Team 4: Tracking and Predicting the State of a Building

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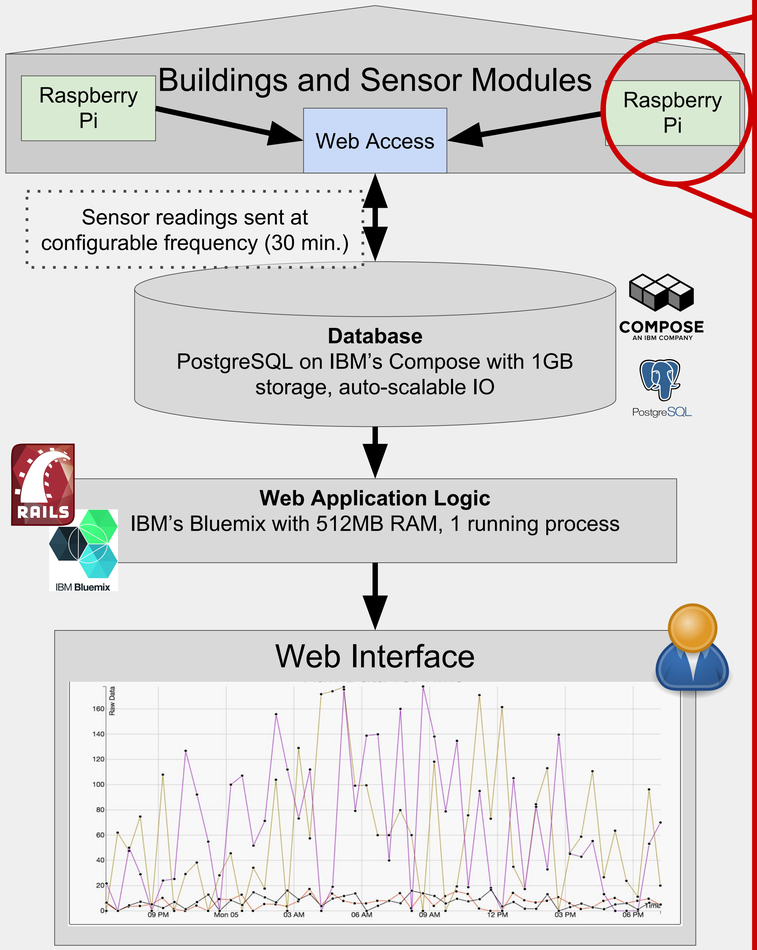
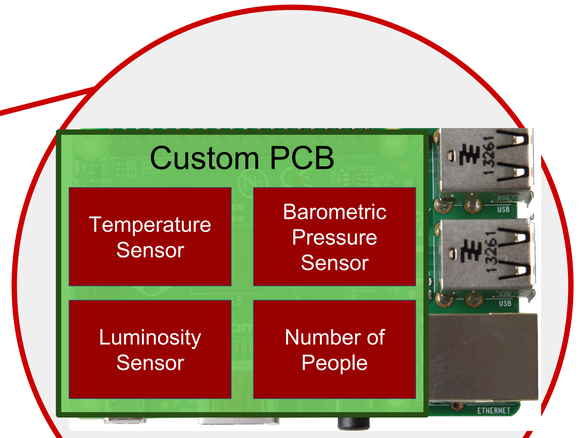
Complete System Overview



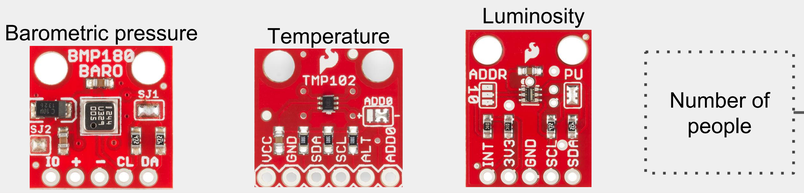


Web Application

- assigns each sensor module a unique serial number, which is displayed on a sticker on the module
- graphs historical data as well as future predictions up to 1 week into the future
- enforces user-defined access privileges for sensor data

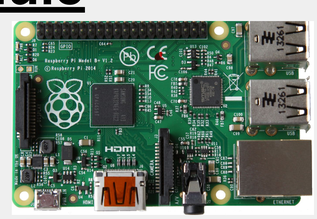
Sensors

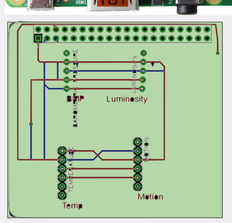
These three sensors communicate via I^2C



Sensor Module

- Raspberry Pi B+ with Custom PCB
- The device boots when the user connects power via a provided AC to 5V DC converter
- Data is sent as soon as the device boots
- Data is sent from all four sensors once every 30 minutes





Conclusions

- OpenCV can effectively be used to count objects passing through the frame of a Pi camera.
- Typical infrared emitter/detector diodes have a severely limited range of operation (5-25cm).
- The luminosity sensor was significantly affected by the clear plastic case. Holes were drilled in the case to accommodate this issue.

Problem Statement

To have an inexpensive electronic device that can track the state of a building. The data will be shown in a web app, and will also be used for predicting future states of a building.

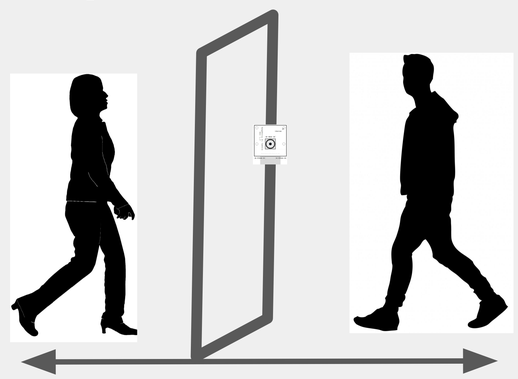
Requirements

- Web application
- Collects data from sensor modules (Raspberry Pi)
- Displays historical data
- Aesthetically pleasing
- Prediction for variables
- Tracks variables
  - Light
  - Temperature
  - Barometric Pressure
  - Number of People (Motion)

Testing and Demo

- We installed 3 sensor modules in Troxler lab for 2 weeks prior to design day for historical data.

Counting People with a Camera



The camera module shown above is used in conjunction with custom image processing software to count the number of people travelling in a given direction.