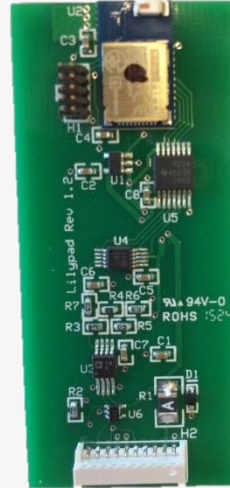


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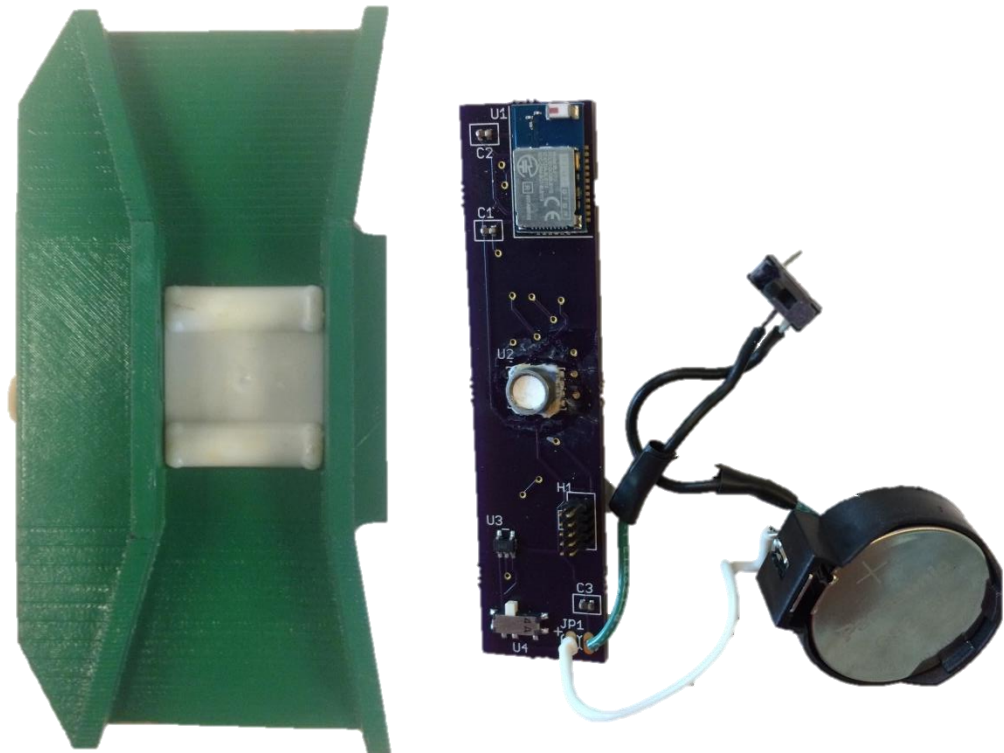
WHEELCHAIR SCALE, STRAIN GAUGE DESIGN



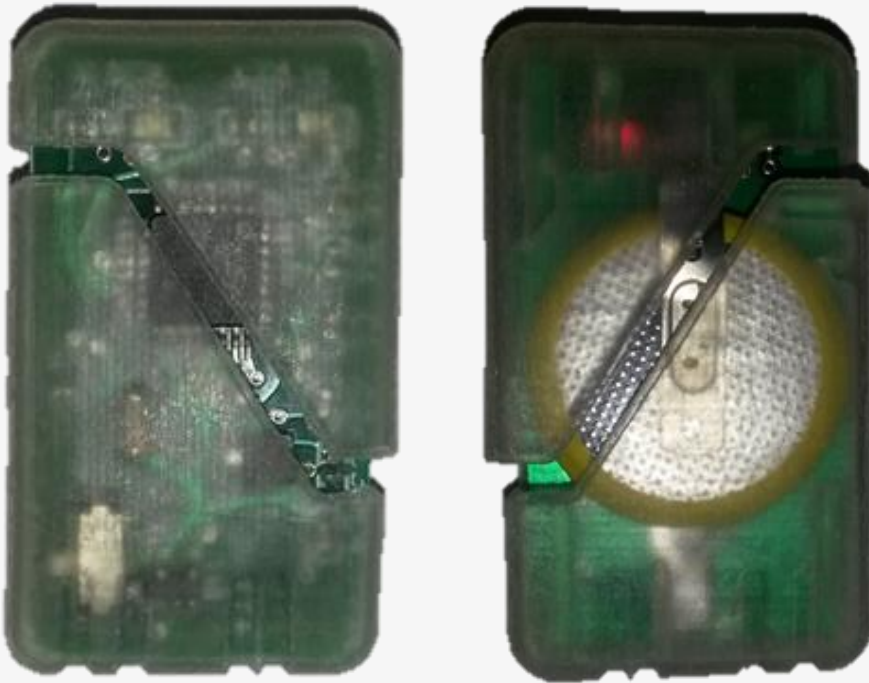
- Wheelchair scale composed of 4 mini-scales, one for each wheel. Sends data over **Bluetooth to smartphone app**.
- Two strain gauge load cells are read by **analog circuitry** then an **ADC**, which transmits data through a level shifter to a **BLE113 Bluetooth-enabled microcontroller**.
- Designed all aspects of **circuitry, PCB layout, power system, and connectors**, and wrote all **firmware**.
- **Optimized for low power draw** such that 2 AA batteries last about 1 year.
- Integrated design with mechanical system, did **DFM/A**.
- Worked with **contract manufacturers** to get product fabricated and **negotiated with suppliers**.
- **Iterated** design until it was a **sellable product** with 5-star reviews on Amazon.

WHEELCHAIR SCALE, PRESSURE-BASED DESIGN

- Wheelchair scale composed of 4 mini-scales, one for each wheel. Sends data over **Bluetooth to handheld readout**.
- **Digital pressure sensor** transmits data via **I2C** to **BLE113 Bluetooth-enabled microcontroller**.
- **Readout reads wireless data** from 4 mini-scales using BLE113 Bluetooth-enabled microcontroller, **calculates weight, and reads out to an LCD screen**.
- Designed all aspects of **circuitry, PCB layout, power system, and connectors** and wrote all **firmware**.
- Integrated design with mechanical system.
- **Iterated** design until it worked reliably and was **ready for pilot testing**.



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CONCUSSION DETECTOR

- Starting with just an idea (concussion detector with indicator lights) **designed and fabricated an initial working prototype** then a working prototype of the right size and shape.
- Design included **sensor, analog circuitry, microcontroller, LEDs, and battery.**
- **Designed all aspects of circuitry, did PCB layout, specified all parts, and wrote all firmware.**
- **Optimized for low power draw.**
- Ran cost analysis for product at high volume, **went back and forth with decision makers on features vs. cost.**
- **Iterated** design to make device as small as possible within cost constraints.
- **Integrated design with mechanical case.**

GOOGLE STREET VIEW CONNECTED BICYCLE

- Connected a bicycle to Google Street View so that a stationary rider could explore the streets, make real turns with the handlebars, and experience increased resistance going up hills.
- Wrote **firmware** for a **PIC microcontroller** to read data from handlebar **sensors** (sensing turns) and to **control a mechanical system** that increased resistance when the cyclist was going up hills in Google Street View.
- **Wrote a software interface** for the microcontroller in **Python**, which the team working on the Google Street View API could then interface with.
- **Designed and fabricated the mechanical system** that controlled resistance of the bicycle.

