

# MAZE MAPPING ROBOT

JUNIOR YEAR ROBOTICS COMPETITION

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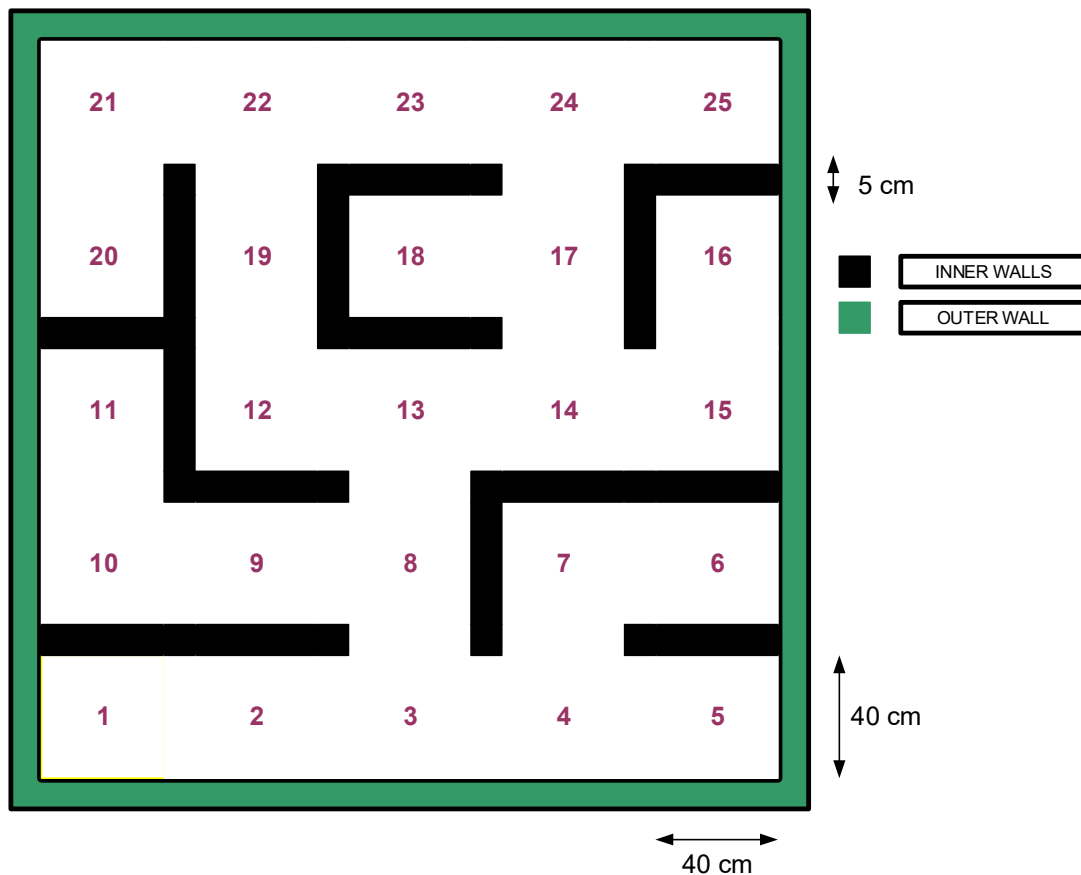
## INITIAL IDEA

Two robots, ‘Ragnar’ and ‘Flokki’, working as a team, are thrown into a maze by evil ‘Thor’ one at a time. Ragnar being the intelligent one, risks its life and tries to map the maze. After Ragnar plays its role, Flokki being the quick one, has to reach all four edges of the maze by covering the least distance. Upon completion, Thor is defeated.

## PROBLEM STATEMENT

A group, consisting of two teams, Team Ragnar and Team Flokki, with two members in each team are to coordinate for the mission. Both the robots are placed on a random block location in the maze, from where they are to perform following tasks:

1. Team Ragnar – From a random location, the robot is to map the maze completely and send a simplified data to team Flokki wirelessly.
2. Team Flokki – Using the data sent by Team Ragnar, the robot is to reach the four corner blocks of the map from your location using the shortest paths.



The maze consists of 5x5 square blocks. The blocks are separated by walls having constant thickness. Each block is numbered as shown in the above figure. The **starting block** and the routes can be changed during the competition.

## Arena Specifications

- Block size – 40cm x 40cm
- Wall width – 5cm
- Wall height – 20cm

## TASKS OF ROBOT

### TEAM RAGNAR

- The robot will start from the **starting point** after the reception of “OK” command from base station (smart phone).
- The robot will move to each block in order to map the floor.
- At each block, the robot will convey the proximity values of the walls around it to the connected smart phone.
- After successful mapping, Ragnar should form the complete matrix of the arena and transfer the matrix to the Flokki through Bluetooth or any preferred wireless module (communication).
- For proper and measured movement of the robot on the arena, position control on each motor is to be applied (controls systems).

### TEAM FLOKKI

- Flokki will receive the maze matrix from Ragnar
- Flokki will then be placed on a random location but will be told of its block number.
- On the reception of “GO” command from the smart phone, it will calculate the shortest path to one corner of the maze.
- Upon arrival at each corner, Flokki will then calculate the shortest path to the next corner and starts moving.
- On reaching all four corners, Flokki will send a “DONE” text to smart phone.

## FEATURES OF ROBOT

Following are the features of the robot:

- Dimension: 25 cm x 25 cm (circular preferred)
- 2 DC motors/stepper for movement
- Bluetooth for wireless communication
- Battery and power supply module
- Proximity sensors (range finders, SONAR)
- Microcontroller (Arduino, raspberry, teensy etc.)
- Buzzer
- H-bridge on PCB
- Vero boards and bread board are not accepted.
- System should have no jumper wires. Only wire buses allowed in neat way.

- Robot should be completely neat and look like a final product.

## MARKS DISTRIBUTION

TEAM RAGNAR

TASKS	MARKS (100)
Movement through complete maze	15
Mapping of maze	15
Wireless communication	10
Matrix formation	10
Hardware neatness	5
Report	5
Viva	40

TEAM FLOKKI

TASKS	MARKS (100)
Shortest path calculation (four paths)	20
Movement through shortest paths	20
Wireless communication	10
Hardware neatness	5
Report	5
Viva	40

## TIMELINE

WEEK	DELIVERABLE/SUBMISSIONS
1-4	Hardware completion (robot assembly)
5	H-bridge fabrication, testing and other PCBs
6	Circuit assembly and modular testing
7-9	Coding and algorithm implementation
10-12	Calibration and report

## NOTE

- Robot is to be designed by the group. No ready-made body is allowed.
- There will be 2 heats in the competition; heat 1 includes only RAGNAR's tasks and heat 2 will include FLOKKI's tasks.
- Those with total marks below a threshold marks will be awarded low grades in all three labs.
- All circuits need to be fabricated on PCB. Vero and bread board are not allowed.
- Sign-up using the IP 10.1.8.7 for updates and documents.
- Meetings will be called almost each week to check the progress.

## SAMPLE DESIGN

This sample is just an example to follow regarding design and neatness.

