BluePulse - Bluetooth Signal Drop Monitor

BluePulse is a system that monitors the signal strength of a Bluetooth connection and detects sudden drops in link quality. It can display real-time data in a seismograph-style graph using Processing and allows switching between a simulated mode and a real sensor mode from the PC, without the need to reprogram the Arduino.

This document explains how to connect the hardware and how the system works.

System Connections (Arduino UNO + HC-05):

1. HC-05 Bluetooth module (slave mode) wiring:
   - VCC -> 5V (Arduino)
   - GND -> GND
   - TXD -> Pin 10 (RX via SoftwareSerial)
   - RXD -> Pin 11 (TX via SoftwareSerial) with a voltage divider (1k Ohm in series + 2k Ohm to GND)
   - KEY -> Not connected

2. Optional analog sensor (e.g., potentiometer):
   - VCC -> 5V
   - GND -> GND
   - Center pin -> A0 (analog input)

System Operation:

- Arduino starts in DEMO mode by default.
- Processing can send commands via Bluetooth:
  - "DEMO" to generate a simulated wave with noise (artificial seismograph mode).
  - "REAL" to start reading real values from pin A0 (sensor mode).
- Arduino generates a new value every 50ms and sends it via HC-05.
- Processing receives and plots these values in real time.
- No need to reprogram Arduino; all control is done remotely via Processing.

Bluetooth During a Power Outage:

During a power outage, Bluetooth connectivity may be indirectly affected:

- Devices powered from wall sockets may shut down.
- Electromagnetic interference can affect the 2.4 GHz Bluetooth band.
- Devices may reboot and fail to reconnect automatically.

BluePulse lets you visualize these issues in the form of signal drops or interruptions on the graph, enabling post-event analysis.