
IoTSSC Project Indoor Localisation

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April 25, 2018



Tracking device

Our chosen localisation device is a Nordic nRF51-DK, running ARM Mbed OS 5

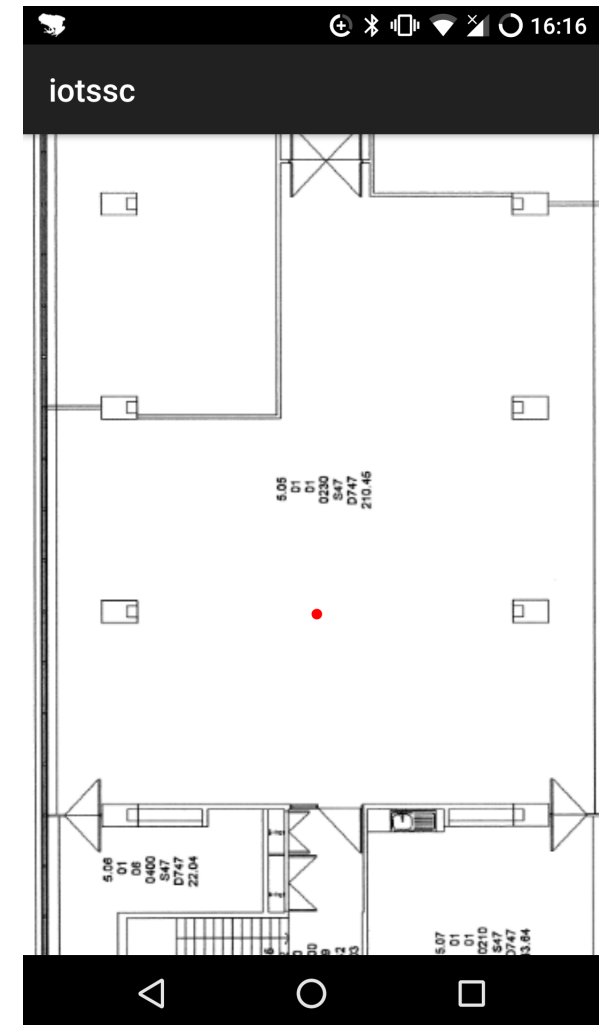


Due to limited processing power, the firmware running on the board is limited to scanning for Bluetooth Beacons and updating a BLE Characteristic with their RSSI strength

Android App

The app acts as a Bluetooth gateway, connecting to the board to read from its LocationService, and forward a timestamped RSSI, BeaconID pair to the server.

Additionally, we display a map of the 5th floor, and a location marker, which can be manually modified based on the board's position to collect training data.



Server

The server is a simple Flask app hosted on a Google Cloud Virtual Machine. It receives POST requests from the Gateway, and saves the data in a file.

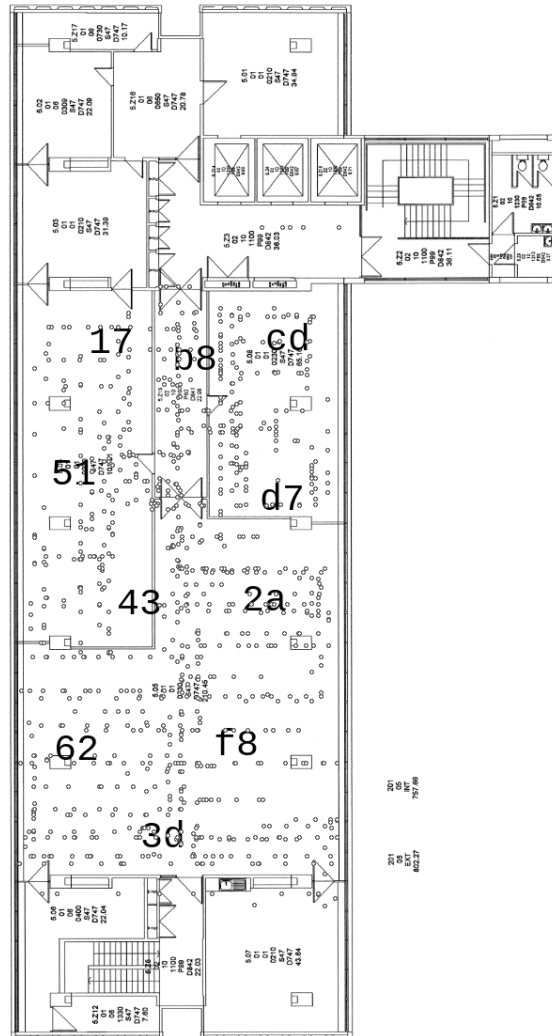
To ensure all data is transmitted securely, the server runs over HTTPS, using a self signed certificate manually provisioned to the app (its only client).

Analytics

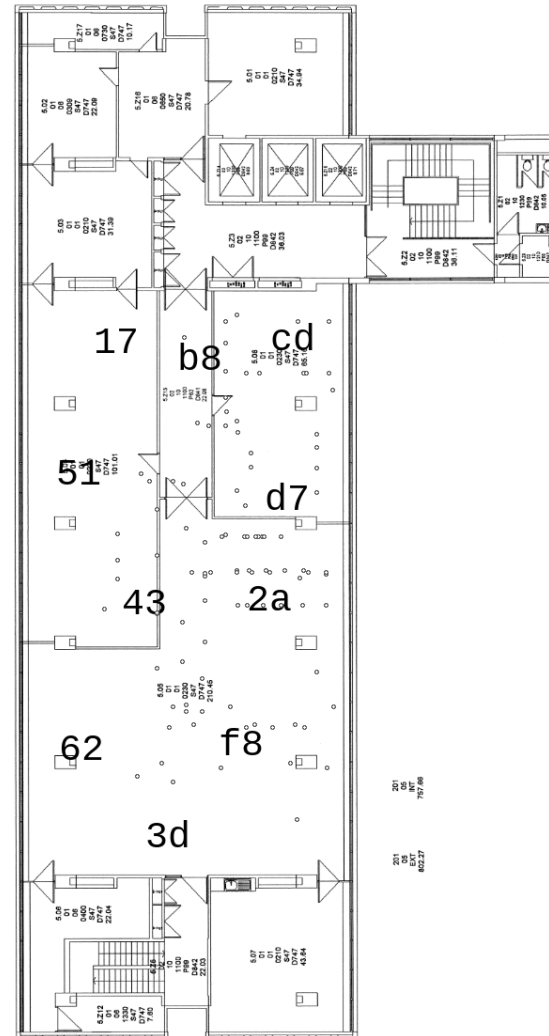
... RSSI triangulation SVMs KNN Kalman Filters

Collected data

b8



2a



Conversion to/from global coordinates

- We need to convert between global coordinates and pixel coordinates.
- For the tiny area of a building, we can approximate spherical coordinates with Cartesian coordinates.
- We translate the coordinates vectors so that the origin is at the NE corner of the floor, and then perform rotation and scaling by multiply a vector by a 2x2 matrix (or its inverse).
- The conversion matrix was found by taking the global / pixel coordinates of three points and solving a linear equation.

Does free-space propagation model hold?

