

AE498MPA (Fall 2007)

Homework 2: Tower Mapping and MTD Localization

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Due at 5PM on October 24, 2007

Basic assignment

The route map for the Champaign-Urbana Mass Transit District (MTD) bus lines is at <http://www.cumtd.com/>. We define a *transfer* as getting on or off a bus. So getting on line “21 Quad” is one transfer, and switching from “21 Quad” to “26 Pack” is two transfers. Create an application that uses *anything except GPS data and user input* to show the following:

1. A map of campus, the current position (point on the map), and the path followed (curve on the map), the same as in the first homework.
2. The current MTD bus line name, or “none” (text overlaid on the map).
3. The total number of transfers (text overlaid on the map).

A menu option will be available that saves the display (an image of the map, position, path, bus line name, and number of transfers) to a `.jpeg` file. Satellite time, latitude and longitude, bus line name, and total number of transfers n will be logged to a `.txt` file, where each line has the form `t lat lon line-name n`.

Suggested approach

By using the `location` module and calling `print location.gsm_location()`, you will get the ID number associated with the cell tower that is currently being used by the phone. By using the `sysinfo` module and calling `print sysinfo.signal_dbm()`, you will get a number that describes the total signal strength seen by the phone.

Although you are allowed to use anything besides GPS data and user input in this assignment, it is suggested that you initially try to use the tower ID and signal strength. To do so, you will need a map of how the ID and signal strength vary with position. You will have to create such a map yourself, from lots of data. In fact, you must generate and share such data as part of this assignment. See the “SharedData” page on the class wiki for the format. **By Friday, October 12, all groups are required to have generated at least 5000 lines of data, and posted this data to the wiki.**

Contest

At 5PM on October 24, all groups will ride a sequence of MTD bus lines, starting from Engineering Hall. The group that reports the total number of transfers most accurately is the winner. Groups will be penalized by 1 point each time they do not correctly identify the bus line (or “none”) *at least once* during each ride. Each member of the winning group will receive a prize, as well as everlasting fame.

Deliverables

Submit an annotated python script (and any other code) and a brief summary of your solution approach (in particular, any innovative algorithms such as for map display, position smoothing, calibration, or user modeling). Also submit logged data from the contest. Within each group, all members will receive the same grade.