

# CS684

## Course Projects

# Projects:

- Two Projects:
  - Search and Rescue Robot
  - Valet Parking Robot
- Labs are based on project implementation
- Groups:
  - Consists of three members
  - Select the project
  - One submission per group
  - One hardware kit

# Submission instructions:

One submission per group

Submission will be through moodle

Member having highest roll no will do the submission

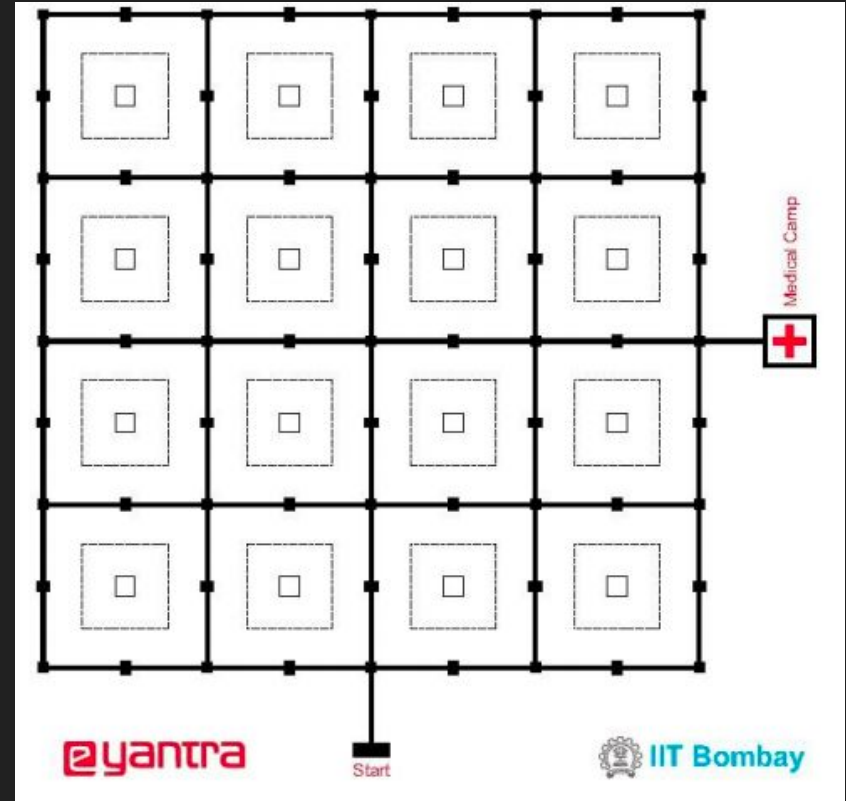
While submitting:

1. Readme.txt file - explaining the details about the implementation
2. Contribution.txt file - stating detailed contribution of each member
3. Project folder - depends upon the lab
4. Video file - demonstrating the simulation/output of the implementation

# Project 1: Search and Rescue Robot

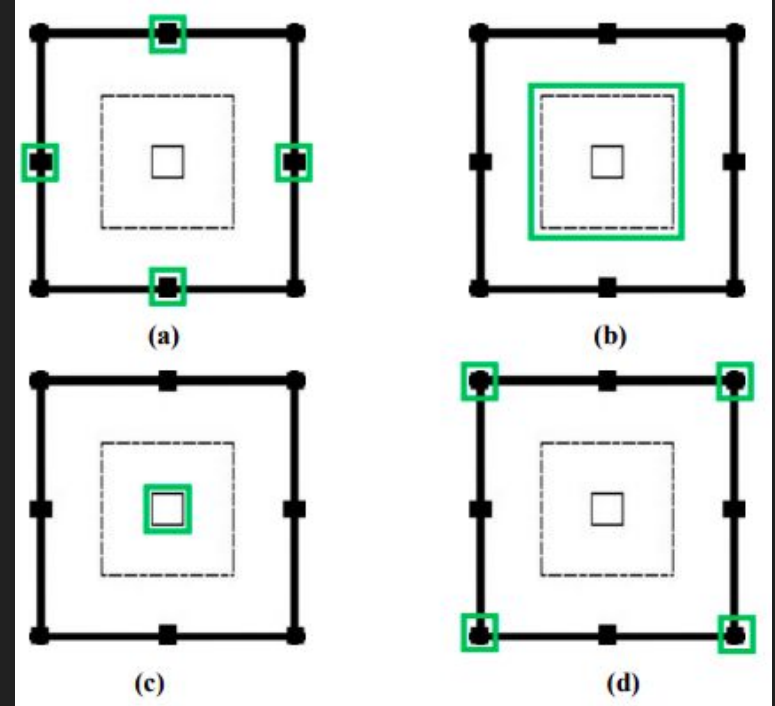
## Arena

- Abstraction of disaster-affected area
- Grid consists of 16 Plots

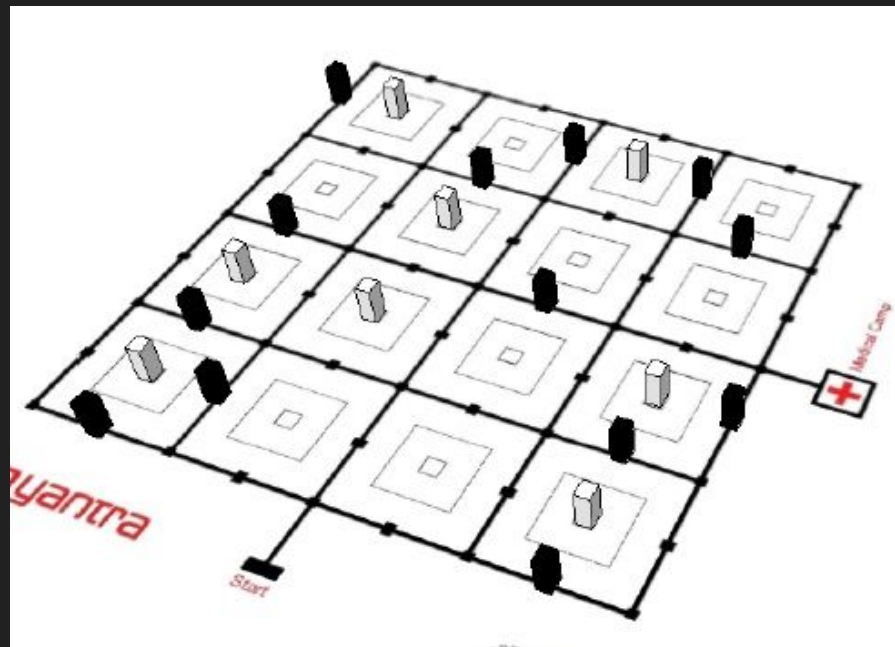
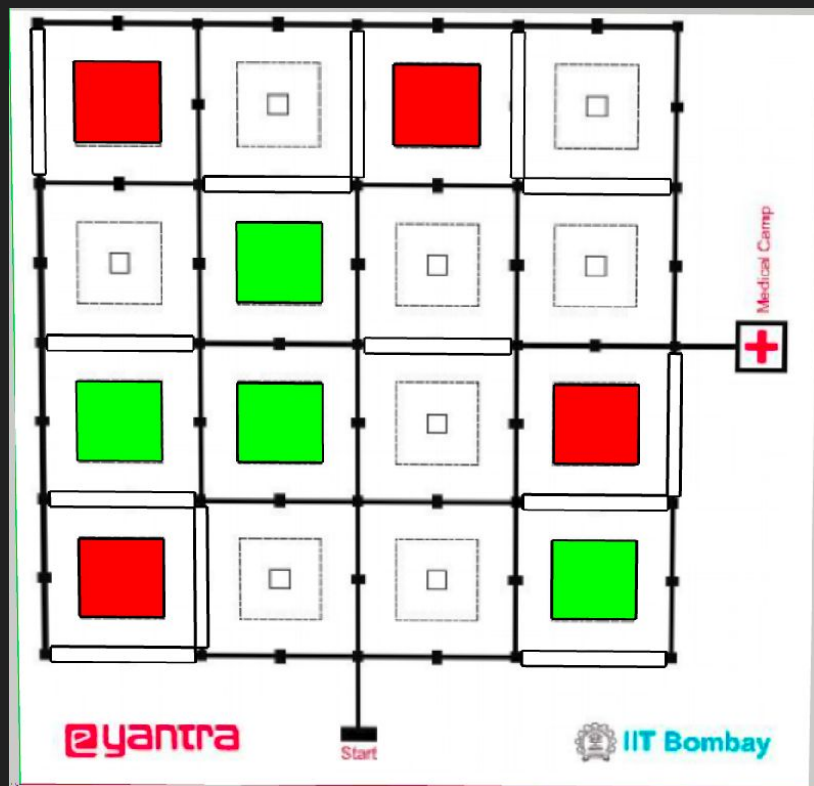


# Arena Components:

- a. Mid-Point Markers
- b. Clearing Zone
- c. Inner Square
- d. Four Nodes



# Arena configuration:



# Input Operations:

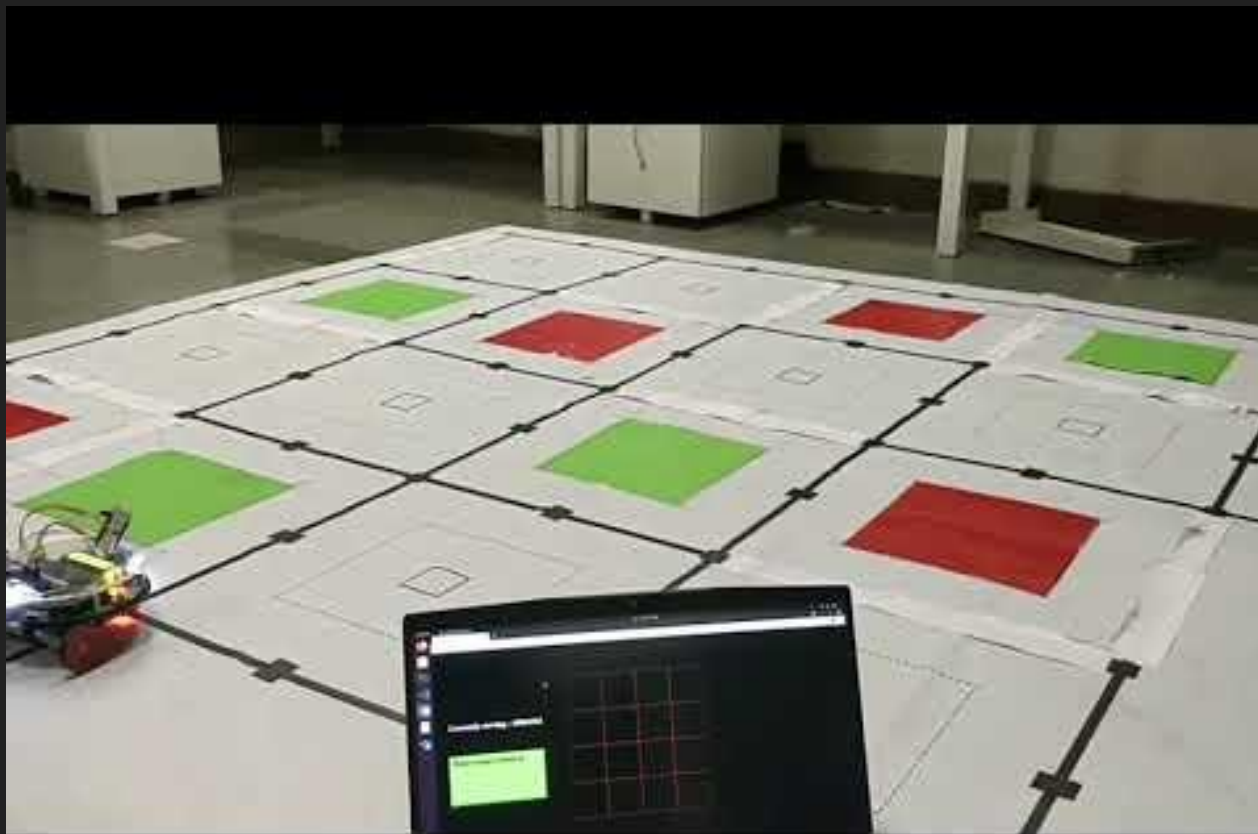
- Server will send requests to the robot.
- The requests may contain single or multiple requests (actions to perform). Robot can decide to satisfy the requests or ignore them.
- There can be different types of requests as given below:
  - Fetch RED Survivor in 10s: Robot has to traverse to the nearest RED Survivor plot and acknowledge back.
  - Identify Survivor at plot 4 in 20s: Robot has to traverse to plot 4, identify the Survivor and acknowledge back.
  - No Request: No action needs to be performed

# Problem Statement

1. The bot starts at 'Start' location.
2. A supervisor sends commands to the bot at regular intervals.
3. The bot waits for commands and meanwhile starts scanning the entire grid.
4. Example of commands are fetch RED block in 10 seconds or scan cell at [2] in 45 seconds
5. On receiving commands, the bot takes the required action OR ignores it.
6. Robot has to scan the entire grid and stop at medical camp.



Video:



# Hardware:

## 1 . Alphabot - Arduino based robot

- While line sensor array (5)
- IR Proximity Sensor (2)
- Position encoders (2)
- DC motors (2)

## 2. Color sensor

## 3. Zigbee Module

# Project 2: Valet Parking Robot

Arena:

- Consists of two parts:
  - Traversal Area
  - Parking Area



# Arena Components:

Thermocol cubes are used to depict the dummy cars.

Dummy cars can be placed:

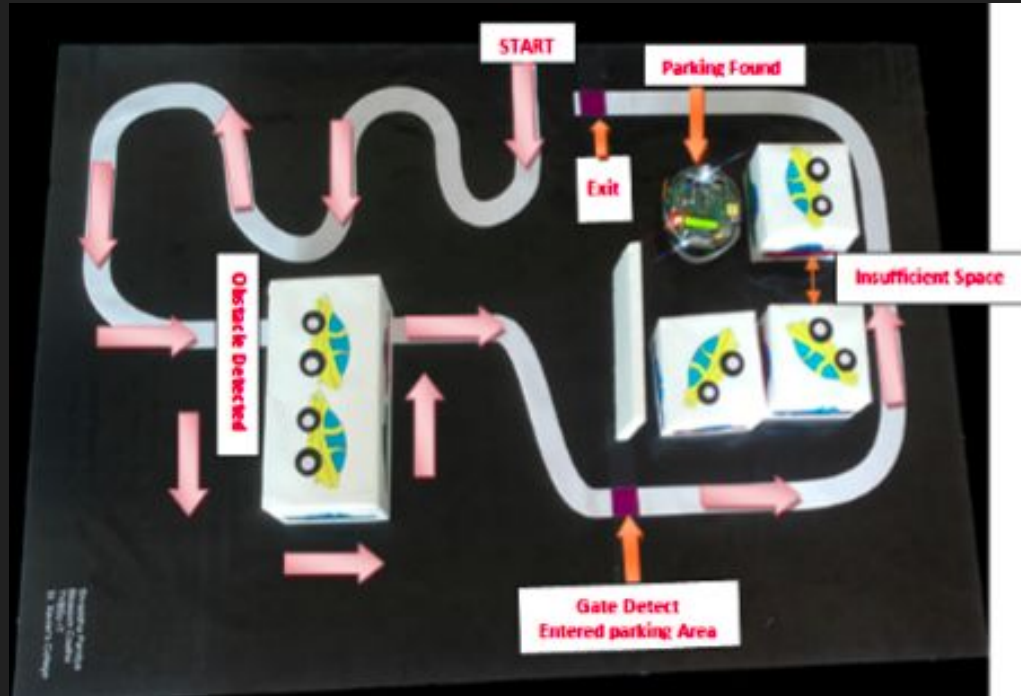
- On the line: acting as an obstacle
  - Moving obstacle
  - Static obstacle
- In the Parking Area: blocks the parking area

Robot has to bypass an obstacles if they are static or moving towards the robot.

# Problem Statement:

- The robot will start from the START position of the arena.
- It must traverse around the arena avoiding obstacles.
- It has to detect the parking area.
- Once robot enters into the parking area, it has to detect sufficient space to park itself.
- If space is not available for the parking, robot should stop at the EXIT position marked on the arena.

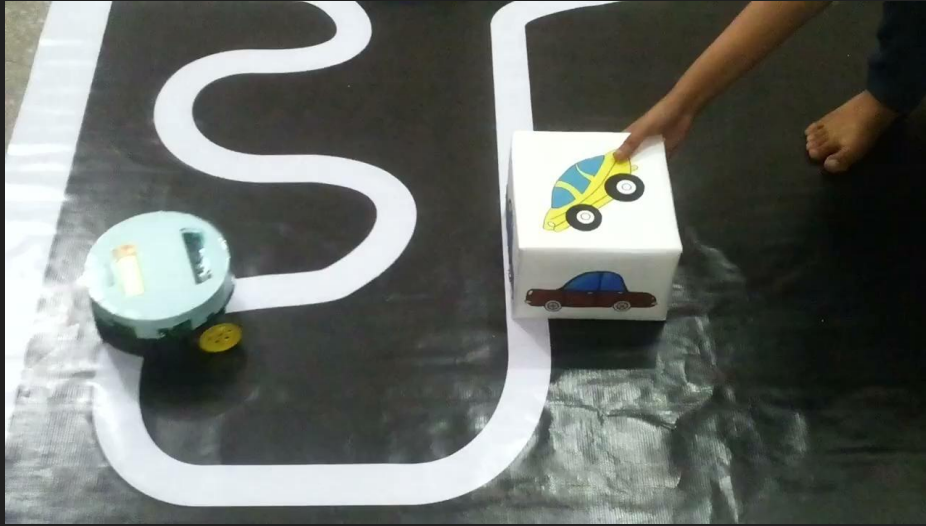
# Arena Traversal:



Videos:



# Obstacle Navigation:





# Hardware:

## 1 . Alphabot - Arduino based robot

- While line sensor array (5)
- IR Proximity Sensor (2)
- Position encoders (2)
- DC motors (2)

## 2. IR Proximity Sensors (5)