You will also get a discount on shipping on your first order. Upload your Gerber files onto PCBWAY to get them manufactured with good quality and quick turnaround time. PCBWay now could provide a complete product solution, from design to enclosure production. Check out their online Gerber viewer function. With reward points, you can get free stuff from their gift shop. Also, check out this useful blog on PCBWay Plugin for KiCad from here. Using this plugin, you can directly order PCBs in just one click after completing your design in KiCad.



Étape 4 - ? Hardware Setup

Wiring

Geiger Module → Beetle ESP32-C6

VCC → 3.3V

GND → GND

OUT → GPIO4

⚠ Be cautious around the Geiger tube—it operates at ~400V and is fragile.

Geiger Module → Beetle ESP32-C6

VCC	→ 3.3V
GND	→ GND
OUT	→ GPIO4

Étape 5 - ? Arduino IDE Configuration

Install **ESP32-C6 board support**: Add this URL to Board Manager:

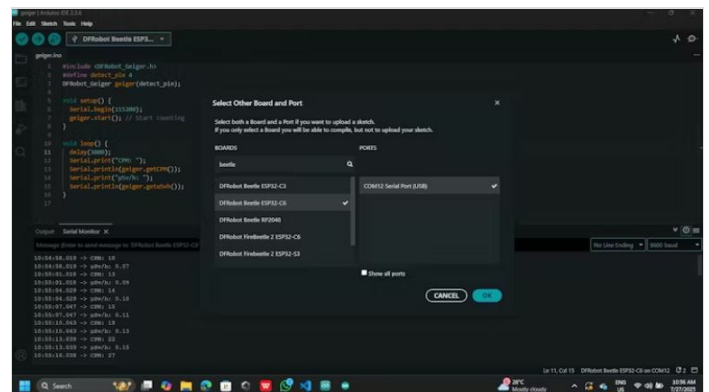
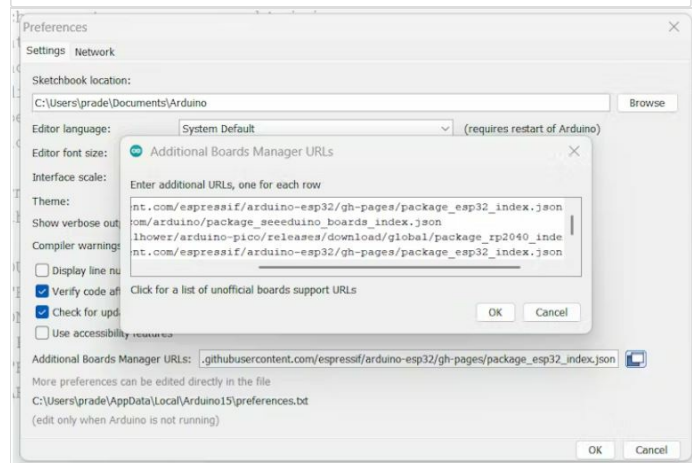
https://raw.githubusercontent.com/espressif/arduino-esp32/gh-pages/package_esp32_index.json

Select the board:

Install **DFRobot_Geiger** library via Library

Beetle ESP32-C6 → Partition Scheme: "Minimal SPIFFS (Large App)"

Manager or from this GIT Repo.



Étape 6 - Arduino Code

```
#include <DFRobot_Geiger.h>
#define detect_pin 4
DFRobot_Geiger geiger(detect_pin);

void setup() {
  Serial.begin(115200);
  geiger.start(); // Start counting
}

void loop() {
  delay(3000);
  Serial.print("CPM: ");
  Serial.println(geiger.getCPM());
  Serial.print("µSv/h: ");
  Serial.println(geiger.getuSvh());
}
```

CPM = Counts Per Minute µSv/h = Radiation dose rate (safe background levels are usually 0.05–0.2 µSv/h)

Étape 7 - Real-World Use Cases

 **Physics Demos** – Quick hands-on tool for teaching radiation in schools.

Antique & Gem Scans – Detect hidden radioactive elements in old items or minerals.

 **Urban Mapping** – Log background levels in metro stations or granite-rich zones.

 **Emergency Monitoring** – Lightweight safety gear for post-disaster areas.

 **Home Check** – Scan tiles, marble, and powders for elevated readings.

 **Cosmic Ray Tracker**– Capture fluctuations during hikes or balloon launches.

Étape 8 - Optional Enhancements

-  **GPS Logging**: Pair with a GPS module to create timestamped radiation maps
-  **Wi-Fi Uploads**: Send readings to Qubitro or ThingSpeak dashboards
- **Telegram Bot**: Trigger measurement and get results remotely
-  **OLED Display**: Add compact readouts for field use
-  **Solar Charging**: Combine with a small panel for outdoors

Étape 9 - Final Thoughts

This project leverages the versatility of the Beetle ESP32-C6 and the precision of DFRobot's Geiger counter to create a meaningful gadget. It's easy to build, scales well with wireless/cloud modules, and makes environmental sensing more accessible to hobbyists, educators, and citizen scientists alike.

Étape 10 - Optional Enhancements

-  **GPS Logging**: Pair with a GPS module to create timestamped radiation maps
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