# Autonomous Systems - Assignment 1 Report

**-Drithi Davuluri (B21AI055)**
**-G Mukund (B21CS092)**

We installed the ROS (Robotic Operating System) as the middleware to manage communication between agents and to simulate the multiagent environment for the campus tour.

## Workspace Setup

Once ROS was installed, the next step was to set up the ROS workspace where the campus_tour package will be developed.

Creating Catkin workspace
mkdir -p ~/catkin_ws/src
cd ~/catkin_ws/
catkin_make
source devel/setup.bash

CrewAI and ROSPy Installation
pip install crewai
pip install rospy

Creating the campus_tour Package

- Navigate to the workspace src directory:
  cd ~/catkin_ws/src

- Create the campus_tour package:
  catkin_create_pkg campus_tour rospy std_msgs

- Build the workspace:
  cd ~/catkin_ws/
  catkin_make

- Source the workspace again:
  source ~/catkin_ws/devel/setup.bash

## Message Types

To facilitate communication between the CI agents and BI agents, message types were defined.

Navigate to the msg folder:
mkdir -p ~/catkin_ws/src/campus_tour/msg
cd ~/catkin_ws/src/campus_tour/msg

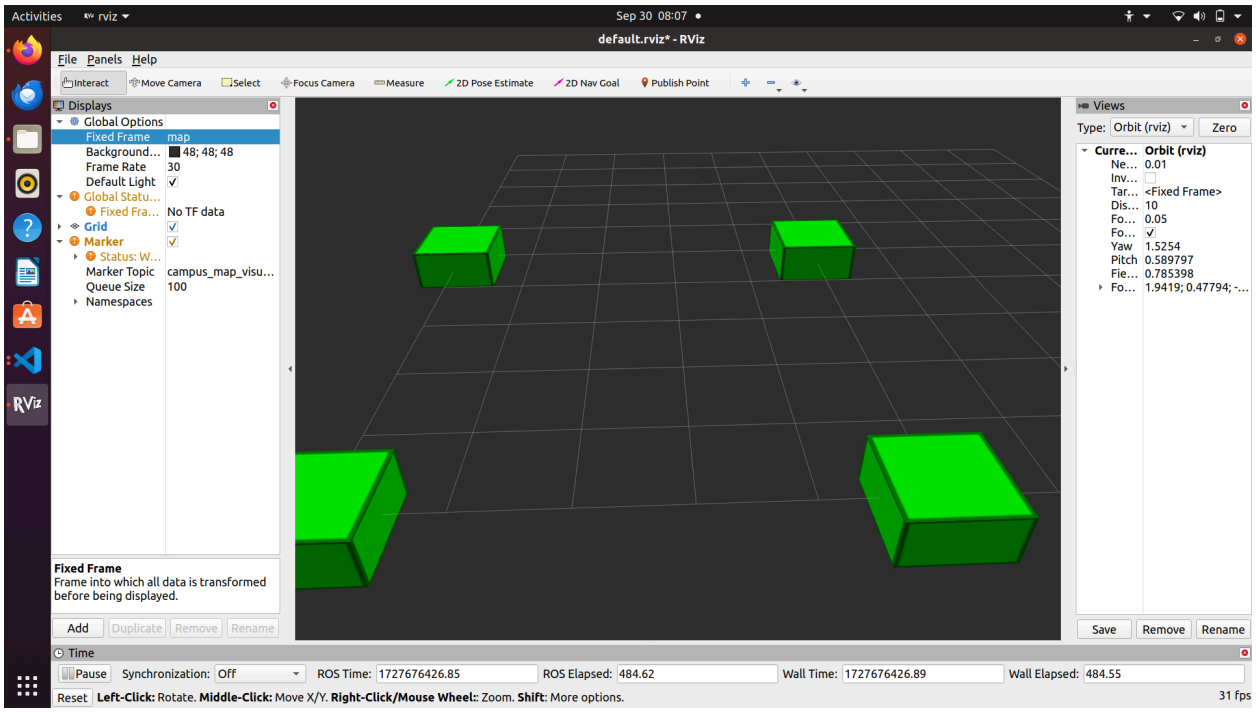
Create msg files
touch NavigationRequest.msg
touch NavigationResponse.msg
touch OOSNotification.msg

Defined the message formats
Updated CMakeLists.txt and package.xml
Rebuilt the workspace

With this the foundational environment for implementing and testing the multiagent system for the campus virtual tour was ready.

## Visualization of Campus Buildings Using ROS and Markers

A basic map is plotted on rviz to get familiar with the software



Then for the final campus map each building is represented by Marker objects published to specific topics, with different colors, dimensions, and positions for each building and its components.

## 1. Entrance Gate

**Topic: /**campus_map_visualization

- **Color:** Red (RGBA: 1.0, 0.0, 0.0, 1.0)
- **Scale:** (2.0, 0.5, 3.0) for width, height, and depth of the gate.

## 2. Main Academic Block

**Topic:** acad_map_visualization

- **Color:** Blue (RGBA: 0.0, 0.0, 1.0, 1.0)
- **Scale:** (8.0, 8.0, 10.0) for the size of the building.

## 3. Library

**Topic:** library_map_visualization

- **Color:** Blue for outer walls (RGBA: 0.0, 0.0, 1.0, 1.0)
- **Pathways:** Yellow markers for pathways within the library.

## 4. Lecture Hall Complex (LHC)

**Topic:** lhc_map_visualization

- **Color:** Yellow (RGBA: 1.0, 1.0, 0.0, 1.0)
- **Scale:** (8.0, 20.0, 8.0) for dimensions of the LHC.

## 5. Hostels

**Topic:** hostel_map_visualization

- **Color:** Orange (RGBA: 1.0, 0.65, 0.0, 1.0)
- **Scale:** (15.0, 15.0, 15.0) for each hostel block.

## 6. Sports Complex

**Topic:** sports_complex_map_visualization

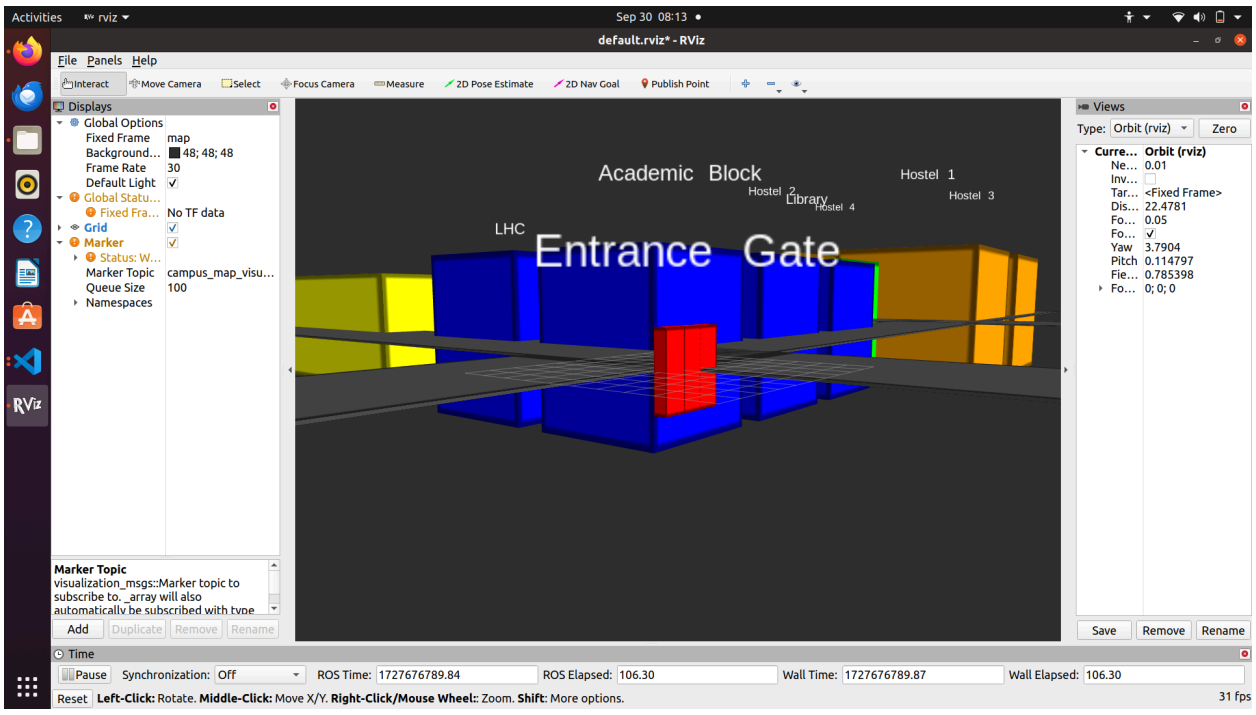
- **Color:** Purple (RGBA: 0.5, 0.0, 0.5, 1.0)
- **Scale:** (30.0, 20.0, 5.0) for size of the sports complex.

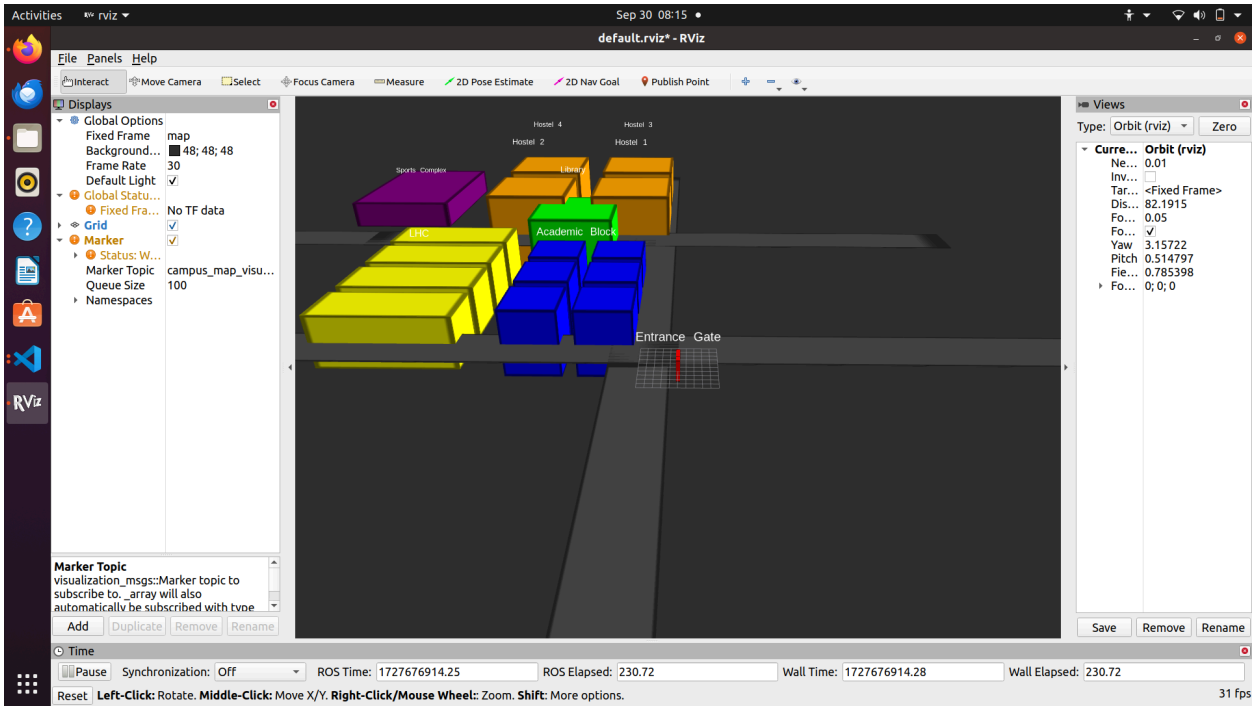
## 7. Roads

**Topic:** campus_map_visualization

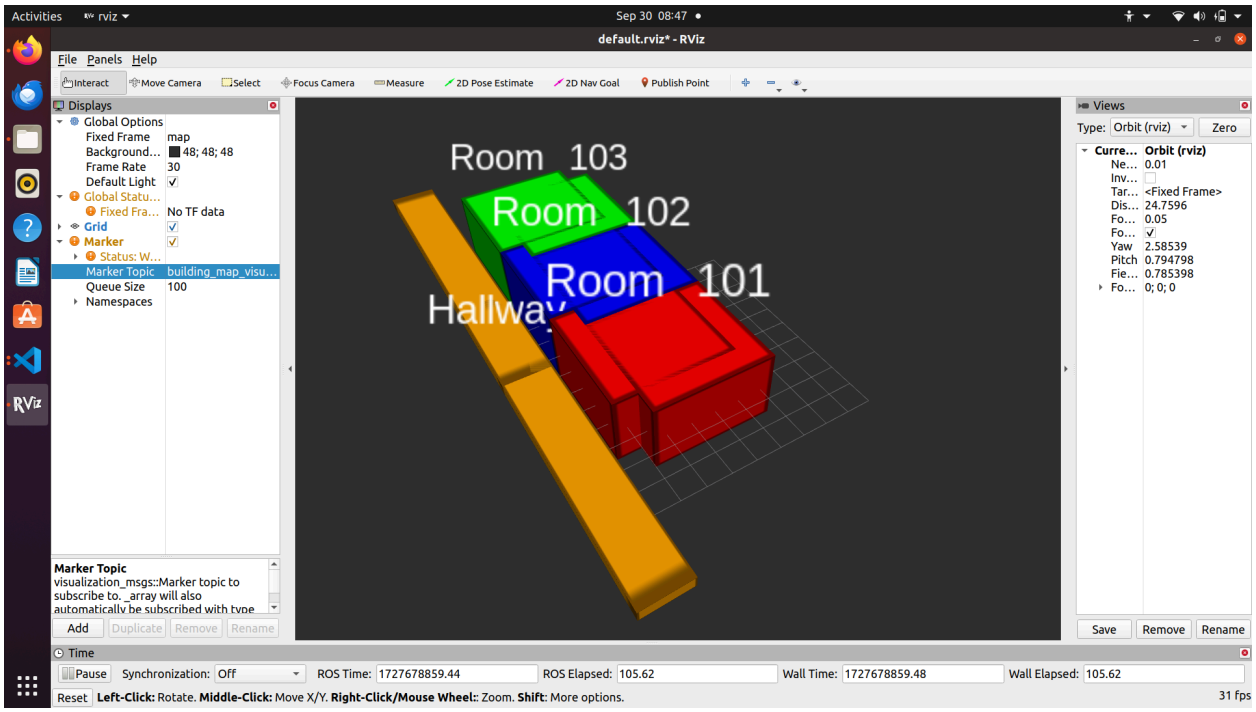
- **Color:** Dark Gray (RGBA: 0.3, 0.3, 0.3, 1.0)
- **Scale:** Roads are defined with varying lengths and widths.

1. The markers are created using the Marker message type. Each marker has a unique ID and namespace, and markers are added to represent both the physical structures and text labels.
2. Buildings and rooms are visually distinct based on their color and scale, which helps in the clear differentiation of campus areas.
3. Text labels are generated for each building or room, with unique IDs to prevent conflicts in visualization.
4. Each building or map is published to its own topic, allowing separation of visualization streams in RViz.






The map of academic block is also visualized as below-




Made the script executable
Launched using rosrun

**Campus_tour.rizviz** - The campus_tour.rviz file is a crucial configuration for RViz that enables effective visualization of maps, markers, and interactive tools in our virtual campus tour project. It includes a Displays Panel for managing visualization elements like grids and markers, a Selection Panel for object interaction, and a Tool Properties Panel for essential tools such as pose estimation and navigation goals. The Global Options feature a dark gray background and a fixed frame set to "map," with a frame rate of 30 frames per second for smooth visuals. We have also set the default view to "Orbit," focusing on the origin from a distance of 10 units, and the RViz window is configured at 1200x846 pixels. This setup enhances our user experience by facilitating seamless interaction and visualization within the 3D environment.

This helped us in the virtual campus tour project, facilitating the visualization of maps, markers, and interactive tools.

**CMakeLists.txt** - `CMakeLists.txt` file which we made is essential for configuring the **campus_tour** ROS package, helping us establish the project name and ensures compatibility with C++11, which is necessary for ROS Kinetic and newer distributions.

In it we identified the crucial dependencies, including **roscpp** for C++ functionalities, **rospy** for Python integration, **std_msgs** for standard message types, and **message_generation** for custom message support. Here we declared two custom message files, `NavigationRequest.msg` and `NavigationResponse.msg`, enabling the package to communicate specific navigation requests and responses.

Furthermore, we generated the message definitions for properly integration with the ROS environment. The `catkin_package` command confirms the package's status within the catkin workspace, while the inclusion of header file directories allows for seamless integration with other components. The `CMakeLists.txt` file enabled setting the **campus_tour** package, facilitating communication between various parts of the campus tour system.

**package.xml** - The package.xml file is a vital component of our **campus_tour** ROS (Robot Operating System) package, as it defines its metadata and dependencies.

In this XML document, we have specified the package name as **campus_tour** and assigned it a version number of **0.0.0**. The description highlights the package's purpose as a multi-agent system designed for campus tours.

Key elements in the file include our contact information as the maintainer, which currently contains a placeholder email and name. We plan to update these details before deployment. We have set the license to **BSD**, indicating that this package is open-source.

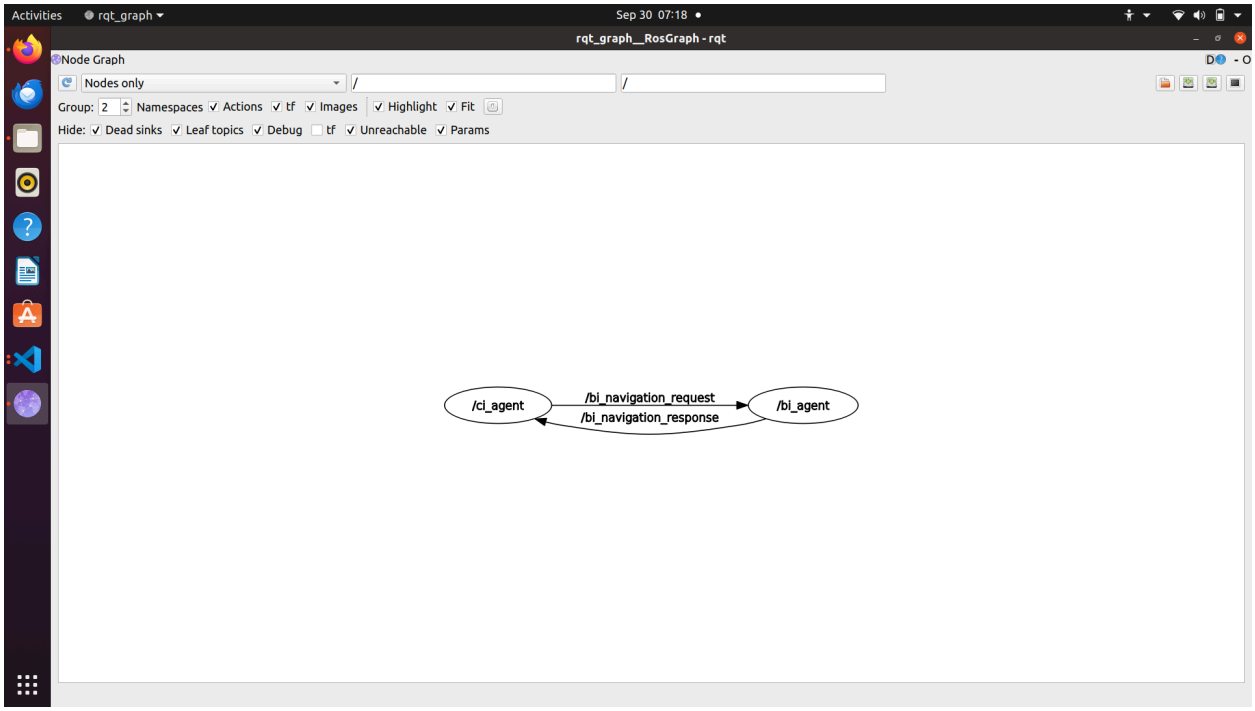
The buildtool_depend tag designates **catkin** as the required build tool. Additionally, we have outlined several dependencies needed during both the build and execution phases. These include **message_generation** for creating custom messages, **message_runtime** for handling messages at runtime, **std_msgs** for standard message types, **rospy** for Python support, and **roscpp** for C++ integration.

We have included the export tag for potential future expansions, which will allow us to declare additional tools and configurations as needed.

**campus_tour.launch** - This launch file defines how different nodes (agents) will be started and executed when the system is launched.

# Interaction protocols

Started with a basic structure of request and response between the ci_agent and bi_agent to understand how the protocol interactions work. The graph for the same when generated was as below




After having a basic understanding, we designed a system for the interaction of the multi agent system for the campus and the building maps as initiated.

# System Components

The system comprises three types of agents: CI agents, BI agents, and Visitor agents. Each agent has a specific role and responsibilities, and they communicate with each other via ROS topics using publish-subscribe mechanisms.

1. **CI Agent (Campus Incharge Agent)**:
    - Handles requests from Visitor agents and provides guidance based on communication with BI agents.
    - Responsible for managing visitor requests, directing visitors to the appropriate building, and coordinating with the respective BI agent to retrieve building information such as maps or host availability.
2. **BI Agent (Building Incharge Agent)**:
    - Manages specific buildings on the campus and provides building-related information (such as maps or host availability) to CI agents.
    - Each BI agent is responsible for one building, and it interacts with the CI agent when a request is forwarded.
3. **Visitor Agent**:
    - Acts as the initiator of the system, where visitors request assistance from the CI agent.
    - The Visitor agent simulates multiple visitor requests, directing them randomly to different CI agents.

# System Workflow

The following steps describe the typical workflow within the multiagent system:

## 1. Initialization

- Each agent is initialized in a separate ROS node. The CI and BI agents are initialized with specific responsibilities.
- For instance, a CI agent is tasked with managing requests for multiple buildings, while a BI agent is assigned to provide details about a particular building.

## 2. Visitor Requests

- Visitor agents are created with unique identifiers (Visitor ID). Each visitor can randomly choose any CI agent to request assistance from.
- Visitor agents publish their request messages to the corresponding CI agent’s request topic in ROS.

## 3. CI Agent Response

- Upon receiving a visitor request, the CI agent determines if it is available to assist. If not busy, the CI agent proceeds to handle the request.
- The CI agent selects the requested building and then contacts the corresponding BI agent for that building to request a map or host details.
- The CI agent logs every interaction and responds to the visitor based on the information received from the BI agent.

### 4. BI Agent Response

- The BI agent receives the request from the CI agent and responds based on its availability and the current state of the building (whether a map or host is available).
- The BI agent simulates a response indicating whether it can provide the necessary assistance (e.g., delivering a map or notifying that no host is available).
- The BI agent publishes the response back to the CI agent's response topic.

### 5. Visitor Interaction Completion

- Based on the BI agent's response, the CI agent provides further guidance to the visitor. This may include escorting the visitor to the host or providing the requested map.
- After completing the interaction, the CI agent logs the completion of the tour and returns the visitor to the entrance of the campus, marking the interaction as complete.

### 6. Logging of Interactions

- A log file is maintained to track every interaction between the agents. Each time an agent processes a request or respond to another agent, the action is recorded in a centralized log file for auditing and debugging purposes.

# Performance analysis and interpretation of results

1. **Assistance and Map Requests**:
    - The Visitor agent frequently assists Visitor by contacting different BI agents for maps of various locations (e.g., hostels, library, sports complex, academic block, and LHC).
    - There are instances where the BI agents are either "currently out of service" or "not available." This is noted multiple times, indicating potential reliability issues with certain BI agents.
2. **Service Responses**:
    - Responses from BI agents vary, with some providing the requested maps and others indicating unavailability or busy status. For example, while the

bi_agent_lhc provided the map on several occasions, other agents like bi_agent_library showed unavailability more frequently.

3. **Visitor Navigation**:
    - The Visitor agent successfully guides Visitor 1 to different hosts based on the maps provided, indicating a smooth navigation process when the BI agents are responsive.

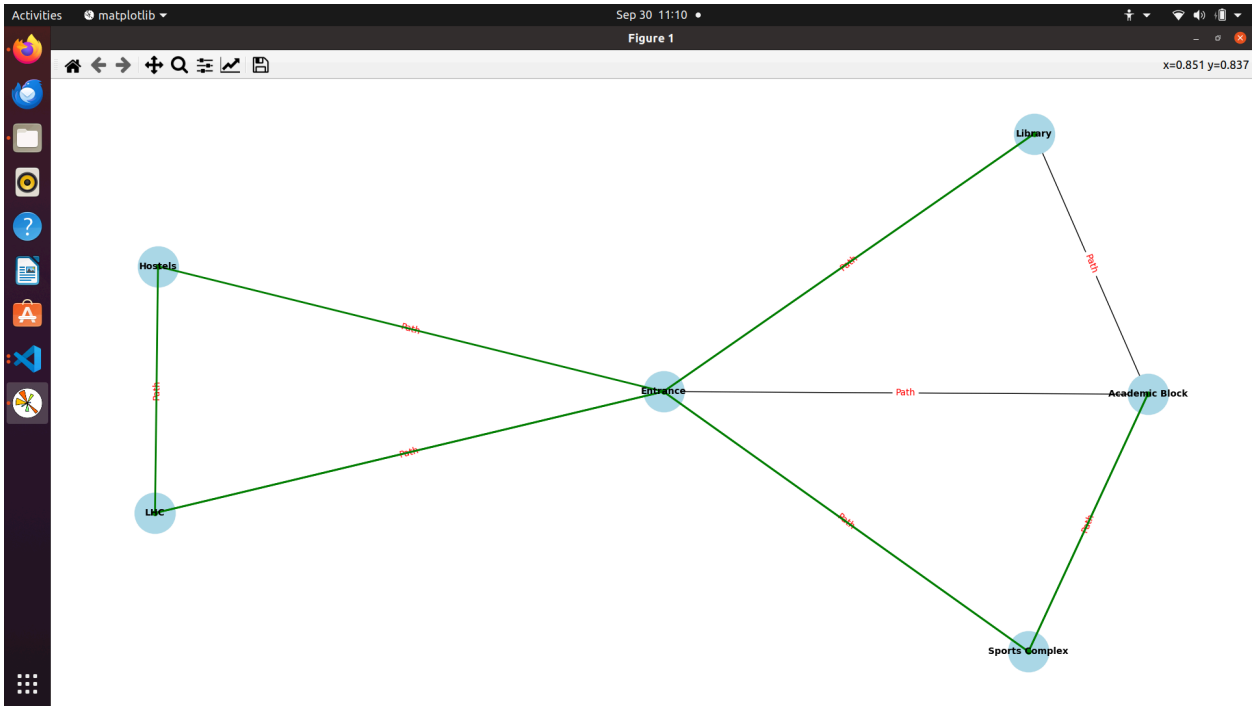
## Areas for Improvement

1. **Agent Availability**:
    - The repeated unavailability of several BI agents suggests a need for a monitoring mechanism to assess and improve their uptime. Consider implementing a fallback strategy where, if the primary BI agent is unavailable, the Visitor agent could attempt to contact an alternative agent or provide a generic map.
2. **Response Time Optimization**:
    - The logs show delays in responses, with the Visitor agent having to wait for replies from the BI agents before proceeding with assistance. Implementing asynchronous communication or optimizing the query process might reduce wait times and enhance user experience.
3. **Error Handling**:
    - The system could be improved with better error handling when a BI agent is unavailable. Instead of simply stating "I am currently out of service," a more constructive message could include alternative options or estimated wait times for when the agent will be available.
4. **Logging Enhancements**:
    - While the current logging captures the interaction flow, enriching the logs with timestamps for each request and response could provide deeper insights into performance metrics and areas needing attention.
5. **User Feedback Loop**:
    - Implementing a feedback mechanism after assisting the Visitor could provide valuable insights into the user experience and help fine-tune agent interactions. Gathering feedback could highlight persistent issues or feature requests from visitors.

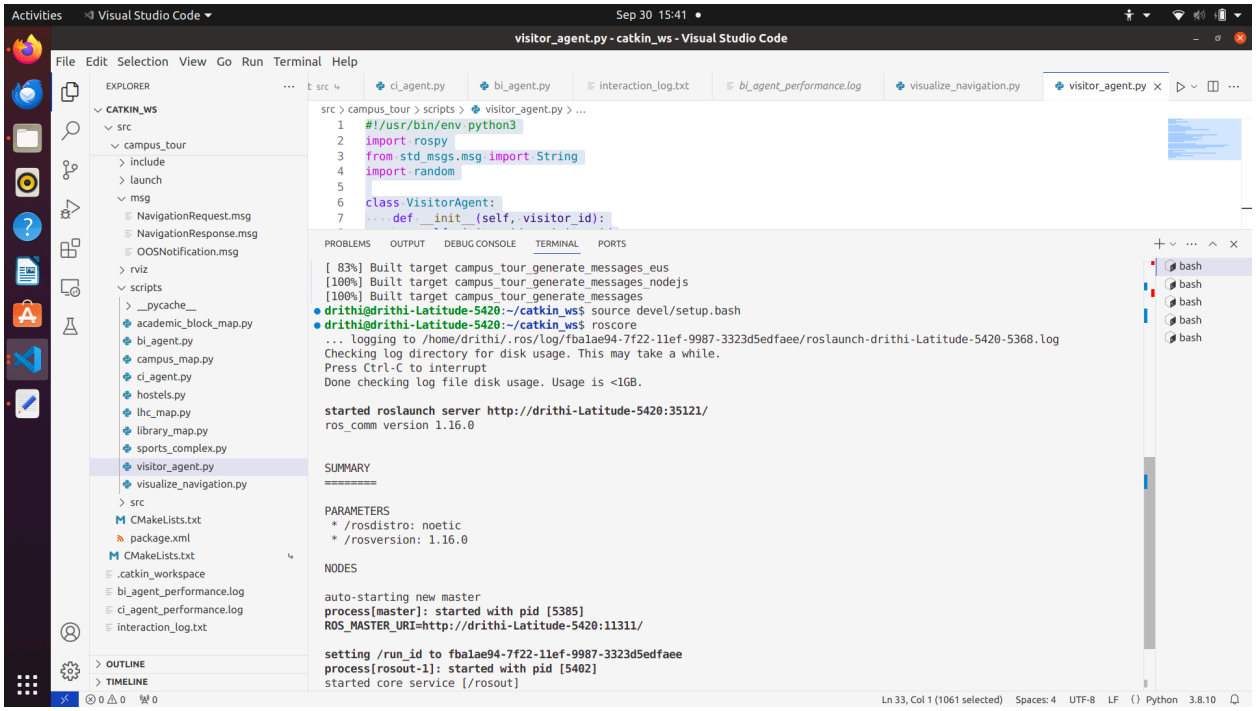
## Visualization Output

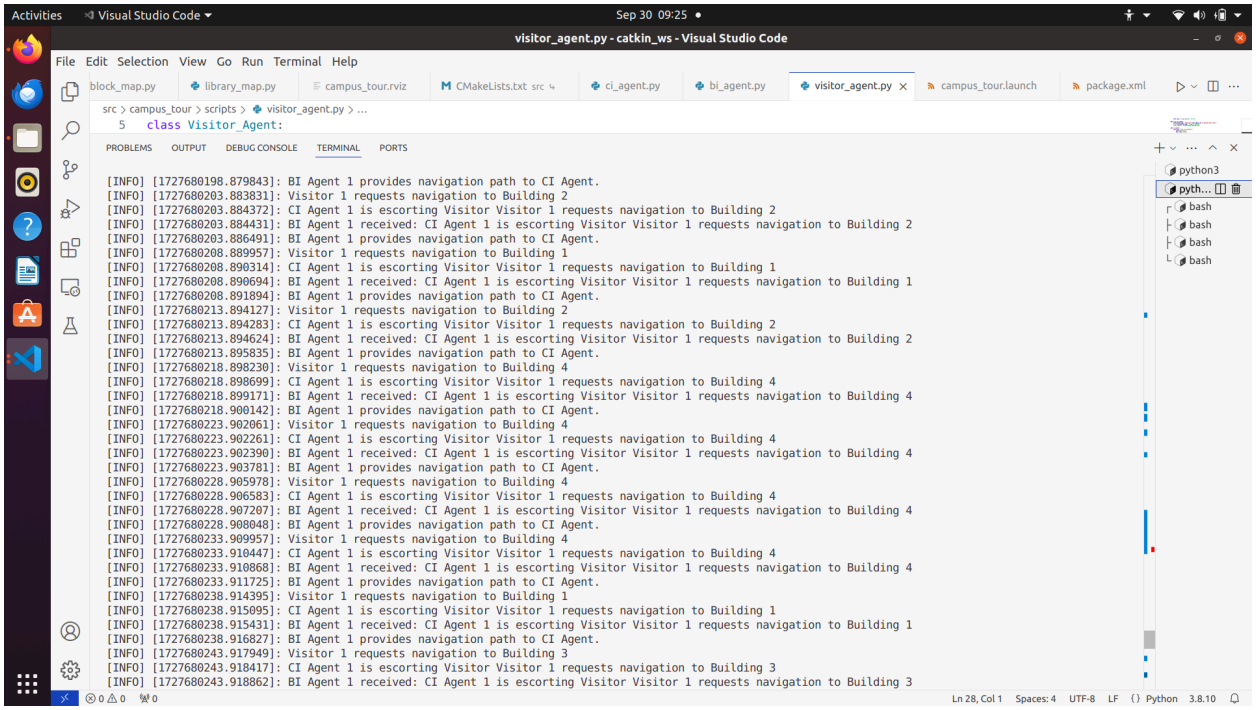
Created a graph visualization that represents:

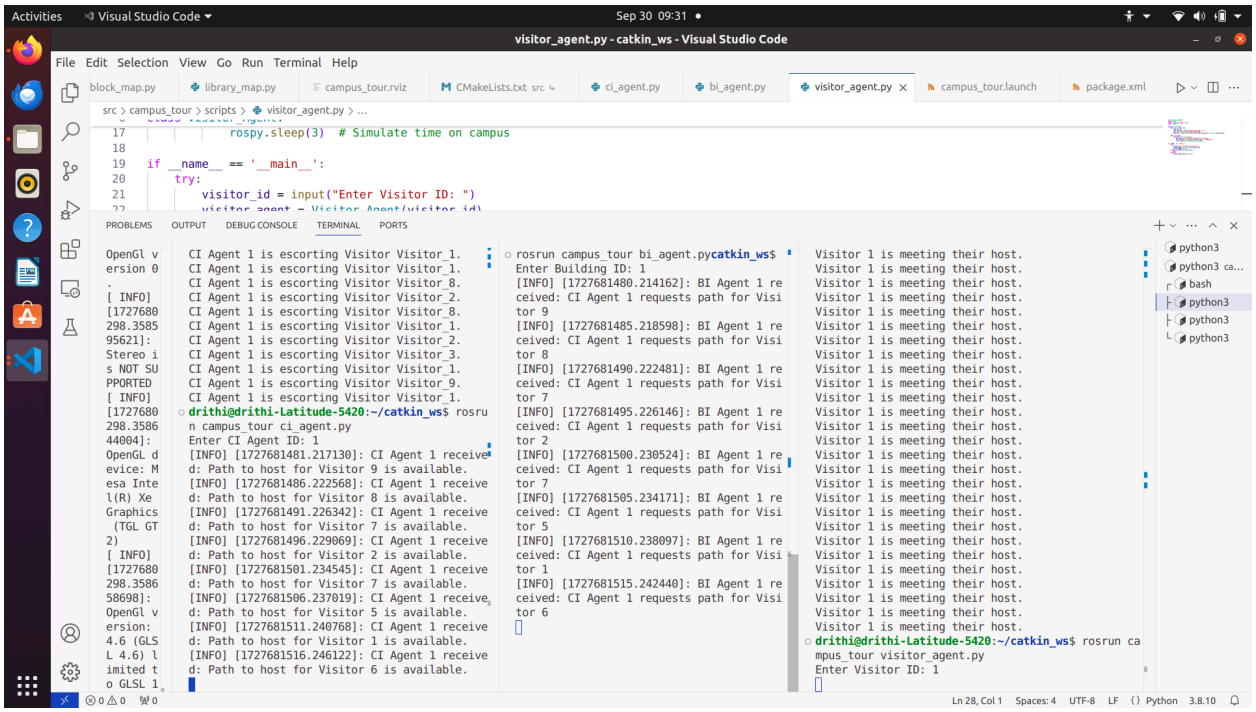
- **Nodes**: The buildings on the campus (Entrance, Library, Academic Block, Sports Complex, Hostels, LHC).
- **Edges**: The paths between the buildings.
- **Agent Movements**: Green lines showing the paths taken by agents as they assist visitors.

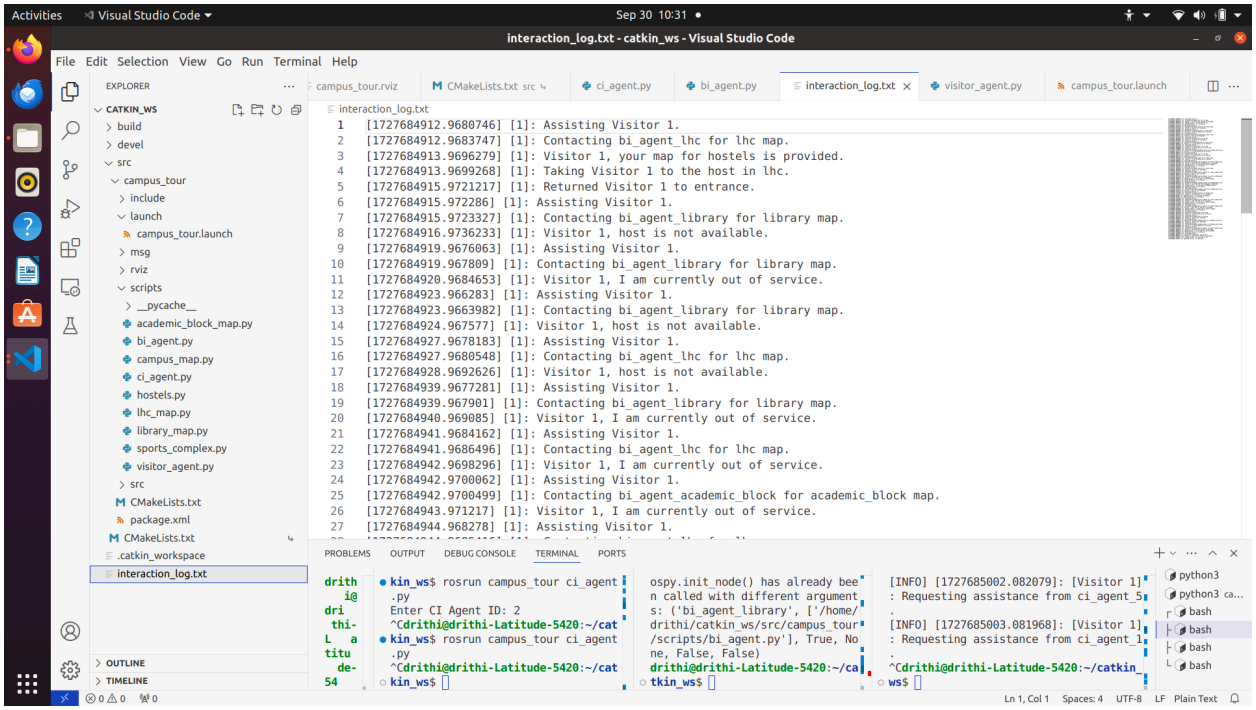


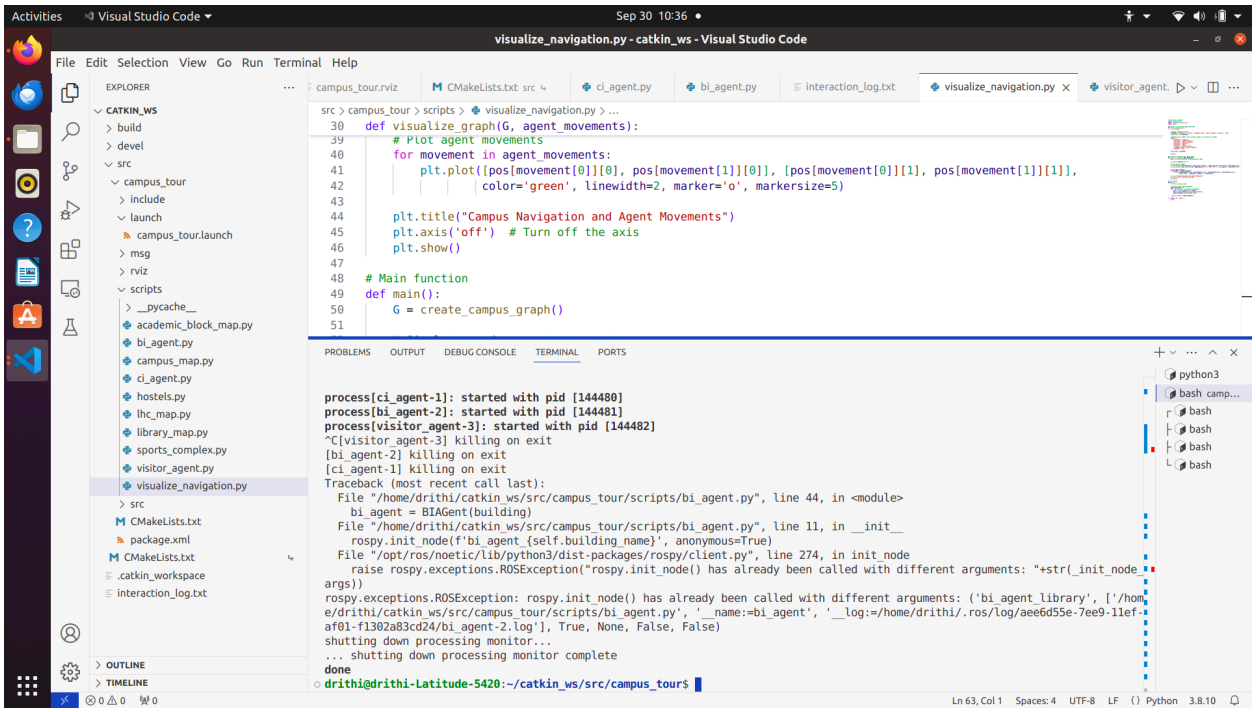

Attached are a few steps during execution




Activities
Visual Studio Code
Sep 30 09:25
visitor_agent.py - catkin_ws - Visual Studio Code
File Edit Selection View Go Run Terminal Help
block_map.py
library_map.py
campus_tour.rviz
CMakeLists.txt src
ci_agent.py
bi_agent.py
visitor_agent.py
campus_tour.launch
package.xml
src > campus_tour > scripts > visitor_agent.py > ...
5 class Visitor_Agent:
PROBLEMS OUTPUT DEBUG CONSOLE TERMINAL PORTS
[INFO] [1727680198.879843]: BI Agent 1 provides navigation path to CI Agent.
[INFO] [1727680203.883831]: Visitor 1 requests navigation to Building 2
[INFO] [1727680203.884372]: CI Agent 1 is escorting Visitor Visitor 1 requests navigation to Building 2
[INFO] [1727680203.884431]: BI Agent 1 received: CI Agent 1 is escorting Visitor Visitor 1 requests navigation to Building 2
[INFO] [1727680203.886491]: BI Agent 1 provides navigation path to CI Agent.
[INFO] [1727680208.889957]: Visitor 1 requests navigation to Building 1
[INFO] [1727680208.890314]: CI Agent 1 is escorting Visitor Visitor 1 requests navigation to Building 1
[INFO] [1727680208.890694]: BI Agent 1 received: CI Agent 1 is escorting Visitor Visitor 1 requests navigation to Building 1
[INFO] [1727680208.891894]: BI Agent 1 provides navigation path to CI Agent.
[INFO] [1727680213.894127]: Visitor 1 requests navigation to Building 2
[INFO] [1727680213.894283]: CI Agent 1 is escorting Visitor Visitor 1 requests navigation to Building 2
[INFO] [1727680213.894624]: BI Agent 1 received: CI Agent 1 is escorting Visitor Visitor 1 requests navigation to Building 2
[INFO] [1727680213.895835]: BI Agent 1 provides navigation path to CI Agent.
[INFO] [1727680218.898230]: Visitor 1 requests navigation to Building 4
[INFO] [1727680218.898699]: CI Agent 1 is escorting Visitor Visitor 1 requests navigation to Building 4
[INFO] [1727680218.899171]: BI Agent 1 received: CI Agent 1 is escorting Visitor Visitor 1 requests navigation to Building 4
[INFO] [1727680218.900142]: BI Agent 1 provides navigation path to CI Agent.
[INFO] [1727680223.902061]: Visitor 1 requests navigation to Building 4
[INFO] [1727680223.902261]: CI Agent 1 is escorting Visitor Visitor 1 requests navigation to Building 4
[INFO] [1727680223.902390]: BI Agent 1 received: CI Agent 1 is escorting Visitor Visitor 1 requests navigation to Building 4
[INFO] [1727680223.903781]: BI Agent 1 provides navigation path to CI Agent.
[INFO] [1727680228.905978]: Visitor 1 requests navigation to Building 4
[INFO] [1727680228.906583]: CI Agent 1 is escorting Visitor Visitor 1 requests navigation to Building 4
[INFO] [1727680228.907207]: BI Agent 1 received: CI Agent 1 is escorting Visitor Visitor 1 requests navigation to Building 4
[INFO] [1727680228.908048]: BI Agent 1 provides navigation path to CI Agent.
[INFO] [1727680233.909957]: Visitor 1 requests navigation to Building 4
[INFO] [1727680233.910447]: CI Agent 1 is escorting Visitor Visitor 1 requests navigation to Building 4
[INFO] [1727680233.910868]: BI Agent 1 received: CI Agent 1 is escorting Visitor Visitor 1 requests navigation to Building 4
[INFO] [1727680233.911725]: BI Agent 1 provides navigation path to CI Agent.
[INFO] [1727680238.914395]: Visitor 1 requests navigation to Building 1
[INFO] [1727680238.915095]: CI Agent 1 is escorting Visitor Visitor 1 requests navigation to Building 1
[INFO] [1727680238.915431]: BI Agent 1 received: CI Agent 1 is escorting Visitor Visitor 1 requests navigation to Building 1
[INFO] [1727680238.916827]: BI Agent 1 provides navigation path to CI Agent.
[INFO] [1727680243.917949]: Visitor 1 requests navigation to Building 3
[INFO] [1727680243.918417]: CI Agent 1 is escorting Visitor Visitor 1 requests navigation to Building 3
[INFO] [1727680243.918862]: BI Agent 1 received: CI Agent 1 is escorting Visitor Visitor 1 requests navigation to Building 3
python3
pyth...
bash
bash
bash
bash
Ln 28, Col 1 Spaces: 4 UTF-8 LF Python 3.8.10


Activities
Visual Studio Code
Sep 30 09:31
visitor_agent.py - catkin_ws - Visual Studio Code
File Edit Selection View Go Run Terminal Help
src > campus_tour > scripts > visitor_agent.py > ...
17 rospy.sleep(3) # Simulate time on campus
19 if __name__ == '__main__':
20 try:
21 visitor_id = input("Enter Visitor ID: ")
PROBLEMS OUTPUT DEBUG CONSOLE TERMINAL PORTS
OpenGl version 0. [ INFO] [1727680298.358595621]: Stereo is NOT SUPPORTED [ INFO] [1727680298.358644004]: OpenGL device: Mesa Intel(R) Xe Graphics (TGL GT2) [ INFO] [1727680298.358658698]: OpenGl version: 4.6 (GLSL 4.6) limited to GLSL 1
CI Agent 1 is escorting Visitor Visitor_1.
CI Agent 1 is escorting Visitor Visitor_1.
CI Agent 1 is escorting Visitor Visitor_8.
CI Agent 1 is escorting Visitor Visitor_2.
CI Agent 1 is escorting Visitor Visitor_8.
CI Agent 1 is escorting Visitor Visitor_1.
CI Agent 1 is escorting Visitor Visitor_2.
CI Agent 1 is escorting Visitor Visitor_3.
CI Agent 1 is escorting Visitor Visitor_1.
CI Agent 1 is escorting Visitor Visitor_9.
CI Agent 1 is escorting Visitor Visitor_1.
drithi@drithi-Latitude-5420:~/catkin_ws$ rosrun campus_tour ci_agent.py
Enter CI Agent ID: 1
[INFO] [1727681481.217130]: CI Agent 1 received: Path to host for Visitor 9 is available.
[INFO] [1727681486.222568]: CI Agent 1 received: Path to host for Visitor 8 is available.
[INFO] [1727681491.226342]: CI Agent 1 received: Path to host for Visitor 7 is available.
[INFO] [1727681496.229069]: CI Agent 1 received: Path to host for Visitor 2 is available.
[INFO] [1727681501.234545]: CI Agent 1 received: Path to host for Visitor 7 is available.
[INFO] [1727681506.237019]: CI Agent 1 received: Path to host for Visitor 5 is available.
[INFO] [1727681511.240768]: CI Agent 1 received: Path to host for Visitor 1 is available.
[INFO] [1727681516.246122]: CI Agent 1 received: Path to host for Visitor 6 is available.
rosrun campus_tour bi_agent.pycatkin_ws$
Enter Building ID: 1
[INFO] [1727681480.214162]: BI Agent 1 received: CI Agent 1 requests path for Visitor 9
[INFO] [1727681485.218598]: BI Agent 1 received: CI Agent 1 requests path for Visitor 8
[INFO] [1727681490.222481]: BI Agent 1 received: CI Agent 1 requests path for Visitor 7
[INFO] [1727681495.226146]: BI Agent 1 received: CI Agent 1 requests path for Visitor 2
[INFO] [1727681500.230524]: BI Agent 1 received: CI Agent 1 requests path for Visitor 7
[INFO] [1727681505.234171]: BI Agent 1 received: CI Agent 1 requests path for Visitor 5
[INFO] [1727681510.238097]: BI Agent 1 received: CI Agent 1 requests path for Visitor 1
[INFO] [1727681515.242440]: BI Agent 1 received: CI Agent 1 requests path for Visitor 6
Visitor 1 is meeting their host.
drithi@drithi-Latitude-5420:~/catkin_ws$ rosrun campus_tour visitor_agent.py
Enter Visitor ID: 1
python3
python3 ca...
bash
python3
python3
python3
Ln 28, Col 1 Spaces: 4 UTF-8 LF Python 3.8.10


Activities
Visual Studio Code
Sep 30 10:31
interaction_log.txt - catkin_ws - Visual Studio Code
File Edit Selection View Go Run Terminal Help
EXPLORER
CATKIN_WS
build
devel
src
campus_tour
include
launch
campus_tour.launch
msg
rviz
scripts
__pycache__
academic_block_map.py
bi_agent.py
campus_map.py
ci_agent.py
hostels.py
lhc_map.py
library_map.py
sports_complex.py
visitor_agent.py
src
CMakeLists.txt
package.xml
CMakeLists.txt
.catkin_workspace
interaction_log.txt
campus_tour.rviz
CMakeLists.txt src
ci_agent.py
bi_agent.py
interaction_log.txt
visitor_agent.py
campus_tour.launch
interaction_log.txt
1 [1727684912.9680746] [1]: Assisting Visitor 1.
2 [1727684912.9683747] [1]: Contacting bi_agent_lhc for lhc map.
3 [1727684913.9696279] [1]: Visitor 1, your map for hostels is provided.
4 [1727684913.9699268] [1]: Taking Visitor 1 to the host in lhc.
5 [1727684915.9721217] [1]: Returned Visitor 1 to entrance.
6 [1727684915.972286] [1]: Assisting Visitor 1.
7 [1727684915.9723327] [1]: Contacting bi_agent_library for library map.
8 [1727684916.9736233] [1]: Visitor 1, host is not available.
9 [1727684919.9676063] [1]: Assisting Visitor 1.
10 [1727684919.967809] [1]: Contacting bi_agent_library for library map.
11 [1727684920.9684653] [1]: Visitor 1, I am currently out of service.
12 [1727684923.966283] [1]: Assisting Visitor 1.
13 [1727684923.9663982] [1]: Contacting bi_agent_library for library map.
14 [1727684924.967577] [1]: Visitor 1, host is not available.
15 [1727684927.9678183] [1]: Assisting Visitor 1.
16 [1727684927.9680548] [1]: Contacting bi_agent_lhc for lhc map.
17 [1727684928.9692626] [1]: Visitor 1, host is not available.
18 [1727684939.9677281] [1]: Assisting Visitor 1.
19 [1727684939.967901] [1]: Contacting bi_agent_library for library map.
20 [1727684940.969085] [1]: Visitor 1, I am currently out of service.
21 [1727684941.9684162] [1]: Assisting Visitor 1.
22 [1727684941.9686496] [1]: Contacting bi_agent_lhc for lhc map.
23 [1727684942.9698296] [1]: Visitor 1, I am currently out of service.
24 [1727684942.9700062] [1]: Assisting Visitor 1.
25 [1727684942.9700499] [1]: Contacting bi_agent_academic_block for academic_block map.
26 [1727684943.971217] [1]: Visitor 1, I am currently out of service.
27 [1727684944.968278] [1]: Assisting Visitor 1.
PROBLEMS OUTPUT DEBUG CONSOLE TERMINAL PORTS
kin_ws$ rosrun campus_tour ci_agent.py
Enter CI Agent ID: 2
^Cdrithi@drithi-Latitude-5420:~/catkin_ws$ rosrun campus_tour ci_agent.py
^Cdrithi@drithi-Latitude-5420:~/catkin_ws$
ospy.init_node() has already been called with different arguments: ('bi_agent_library', ['/home/drithi/catkin_ws/src/campus_tour/scripts/bi_agent.py'], True, None, False, False)
drithi@drithi-Latitude-5420:~/catkin_ws$
[INFO] [1727685002.082079]: [Visitor 1]: Requesting assistance from ci_agent_5.
[INFO] [1727685003.081968]: [Visitor 1]: Requesting assistance from ci_agent_1.
^Cdrithi@drithi-Latitude-5420:~/catkin_ws$
python3
python3 ca...
bash
bash
bash
bash
OUTLINE
TIMELINE
Ln 1, Col 1 Spaces: 4 UTF-8 LF Plain Text


Activities
Visual Studio Code
Sep 30 10:36
visualize_navigation.py - catkin_ws - Visual Studio Code
File Edit Selection View Go Run Terminal Help
EXPLORER
CATKIN_WS
build
devel
src
campus_tour
include
launch
campus_tour.launch
msg
rviz
scripts
__pycache__
academic_block_map.py
bi_agent.py
campus_map.py
ci_agent.py
hostels.py
lhc_map.py
library_map.py
sports_complex.py
visitor_agent.py
visualize_navigation.py
src
CMakeLists.txt
package.xml
CMakeLists.txt
.catkin_workspace
interaction_log.txt
campus_tour.rviz
CMakeLists.txt src
ci_agent.py
bi_agent.py
interaction_log.txt
visualize_navigation.py
visitor_agent.
src > campus_tour > scripts > visualize_navigation.py > ...
30 def visualize_graph(G, agent_movements):
39 # Plot agent movements
40 for movement in agent_movements:
41 plt.plot([pos[movement[0]][0], pos[movement[1]][0]], [pos[movement[0]][1], pos[movement[1]][1]],
42 color='green', linewidth=2, marker='o', markersize=5)
43
44 plt.title("Campus Navigation and Agent Movements")
45 plt.axis('off') # Turn off the axis
46 plt.show()
47
48 # Main function
49 def main():
50 G = create_campus_graph()
51
PROBLEMS OUTPUT DEBUG CONSOLE TERMINAL PORTS
process[ci_agent-1]: started with pid [144480]
process[bi_agent-2]: started with pid [144481]
process[visitor_agent-3]: started with pid [144482]
^C[visitor_agent-3] killing on exit
[bi_agent-2] killing on exit
[ci_agent-1] killing on exit
Traceback (most recent call last):
File "/home/drithi/catkin_ws/src/campus_tour/scripts/bi_agent.py", line 44, in <module>
bi_agent = BIAGent(building)
File "/home/drithi/catkin_ws/src/campus_tour/scripts/bi_agent.py", line 11, in __init__
rospy.init_node(f'bi_agent_{self.building_name}', anonymous=True)
File "/opt/ros/noetic/lib/python3/dist-packages/rospy/client.py", line 274, in init_node
raise rospy.exceptions.ROSException("rospy.init_node() has already been called with different arguments: "+str(_init_node_args))
rospy.exceptions.ROSException: rospy.init_node() has already been called with different arguments: ('bi_agent_library', ['/home/drithi/catkin_ws/src/campus_tour/scripts/bi_agent.py', '__name:=bi_agent', '__log:=/home/drithi/.ros/log/aee6d55e-7ee9-11ef-af01-f1302a83cd24/bi_agent-2.log'], True, None, False, False)
shutting down processing monitor...
... shutting down processing monitor complete
done
drithi@drithi-Latitude-5420:~/catkin_ws/src/campus_tour$
python3
bash camp...
bash
bash
bash
bash
OUTLINE
TIMELINE
Ln 63, Col 1 Spaces: 4 UTF-8 LF Python 3.8.10