Operational Description

1. WiFi Transceiver / Main Processor – CC3200

This processor runs the WiFi connection, as well as performing most other tasks in the system.

- Receives data from accelerometer/gyroscope/magnetometer combo chip over SPI
- Runs the algorithms that analyze motion and measure jump height
- Monitors the debounced pushbutton output of the pushbutton on/off controller
- Measures the battery voltage via an onboard ADC
- Communicates with the CC2540 via UART to coordinate comms with the outside world, as well as power-down of the system via the pushbutton on/off controller
    - Is aware of not only its own connection status via WiFi, but also of the connection status of the Bluetooth Low Energy radio managed by the CC2540
    - Will choose to send data via its own radio if connected, or via the CC2540 for transmission over BLE if there is an active connection to that radio instead

2. Bluetooth Low Energy Transceiver / Auxiliary Processor – CC2540

This processor primarily runs the Bluetooth connection, as well as performing some data buffering and storage (both volatile and, to a lesser degree, non-volatile).

- Monitors the debounced pushbutton output of the pushbutton on/off controller
- Communicates with the CC3200 via UART to coordinate comms with the outside world, as well as power-down of the system via the pushbutton on/off controller

3. WiFi RF Section

WiFi RF signals are sent and received by the CC3200 via a single-ended 50-ohm interface. A 50-ohm transmission line connects the CC3200 to a bandpass filter (TDK Corporation DEA202450BT-1294C1-H), which interfaces via a "Pi" matching network to a ceramic chip antenna (Taiyo Yuden AH316M245001-T). Frequency of operation is from 2.412 to 2.472 GHz.

4. Bluetooth Low Energy RF Section

Bluetooth RF signals are sent and received by the CC2540 via a balanced (differential), non-standard impedance interface. This is connected to a balun (Johanson 2450BM15A0002E) for conversion to an unbalanced, 50-ohm transmission line that interfaces via a "T" matching network to a ceramic chip antenna (Johanson 2450AT07A0100T). Frequency of operation is from 2.4 to 2.4835 GHz (including guard bands).

5. Sensor Chip - Accelerometer/Gyroscope/Magnetometer Combo
The CC3200 communicates with the 3-axis accelerometer/gyroscope/magnetometer chip via the SPI bus (which is run at 4 MHz).

6. **OLED Display**
The OLED is controlled by the CC3200 via the SPI bus (which is run at 4 MHz).

7. Pushbutton On/Off Controller
This versatile part facilitates the "long press on/long press off/longer press forced (hardware) reset" functionality for the system's pushbutton, as well as providing debouncing, under-voltage lockout protection for the battery, power enabling/disabling, and power-on-reset. It's connected directly to the battery, and also gates power to the system's voltage regulators via a mosfet for power enabling/disabling.

8. Power
When charging, the device takes in power via the VERT charger from a 5V USB source. This connects via a Li-Ion charge management chip to the battery.

The battery is connected to:

- The CC3200 via a resistive voltage divider in order to sense the battery voltage
- The pushbutton on/off controller
- The mosfet that the pushbutton on/off controller closes (or opens) to enable (or disable) power to the system's two voltage regulators:
    - A boost regulator that supplies power to the OLED at 7.5 volts
    - A buck voltage regulator that supplies power to the rest of the circuit at 3.14 volts