Headless Raspberry Pi BLE Sensor Deployment Guide

Overview

This guide explains how to deploy a headless Raspberry Pi Zero W as a BLE sensor that logs Bluetooth presence and exfiltrates data securely to an n8n Webhook without storing credentials locally.

Step 1: Flash Raspberry Pi OS Lite

Download Raspberry Pi OS Lite and flash it using Raspberry Pi Imager or balenaEtcher.
https://www.raspberrypi.com/software/operating-systems/

Step 2: Prepare for Headless Boot

- Add an empty file named 'ssh' to the /boot directory
- Create and place a wpa_supplicant.conf file in /boot with your Wi-Fi credentials

Step 3: Boot and Connect

Insert SD and power the Pi. SSH into it using 'pi@raspberrypi.local' or your router-assigned IP.

Step 4: Install Logger

Install dependencies:
sudo apt update && sudo apt install python3-pip -y
pip3 install bleak requests

Place 'ble_logger_pi.py' on the Pi, and edit SENSOR_ID and WEBHOOK_URL accordingly.

Step 5: Automate on Boot

Use cron or systemd to run the logger every minute. Systemd is preferred for logging and reliability.

Step 6: Secure the Device

Change the password, configure UFW, and remove unused services. Do not store sensitive credentials on the Pi.

Step 7: Test and Clone

Confirm n8n receives logs. Reboot the Pi and verify systemctl logs.
Clone the SD image to deploy more sensors.

Next Steps

Consider adding support for MQTT, GPS-tagged scans, or hybrid BLE + Wi-Fi scanning.
All processing is done off-Pi to maintain a secure and minimal edge sensor.