

# IMAT5121 Mobile Robotics

MAIN COURSEWORK

# Assessment

# Assessment

- ▶ This coursework constitutes 50 % of the overall module mark
- ▶ This coursework is marked based on the quality of the report. Therefore the report is a important component of the submission and should show how you tackled the problem and how well the robot performed.
- ▶ You should submit a report explaining how did you tackle the problem and presenting the solution developed by you,
- ▶ Make sure you report the testing and measuring of the performance of the various requirements outlined in this handout
- ▶ Make sure you include well documented source code, a good structure with all relevant sections, analysis and conclusions

# Assessment

- ▶ Submit the report using the turnitin link
- ▶ Submit the code and any other supplementary material in a zip file to the zip submission link
- ▶ This assessment will be 50% of your overall mark

# Environment

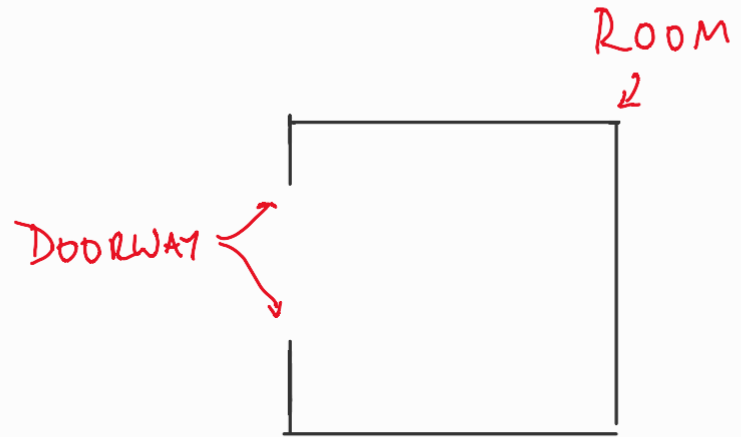
# The Environment

- ▶ For the coursework you should use the map `courseworkMap_iRobotCreateToolboxSim.txt` provided here for the iRobot Create Toolbox Simulator or `courseworkMap_VREP.ttt` for VREP, any other simulator you should build a environment similar to the environment in the next slide.
- ▶ The robot's initial position should be any random place inside the room in the middle of the map

# The Environment

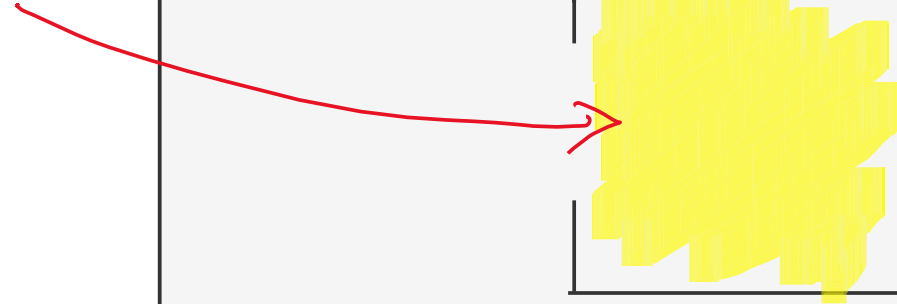
The map is formed of boundary walls and a room in the centre of the map with a doorway.

WALLS →



# The Environment

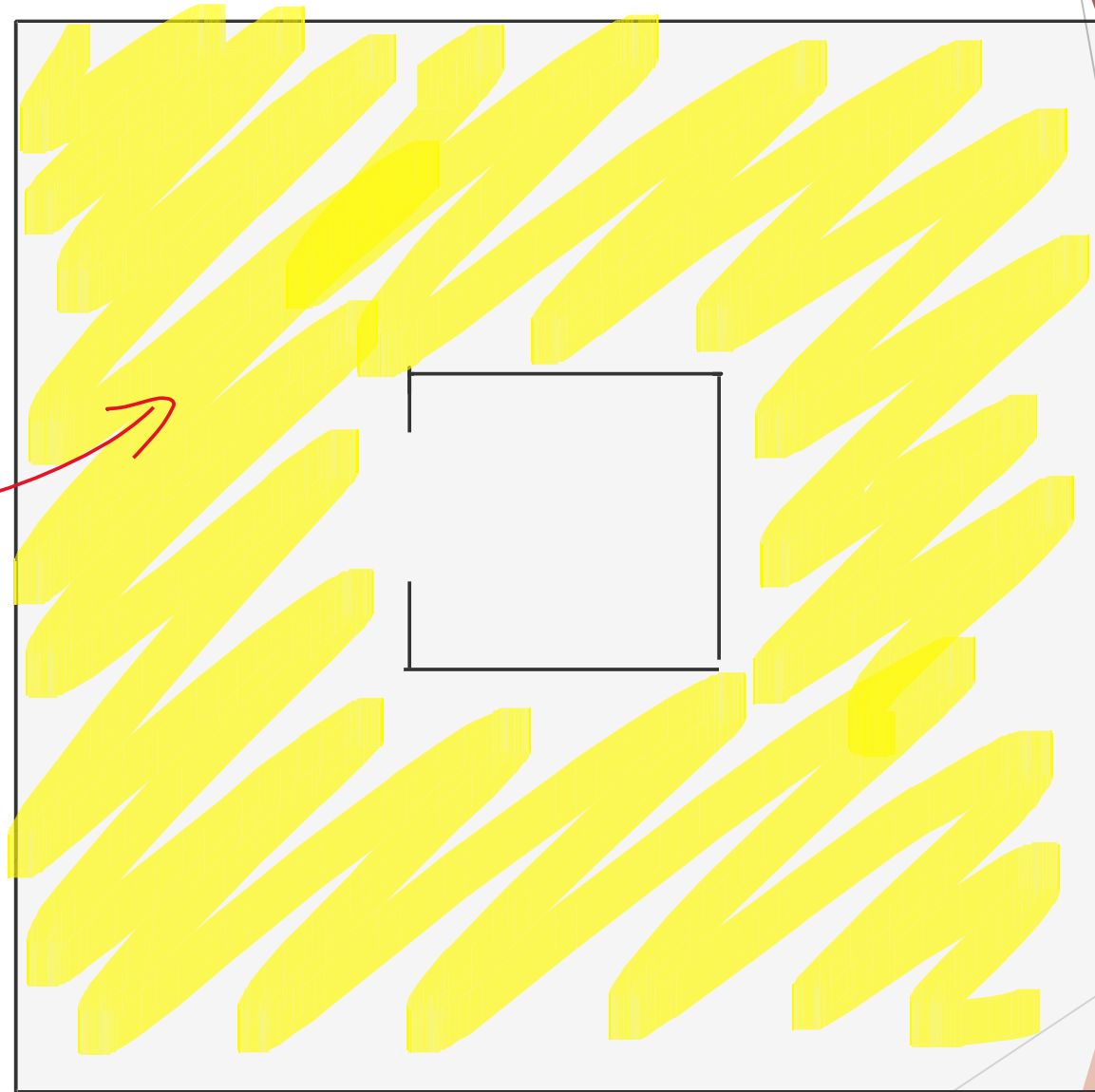
The robot starts in a random position and heading in the room





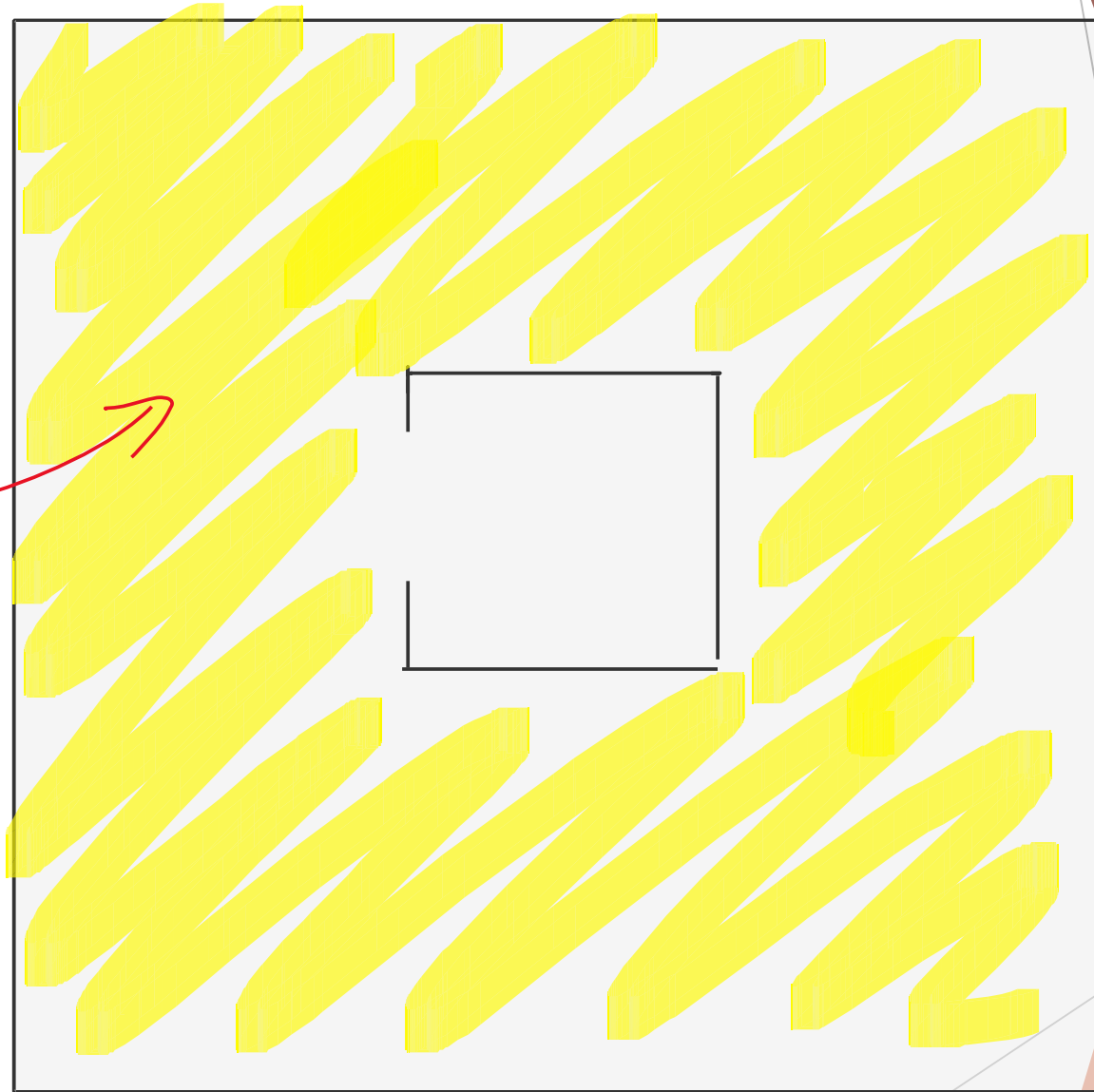
# The Environment

The outside room is currently empty, however you should place objects randomly yourself into this space, the robot must avoid these.



# The Environment

The beacon should be placed inside this environment.



# The Beacon

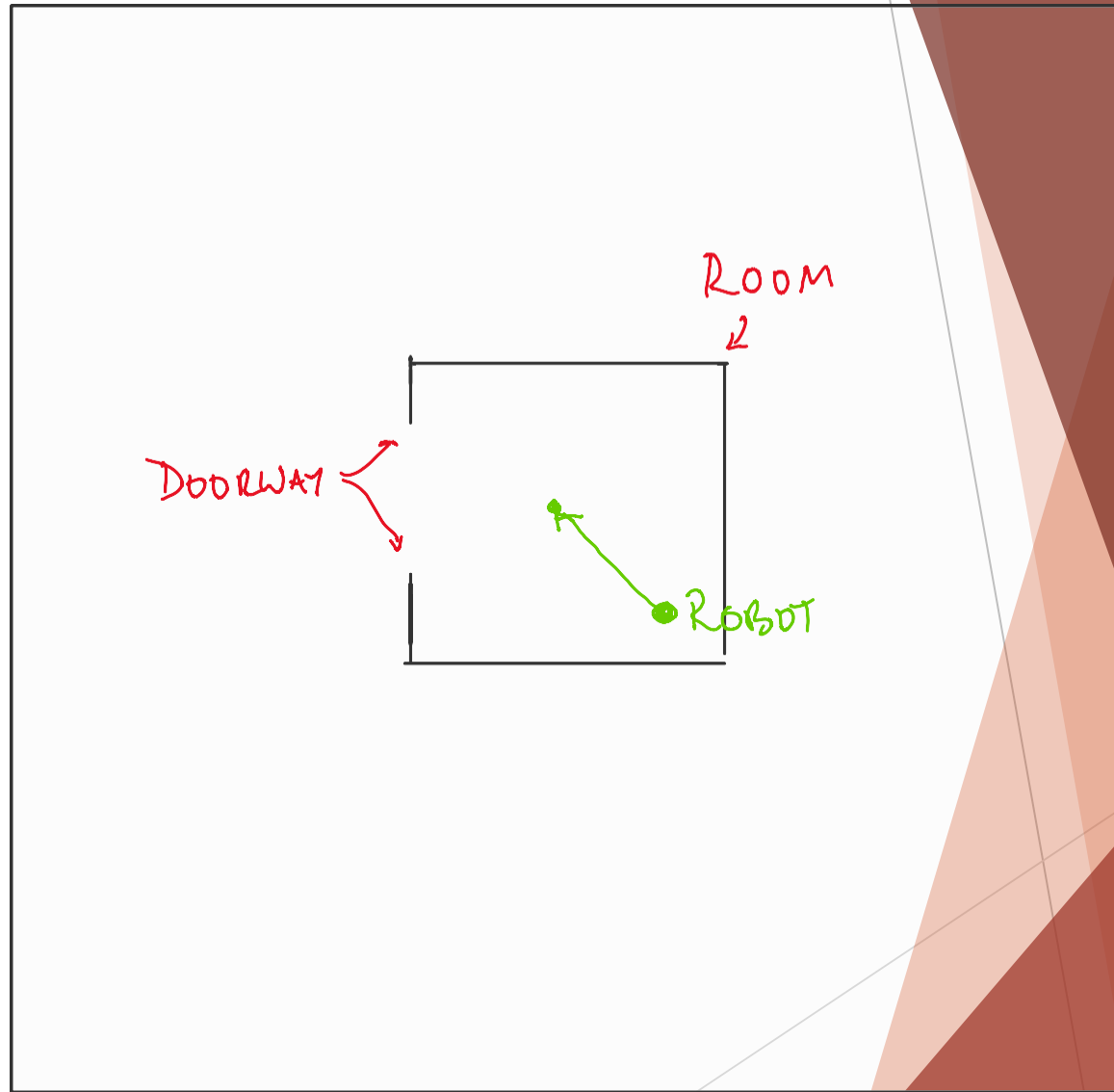
# Beacon

- ▶ Please see the handout named “IMAT5121\_BeaconSupplement.pdf”

# Tasks

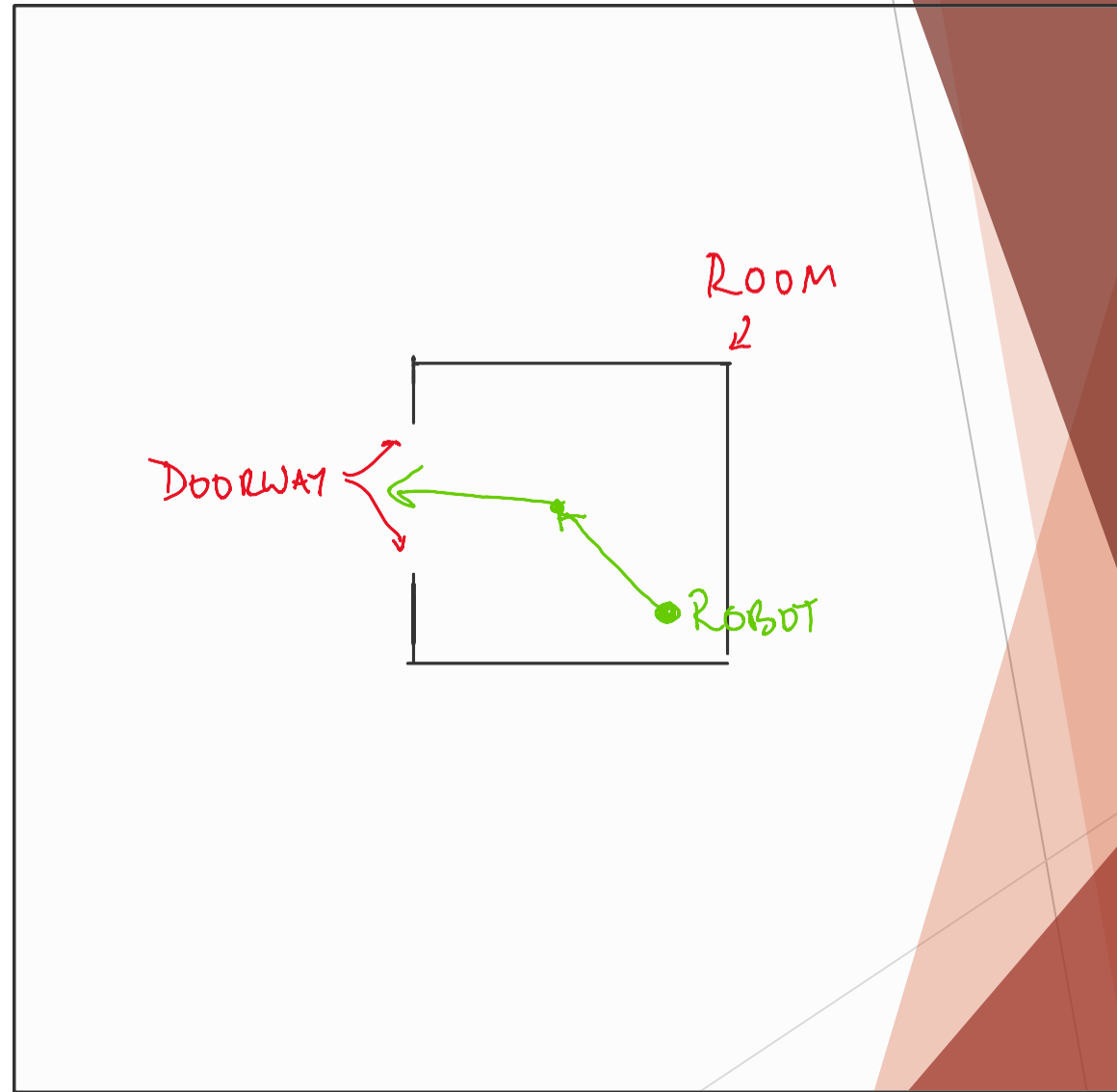
# Task 1

- ▶ The robot should start anywhere in the room, move around and using the sensors find the middle of the room



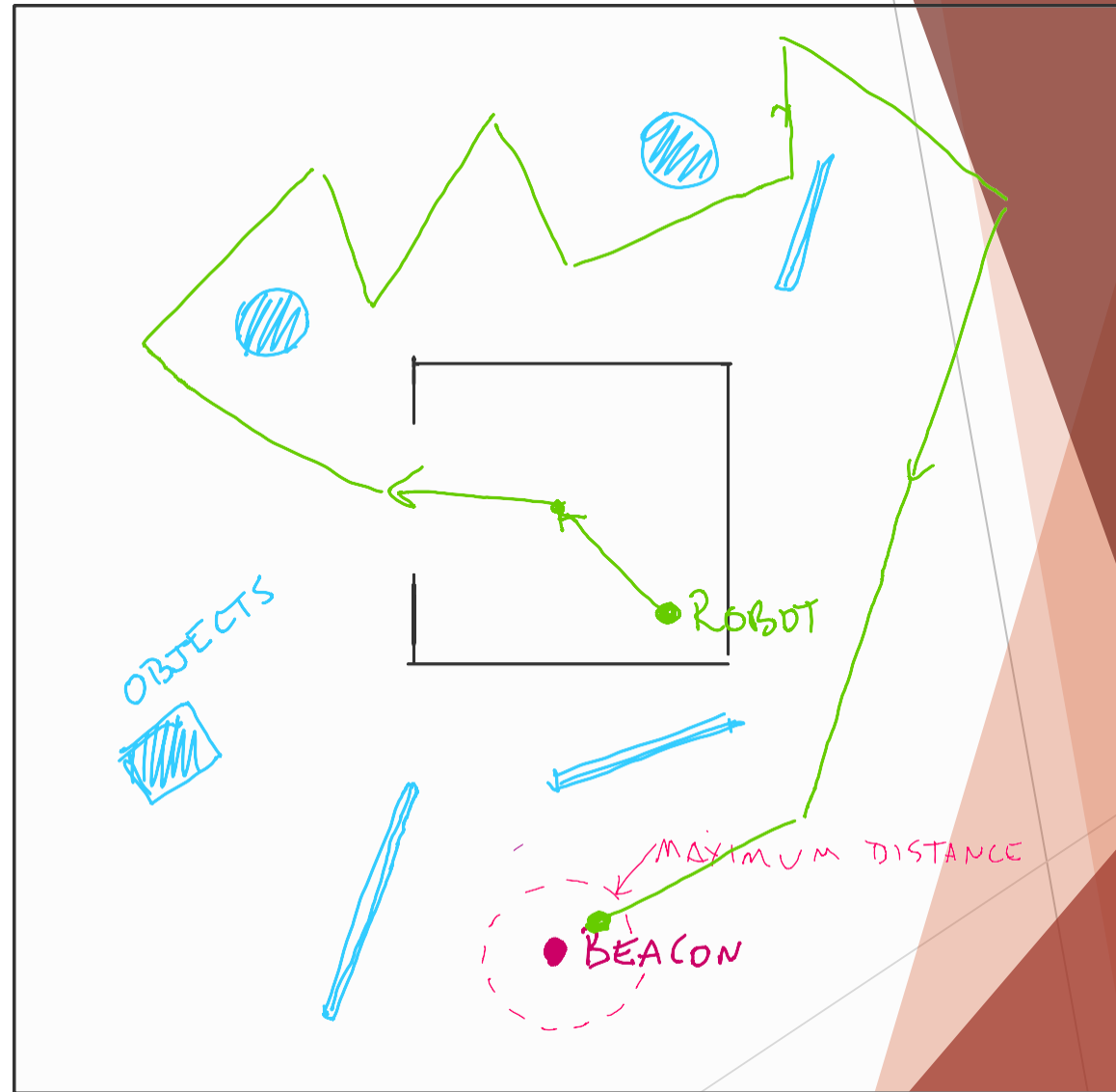
# Task 2

- ▶ It should then align itself with the exit and come out in a straight line without crashing into the doorway



# Task 3 - Beacon task

- ▶ Once out of the room, the robot should start exploring the environment to find the beacon, avoiding objects
- ▶ Once the beacon is found the robot should stop near the beacon (less than 0.5 meters)



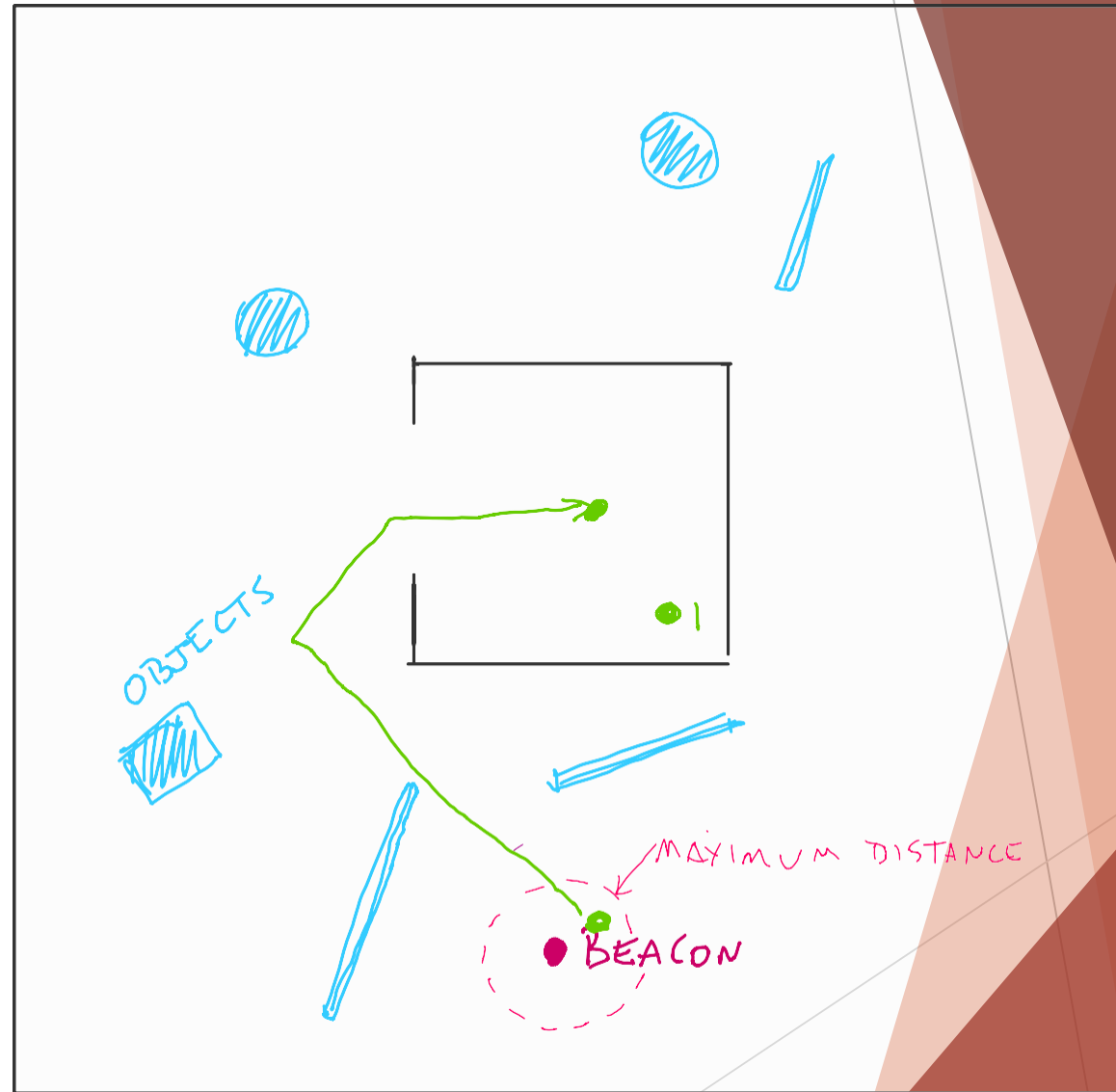


# Task 3 - Mapping Tasks

- ▶ Instead of finding the beacon, you should map the environment completely and accurately.
- ▶ You may experiment with methods to reduce the amount of data in the mapping (such as RANSAC, creating line segments etc)

# Task 4

- ▶ Once the beacon is found, or mapping is completed, the robot will set off to find the room
- ▶ And of course find the entrance to the room
- ▶ The final objective is to enter the room without bumping to the sides
- ▶ And stop exactly in the middle of the room



# Task 5

- ▶ During all the tasks, the robot should attempt to map the environment using data from the sensors.
- ▶ You will learn about this in Week 7
- ▶ The scattergram data may be saved when the robot has completed the tasks, then shown in Excel, Matlab, Python or any other method afterwards.
- ▶ You may also may want to show the data live as the robot completes its tasks.

# Experiments

# Some Experimenting

- ▶ Once your program executes the full task using the map provided, experiment with different setups.
- ▶ Start the robot in different places in the room
- ▶ Change the position of the beacon, make it difficult to find it.
- ▶ Create another map (make sure there is a small square room for the robot) and add complexity if you are doing the mapping task.
- ▶ Add more or less objects, of different types in the environment. Is the robot able to complete its tasks?