



Tecnológico de Monterrey

Evidence 2 - Review 1

Modeling of Multi-Agent Systems with Computer Graphics

Grupo 101

Ana Elena Velasco García	A01639866
Baltazar Servín Riveroll	A01643496
Emilio Pardo Gutiérrez	A01644781
Jozef David Hernández Campos	A01644644
Maria José Medina Calderón	A01639205

Iván Axel Dounce Nava

Jesús Israel Hernández Hernández

Oscar Guadalupe Hernández Calderon

Fecha de entrega:

20 ago 2025

Team

The team is formed with the participants whose names appear on the cover; these are the strengths:

Baltazar

- Strengths: Strong individual team member with a systematic approach and solid technical fundamentals. Demonstrates excellent potential for technical leadership.
- Areas of Opportunity: Further development of collaborative skills and expansion of advanced technical knowledge.

Jozef

- Strengths: Excellent practical skills, systematic thinking, and a positive team attitude. Organized and growth oriented, which supports steady academic and professional progress.
- Areas of Opportunity: Expanding theoretical knowledge to deepen understanding of advanced concepts.

Ana

- Strengths: Well rounded computer science student with strong practical experience and excellent interpersonal skills. Natural ability to explain and teach concepts effectively.
- Areas of Opportunity: Gaining deeper experience with advanced topics like multiagent systems and building leadership experience through team oriented roles.

Maria José

- Strengths: Strong practical skills combined with a collaborative mindset, making her a reliable and valuable team player.
- Areas of Opportunity: Strengthening theoretical foundations to complement existing abilities.

Emilio

- Strengths: Brings practical skills and a cooperative mindset that enhance team dynamics. Reliable in contributing to shared goals.
- Areas of Opportunity: Building a stronger theoretical background to balance technical proficiency with conceptual understanding.

Expectations for the block

Our primary expectation for this block is to develop a functional and intelligent multiagent system capable of solving a non-trivial task in a simulated environment. Specifically, we aim to design and implement a drone agent that can autonomously navigate a 3D environment and accurately identify and land near a designated target person. This challenge will require us to apply the core principles of multiagent systems, including perception, action, communication, and coordination, within a collaborative team setting.

What We Hope to Achieve:

- Technical comprehension of MAS Concepts
- Extend our understanding of perception, decision-making, and interaction protocols in multiagent systems.
- Apply these concepts in practice through Unity and Blender simulations.
- Have a successful Project
- Implement meaningful interaction protocols between agents (Drone ↔ Ground Control).
- Good Team Collaboration and Role Development
- Take into account individual strengths to divide responsibilities efficiently.
- Enhanced Communication and Leadership

- Encourage cross-role communication and peer feedback.
- Foster leadership and accountability by rotating responsibilities and learning from one another's contributions.
- Critical Thinking and Problem Solving
- Reflect on failures and iterate on solutions with a growth mindset.

Commitments to Achieve These Goals

- Collaboration and knowledge sharing: We will ensure frequent check-ins and collaborative debugging to maintain project cohesion. Each member will support others in closing knowledge gaps.
- Adhering to the Work Plan: We will follow a defined schedule and divide the workload based on strengths and learning goals. All deliverables will be completed on time.
- Fostering Growth Opportunities: Each member will take on tasks that challenge their areas of opportunity.
- Quality and Integrity: We commit to writing clean, modular, and well-documented code.

Collaborative tools

This is our Github repository as a shared platform to collaborate and communicate:

<https://github.com/Jozefhdez/MAS-Reto>

Formal proposal

Description: We will try to develop an agent that will control the movements of a drone in a unity simulation. Using blender, we will create a park landscape with several trees, bushes,

grass, and people. The objective of the agent is to land the drone in a 2 meter radius from the person wearing an orange vest and a construction helmet.

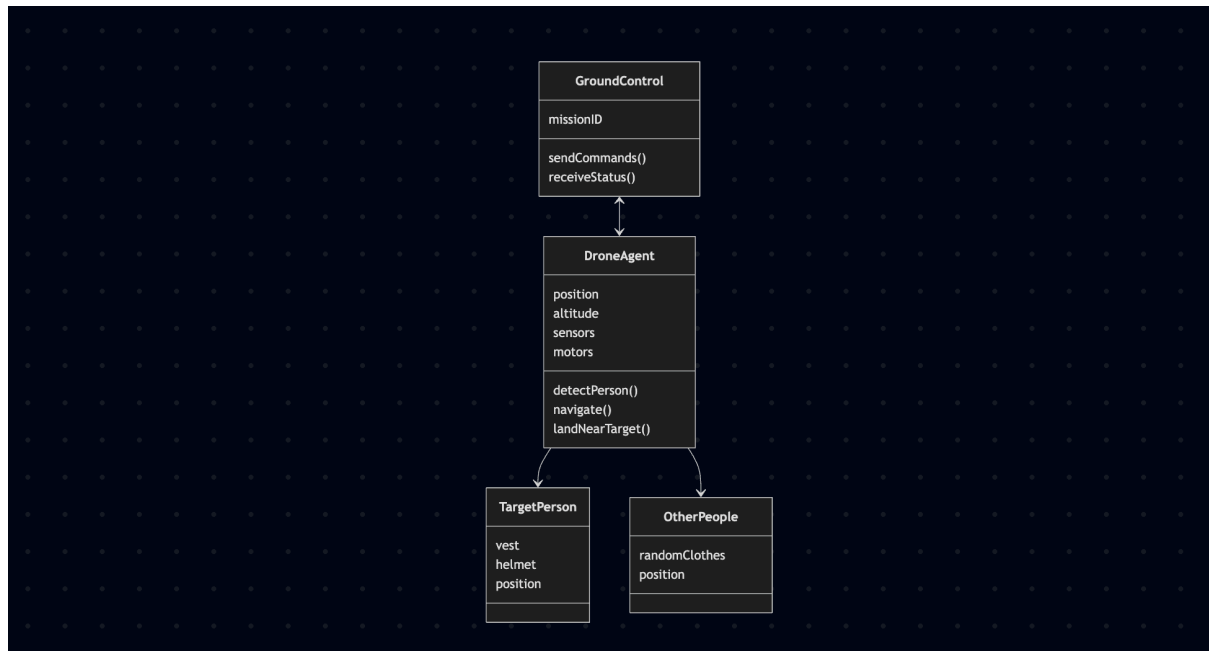
Agents involved

- Drone Agent
 - Autonomous decision-maker.
 - Perceives environment (object detection).
 - Executes actions (fly, hover, land).
 - Objective: land within 2m of the target person.
- Ground Control Agent
 - Acts as supervisor of the drone.
 - Could override or monitor the drone.
- Person of Interest (Target Person)
 - Identified by unique features (orange vest + helmet).
- Other People (Distractors)
 - Represent background actors.
 - Force the drone agent to differentiate between targets.

Relationships

- Drone ↔ Ground Control: command + telemetry.
- Drone ↔ Person of Interest: detection + navigation target.
- Drone ↔ Other People: recognition (avoid false positives).

Class Diagram



Interaction Protocol Diagram

1. Ground Control → Drone: "Mission: Find person with vest + helmet, land within 2m."
2. Drone → Environment: Perceives surroundings via sensors.
3. Drone → People: Detects multiple humans.
4. Drone → Target Person: Identifies orange vest + helmet → sets as target.
5. Drone → Ground Control: Sends confirmation: "Target acquired, approaching."
6. Drone → Environment: Avoids trees, bushes, obstacles.
7. Drone → Target Person: Lands within 2m radius.
8. Drone → Ground Control: "Landing successful."

Work plan

Pending activities

- 3D Environment Creation (Blender): Park with trees, bushes, grass, people. (2 Weeks)
- Drone Agent Coding: Perception + Navigation + Landing. (1 Week)
- Interaction Protocol Implementation: Communication logic between agents. (1 Week)
- Testing & Calibration: Run simulations, adjust detection threshold (2m radius). (1 Week)

Acquired Learning

- Learned to model environments in Blender.
- Learned that communication protocols and its importance in MAS.

Responsible individuals

Activity	Responsible	Dates	Effort
3D Park Environment (Blender) – trees, bushes, terrain, grass	Baltazar	Week 3 - Week 4	5 hrs
3D People Models – target person (vest + helmet) + distractors	Marijo	Week 3 - Week 4	5 hrs
Drone Movement Physics in Unity – basic flight, landing mechanics	Jozef, Ana	Week 3	8 hrs
Detection Logic – recognize orange vest + helmet, differentiate people	Baltazar, Emilio	Week 3	8 hrs
Interaction Protocol Design – define agent communication & sequence diagrams	Marijo, Ana	Week 4	8 hrs
Integration & First Simulation Test – put together environment + drone + detection	Jozef, Emilio	Week 4	5 hrs