ELECTRICAL TEAM TRAINING

TASK 7

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Group Task

TASK7.1

About

In the ruins of Cybertron, the Autobots faced a vital mission: remove unstable red blocks and replace them with stable green ones.

Optimus Prime urged his team, “Focus, move with precision, and trust each other. Only by working together can we succeed.”

Bumblebee darted ahead, Ratchet steadied the pillars, Arcee freed the red blocks, and Hot Rod set the green ones in place. Each relied on the other’s timing and support, moving as one to complete the mission. Piece by piece, the battlefield shifted from chaos to balance.

In the **Gazebo arena**, the Autobots proved that unity and their ability to work with one another was their greatest strength.

Preface

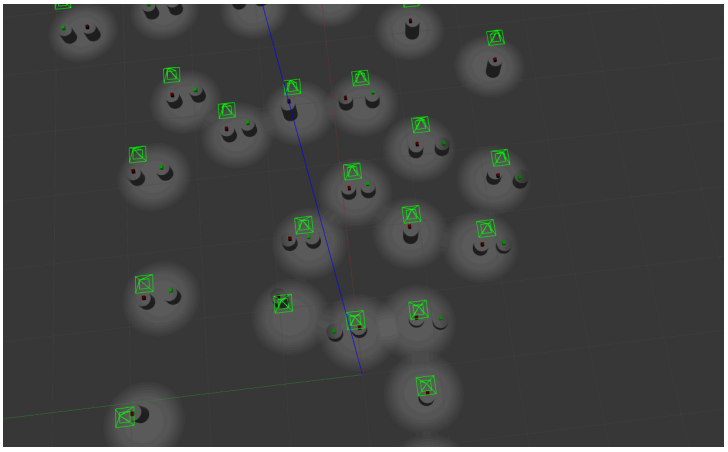
In the OOP workshop,On Saturday 23rd of August, there will be a competition between each group

The competition will be a **5 minute trial** in gazebo using a custom made map(map link provided) where each team will use Turtlebot3 equipped with a manipulator, and each team has to control their robot to remove red cubes and replace them with the green cubes

Rules

1- Each player must use and control **TurtleBot3 equipped with the OpenManipulator's manipulator**.

2- All players will compete in the **same Gazebo map** (map link provided)



3- The maximum **Linear** speed each turtlebot can move in is 0.33

4- Players goals are to **remove** red blocks from the pillars and **replace** them with green blocks using T**urtlebot3 manipulator**

5- **Scoring**

- Each red block removed is a half a point, **With the exception** of the tall pillars,being 3 points
- Removing the green block is half a point, and replacing the red block with the green block is 2.5 points

- **Any blocks removed by pushing the pillars does not count**

6-There can be multiple players in a single gazebo game

7- The trial length is 5 minutes

Requirements

Players will participate in a simulated competition inside a custom Gazebo map. using the TurtleBot3 Waffle robot equipped with the OpenManipulator arm.

The objective of the game is to use the robot's gripper to remove red blocks from the pillars and replace them with green blocks.

1- Turtlebot3

- Players are required to deploy the Turtlebot3 model waffle with the manipulator modification into gazebo

Turtlebot3 with a manipulator

- Each player must control the bot with a custom made python or C++ control script, the control script controls both the bot

movement and manipulator's 4 motors using ros **And must limit the linear speeds into 0.33**

2-Game map

- After downloading the game map, players are required to deploy the robot into the gazebo map

- Players must be able to control the robot efficiently enough where they can pick up and remove the cubes, and replace the red cubes with the green cubes using the robot's manipulator

3- Bonus:Multiplayer

- To maximize your score, you may deploy multiple robots, each controlled by a different player during the competition.

Resources

- Classic Gazebo installation
- Classic Gazebo documentation
- Turtlebot3 documentation

Individual Tasks

TASK7.2

About

In the middle of a raging cybernetic battlefield, the **Decepticons** were preparing for yet another strike against the Autobots. Explosions echoed across the metallic horizon of Cybertron as **Megatron**, their fearsome leader, stood at the command post, directing the chaos with cold precision.

The battlefield of Cybertron roared with fire and steel. The Decepticons surged forward, their leader **Megatron** towering above the chaos, issuing his commands through **ROS** and **sending orders by publishing on a ROS topic** .

“**Starscream: Attack**”

“**Cyclonus: Defend**”

Requirements:

- Write a python script or c++ code to create a publisher node that publishes string messages on a topic named **/decepticons** containing the following messages in any sequence you like:
  - starscream: Attack
  - starscream: Defend
  - cyclonus: Attack
  - cyclonus: Defend

- Write a python script or c++ code that represents a node referring to starscream that subscribes on the topic and each time starscream is included in the message this node publishes on another topic named **/starscream** the message Attack or Defend based on the received message.

- Do the same for cyclonus.

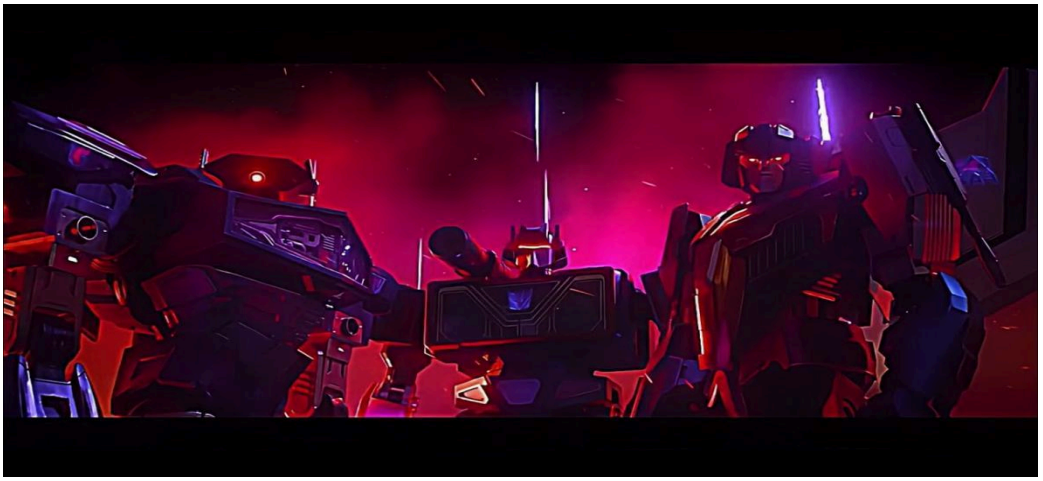
Resources

- C++ publisher & subscriber
- Python publisher & subscriber

TASK7.3

About

As the Autobots pressed harder, Megatron realized the flow of battle needed to be sharper, **faster**. Shouting across the field was no longer enough. He turned to **ROS services**, refining his commands so that Cyclonus and Starscream could respond instantly.
The orders cut through the chaos with precision, each Decepticon reacting without hesitation. Starscream dove from the skies in a flash, while Cyclonus braced the defense like an unbreakable wall.



Requirements:

- Create a ROS service node named starscream.
  - The service must use **std_srvs/Trigger.srv.**
  - Upon receiving a request, the service responds with either:
    "Attack" message, or
    "Defend" message.
- Do the same for cyclonus
- Create a node named megatron, the node must act as:
  - A **service client**:
  - Periodically send requests to both the **starscream and cyclonus services**.
  - A publisher: Publish on the topic **/decepticons**.
  - Each message must include:
    The robot's name (**"Starscream"** or **"Cyclonus"**).
    Its current status (**"Attack"** or **"Defend"**, depending on the service response).

Resources

- ROS service and client in c++
- ROS service and client in python

Submission

For Task 7.1:

- Upload a video showcasing your turtlebot removing a red cube and replacing it with a green cube
- Upload a zip file containing all the scripts you used to control the robot

For Task 7.2 and 7.3:

- You must upload your ros package and inside that package the scripts and services you created,you should also follow the proper folder system that was shown in the video
- Upload a video showcasing your runtime of the program,the video should show you using rostopic echo on the topics you created, like /decepticons, /starscream and /cyclonus, and the messages sent to this topics and should be run from your package

Link for submission: https://forms.gle/ec7kEHXK7L6phzvK7

Deadline for submission: Thursday at 21st of august at 11:59 pm