CAS765 Final Project – Indoor localization

Due date: Dec 2nd, 2013

In this assignment, you will develop an Android application that tracks the indoor location of a user. For testing and evaluation, the indoor map for the Information Technology Building (ITB) level 1 is given.

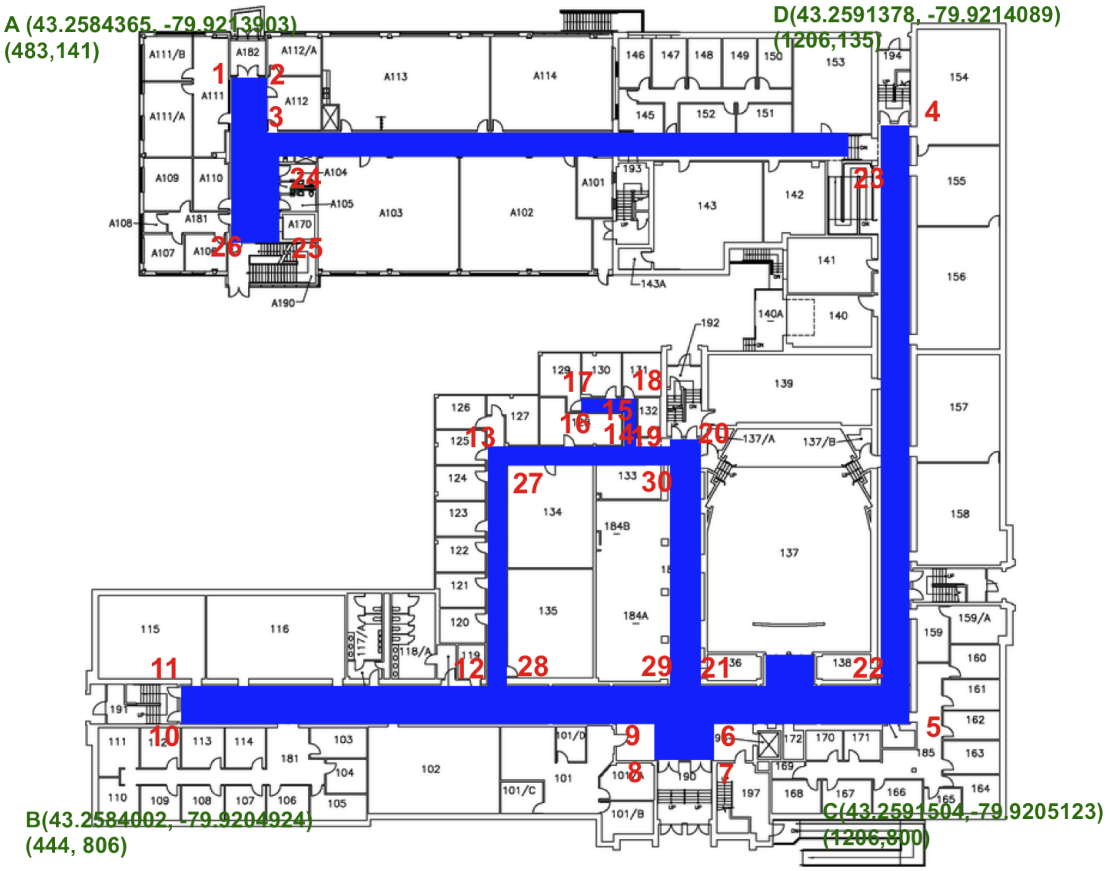

Fig. 1. Annotated map of ITB level 1

The latitude and longitude of the coordinates of the four corner of the building as well as the (x,y) coordinates measured in points are given below.

	A	B	C	D
(lat,long)	(43.2584365, -79.9213903)	(43.2584002, -79.9204924)	(43.2591504,-79.9205123)	(43.2591378, -79.9214089)
(x,y)	(483,141)	(444, 806)	(1206,800)	(1206,135)

The (x,y) coordinates (in points) of the corners in the corridor is given by Table I.

Requirements: You may assume that the user holds the phone in her hand when running this application. However, the orientation of the phone may change over the course of walking. Users may walk fast or slow. The application should display the map (itb1.jpg) and update the user's location on the map in *real time*. User's location can be represented using an uncertainty disk, where she is most likely to be present (you can specify the confidence interval in your program). The user is assumed to walk along the hall way. She can be asked to pin point her initial location and heading at the onset of the walk.

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TABLE I
(X, Y) COORDINATES OF THE CORNERS IN THE CORRIDOR

1	2	3	4	5	6	7	8	9	10
(560,180)	(580, 180)	(588, 226)	(1126, 221)	(1126, 721)	(961,721)	(961,750)	(913, 750)	(913,721)	(518, 721)
11	12	13	14	15	16	17	18	19	20
(517, 688)	(773, 688)	(773, 488)	(886, 488)	(886, 462)	(851, 462)	(851, 450)	(900, 450)	(900, 488)	(950, 480)
21	22	23	24	25	26	27	28	29	30
(950,688)	(1102, 688)	(1102, 247)	(600, 247)	(600, 318)	(560, 318)	(789, 504)	(789, 688)	(926, 688)	(924, 504)

Implementation: Your application can build upon the step counting application developed in programming assignment 3. You can choose to implement any of the indoor localization algorithms utilizing inertial navigation discussed in the class (e.g., papers LZDGLZ12, RCPS12, YWL12), or ones you find in literature. However, methods that require extensive survey and/or manual measurements should be avoided.

Report: In the report, you will describe the algorithm(s) implemented using both plain English and block diagrams. Provide quantitative results of the accuracy of the algorithm(s) over different test runs and different conditions (phone orientations, walking speed etc.). The use of charts is encouraged. Discuss the weakness of the approach and potential means to improve if any. Each group will give a demo, and a short presentation of their approach and results during class. The best performing team will receive bonus points. Email your code to the instructor in a tar.gz ball.