

# ENPM661 - Spring 2023

## Competition

### Guidelines

**Competition Dates: May 6 & 7\*, 2023**

\* Reserve day

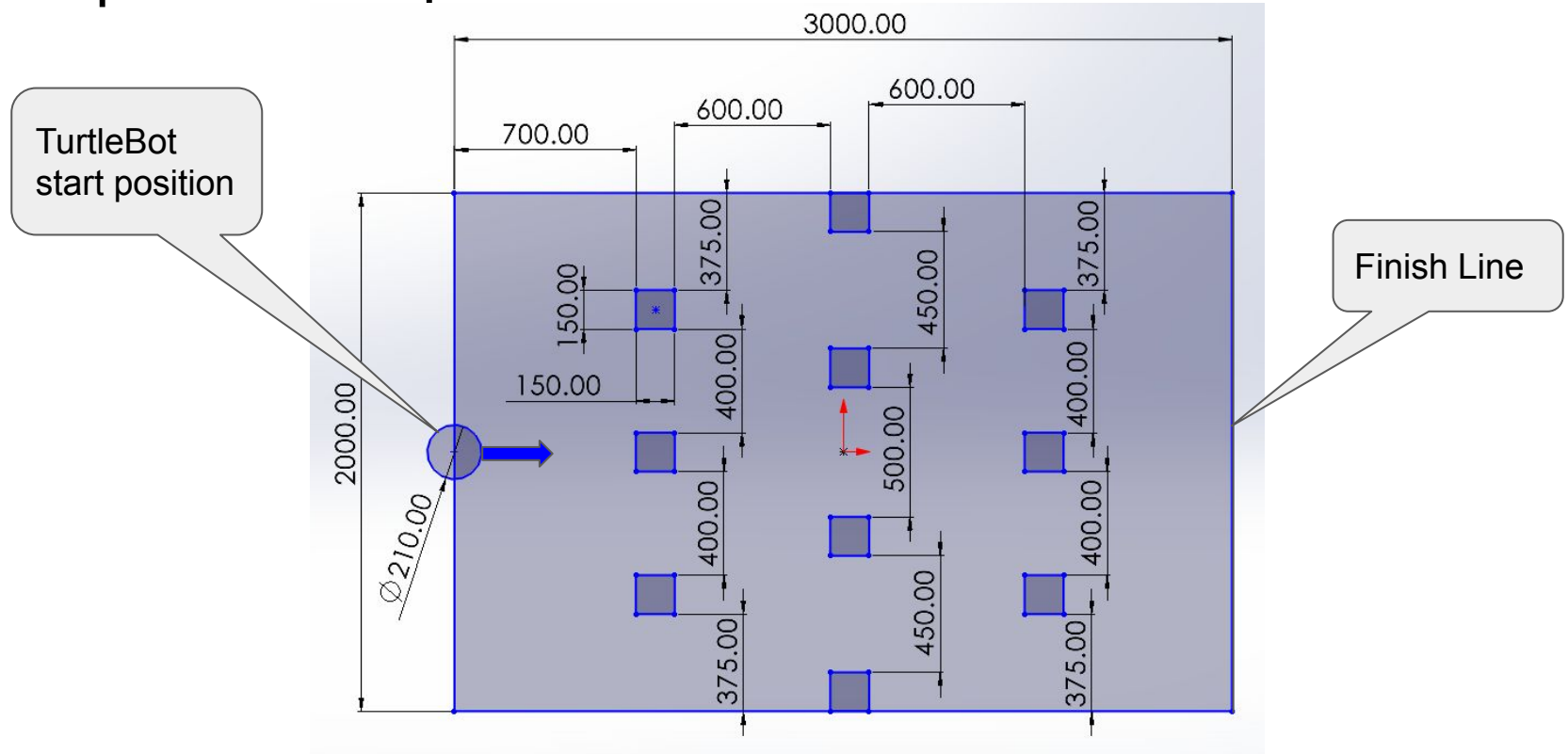
**Points/Weightage: 5^**

^ Plus extra credits!

# Competition: Rules

- **Goal:** Make the TurtleBot3 Burger compute a path from the start point to the finish line in the arena and follow it in the shortest possible time.
- Each team is given a **total of 5 minutes** to setup and run the robot. This time period will NOT be extended due to time restrictions. Multiple runs can be made within this time period, with changes to the code if required.
  - You have to generate the path and move the robot in the stipulated time. **Previously generated** path files will **not be accepted**.
- Teams are free to use any path planning algorithm learnt in class (BFS, Dijkstra, A\*, RRT, etc) as long as it is a custom implementation.
  - ROS Navigation Stack/SLAM packages/any other inbuilt planning packages for the robot are **STRICTLY prohibited**.
- A run is considered to have ended when **any one** of the following occurs:
  - [SUCCESS] When more than half of the robot successfully passes the goal line.
  - [FAIL] If any part of the robot touches any obstacle in the arena.
  - [FAIL] If more than half of the robot is out of the arena boundaries.
  - [FAIL] When the 5 minutes time limit has elapsed and the robot is still trying to compute/follow a path.
- To get the full base marks (5 points), the robot should successfully reach the goal location (crossing the Finish line).
  - **Extra points** will be given to the top **5 teams** with the **shortest run time**.
    - Shortest run time = time taken for your code to find a path + time taken for the bot to cross the finish line.

# Competition: Map



- All the units in the above image are in mm.
- All the boxes have a base of 150x150mm and are taller than the Turtlebot.

# Competition: Tips

- ❖ Send us your saved velocity values with time step and frequency of publishing
  - Include note on good value(s) of frequency
- ❖ Create your own Gazebo world map to simulate before the competition.
- ❖ Not possible to connect participant laptop to bot. Package/code must work on Teaching Staff's laptop.
- ❖ Can use LIDAR/IMU data to close the loop in control/obstacle avoidance.
- ❖ Comment out unwanted lines of code such as PyGame/OpenCV visualization while publishing the optimal path. Don't launch the Gazebo simulation to better performance.
- ❖ Check if your dt for calculating the path is matching with the publishing rate.