Progress Evaluation: Milestone 4

SRCIS

Search and Rescue Coordinated Intelligence Systems

Team Members
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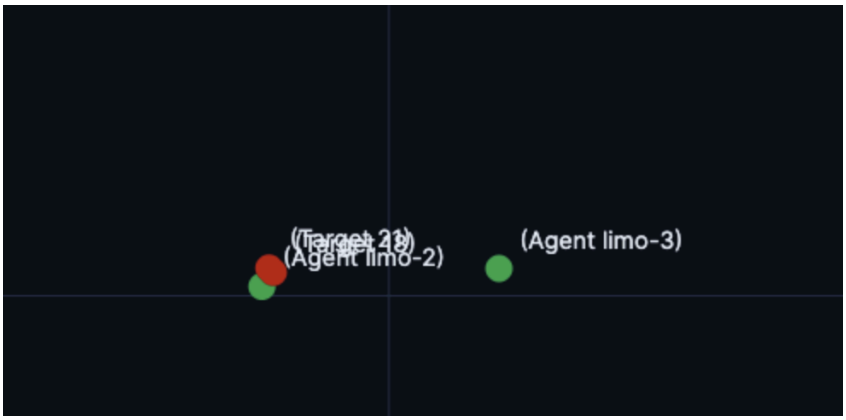
Milestone 4 task matrix:

Task	Completion	Yav	Young	Pop	To Do
Drone Setup (Parrot)	100%	40%	60%	0%	Develop code for drone operation(Basic) + **operate**
Unitree Go2 Setup	100%	40%	0%	60%	Integrate w/ Base Driver
Target Sharing	80%	40%	20%	20%	Clean up bugs
Multi-agent Coordination	75%	50%	15%	10%	Setup Unitree GO2 + operation
Concurrent Map Sharing	10%	10%	0%	0%	Implement an algorithm we researched to fit the needs of what we want; Merge the maps
Target engagement algorithm	0%	0%	0%	0%	Dependent on other tasks. Make an efficient algorithm for multiple robots to surround the target.
Robot Operator	0%	0%	0%	0%	Dependent on other tasks; need to finish the target engagement algorithm

Discussion of accomplished tasks / Contribution:

- **Pop:**
  - **Unitree ROS Drivers**
    - I ma
  - **Recorded demos**
    - Go2 Setup
    - LIMO Target Sharing and Engagement
- **Yav:**
  - **Target Sharing**

    The agents can share that they've seen a target and its location relative to the world origin. This information is also properly displayed on the mission map.

  - **Multi-Agent Coordination**

    When an agent confirms the target's location, all other active agents (capable) will navigate to the target, avoiding obstacles and other hazards.

- **Young:**
  - **Drone Setup**
    - Implemented ROS2-based control code for a Parrot drone, supporting takeoff, landing, and movement commands.
    - Integrated real-time camera streaming and enforced safety constraints using a controller interface to prevent unsafe drone behavior by
      1. Clamping max speed, rotation speed.
      2. Instead of a queue command, cancel when a new command is sent and practice it.

Milestone 5 Task Matrix

Task	Yav	Young	Pop	To-Do
Target Sharing	50%	25%	25%	Clean up bugs
Multi-agent Coordination	60%	25%	15%	Setup Unitree GO2 + operation
Drone integration (Parrot)	40%	60%	0%	Develop code for drone operation(Basic) + **operate**
Unitree Go2 Integration	40%	0%	60%	Integrate w/ Base Driver from LIMO
Concurrent Map Sharing	60%	20%	20%	Implement an algorithm we researched to fit the needs of what we want; Merge the maps
Mission Command Structure	33%	33%	33%	Draft a scheme of maneuver to explain the priorities pre-, during, and post-execution
Full-dress Demo	33%	33%	33%	Dependent on other tasks; Mock demo
Showcase Poster	33%	33%	33%	Make poster for Showcase
Target engagement algorithm	33%	33%	33%	Dependent on other tasks. Make an efficient algorithm for multiple robots to surround the target.
Robot Operator	33%	33%	33%	Dependent on other tasks; need to finish the target engagement algorithm

Discussion of planned tasks for the next Milestone:

Target Sharing

- Expand the target sharing to the drone.

Multi-agent Coordination

- Connect Unitree Go2 and parrot drone to operating Limo system in the world for map sharing.

Drone integration (Parrot)

- Upgrade existing code for the drone to check world regions and send target location to the other agents.

Unitree Go2 Integration

- Creating/Adding the publishers for Unitree in the base driver for the agents. Once this is complete, the robots will all be visible in the multi-agent view and will inherit the map/target-sharing details.

Concurrent Map Sharing

- By using SLAM developed in milestone 3, we will be able to have one map that has all the information, including
    - Robots (LIMO, Unitree, Parrot)
    - Target
    - Local objects

Mission Command Structure

- Develop a plan for how the robots will develop in their roles by creating a baseline standard for all interactions. This structure will establish the rules for what must happen during planning and execution.
- Agent assigned leader, decentralized execution, shared understanding, etc.

Full-dress Demo

- Create a mock environment to represent an urban environment (Obstacles: Buildings). Have all of the agents running through the base driver to cooperate and execute the task of

Showcase Poster

- Create a poster showing our whole system + real world application.

Target engagement algorithm

- The target engagement algorithm will dictate how the agents encircle the target efficiently.

Robot Operator

- When the agent shares an image of the potential target, the operator can confirm or deny whether it is the anticipated target (confidence level). This will be essential for when we transition from AruCo identification for targets to a more advanced target identification method. Also, even though the AruCo target is lost, assume the target location for efficient target tracking.

Advisor Section

Date(s) of meeting(s) with Client during the current milestone:

- See faculty advisor dates below

Client feedback on the current milestone

- See faculty advisor feedback below

Date(s) of meeting(s) with Faculty Advisor during the current milestone:

- 2/18/25

Faculty Advisor feedback on each task for the current Milestone

Faculty Advisor Signature: __Thomas C Eskridge_____ Date: __2/23/2025___