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# Indoor Mapping System

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## Project Goals Definition

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## Revision Table

Revision	Date	Authors	Description of Revision
<b>0.1</b>	10/05/13	Abdel-Latif, Sari Batth , Chanderdeep Bishara, Marc Elsaftawy , Mahmoud Mansour, Ahmed Wahid , Fahim	<ul style="list-style-type: none"> <li>• First iteration of the goals document</li> </ul>
<b>0.2</b>	10/06/23	---	<ul style="list-style-type: none"> <li>• Modifications not recorded</li> </ul>
<b>0.3</b>	10/07/13	---	<ul style="list-style-type: none"> <li>• Modifications not recorded</li> </ul>
<b>1.0</b>	05/03/14	Bishara, Marc	<ul style="list-style-type: none"> <li>• Added revision table</li> <li>• Reduced goals for identifying nametags and washrooms</li> <li>• Added bonus goal for prior knowledge navigation</li> </ul>
<b>1.1</b>	05/03/14	Bishara, Marc	<ul style="list-style-type: none"> <li>• Revisions to the goals to make them more applicable to general buildings</li> <li>• Added goal limitations to describe the environment of ITB</li> </ul>
<b>1.2</b>	06/03/14	Abdel-Latif, Sari	<ul style="list-style-type: none"> <li>• Review and Formatting</li> </ul>

## Main Goals

The main objective of this project is to create an indoor mapping device that will go around building hallways and generate a digital version of the 2D map with possibilities of integration with mobile applications. The goals of the project are:

1. Develop an autonomous robot that will:
  - a. Go around the hallway and start the mapping procedure.
  - b. Not need any human intervention to operate once started in the building.
  - c. Be able to navigate through the entire floor of a building autonomously and ensure that no hallways or corridors are left unexplored.
  - d. Be able to map up to 1000 m of hallway space on one charge of battery life.
2. Generate a 2D map of the hallway/floor from the data points captured by the autonomous robot.
  - a. Software must be developed to be able to translate data points that are fed back from the robot and use them to generate a 2-D map (connect the dots using some algorithm).
  - b. The mapping shall be done live within the limitations of the communication system used.
  - c. The system should be able to draw the entire hallway map of the building's floor.
3. The robot should be able to identify area of interests; namely: doors.
  - a. The software should be able to receive that data and tag the correct spots on the map to reflect the area of interest.
  - b. The robot should be able to identify 80% of the areas of interest specified above.

## Goal limitations

The robot shall only complete the above goals in a structured building where:

- a. Hallways are at 90 degree angles from each other
- b. Doors are all the same color
- c. There are no slopes or ramps
- d. No hallway is wider than 10 meters

## Bonus Goals

If all the main goals described above are completed well before the deadline, we will try to implement a few more features to achieve the following goals:

- e. Being able to navigate in a building given prior knowledge of the map
  - a. The system should be able to accept a formatted map of the floor of the building.
  - b. The system should be able to navigate from its current location to a point on that map set by the user.
- f. Generate a "hallview" of the hallway/floor. Hall view is similar to Google Street View such that hall view will take images, after certain time or meters, of the view in 3 different angles such as panoramic image with a reasonable quality. This can be attached to the data point at which the image was taken and the user will be able to view an image of the hall. This will allow the users to better navigate the hallway/floor
- g. Generate a 3D map instead of a 2D one. This will afford a better user experience and allow for more use possibilities.