



Tecnológico  
de Monterrey

**Mission:  
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# CHALLENGE DESCRIPTION

The mission consists of designing a **multi-agent system** that enables an autonomous UFO to locate, identify, and abduct specific cows in a mountainous terrain.

Our project implements a UFO that patrols the terrain and detects cows using computer vision.

When a cow is identified, the UFO navigates to its position and descends above it.

This system combines autonomous movement with external AI detection.

# SYSTEM OBJECTIVE

The objective is to create a fully autonomous multi-agent system capable of interpreting mission commands, navigating through obstacles, recognizing cows based on their characteristics, and executing abductions using a tractor beam.

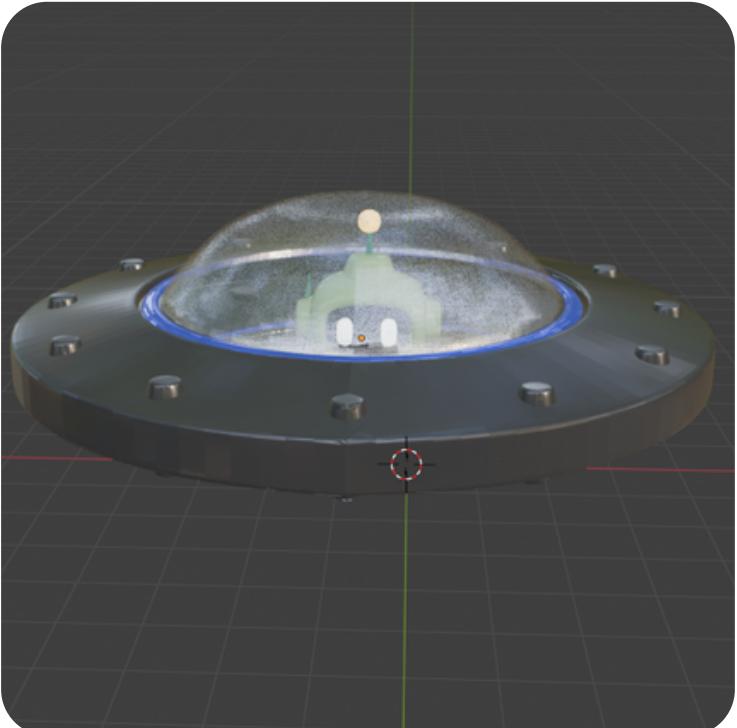


# INVOLVED AGENTS

**UFO**



Perception, environment  
and action.



**ALIEN CONTROL  
STATION**



Mission planning and  
coordination.



**COWS**



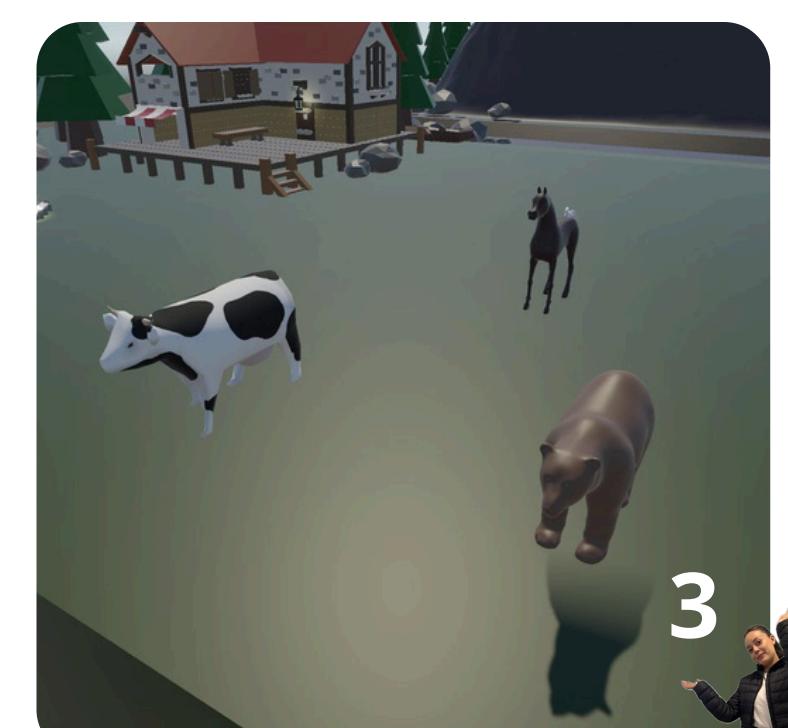
Entities to be detected.



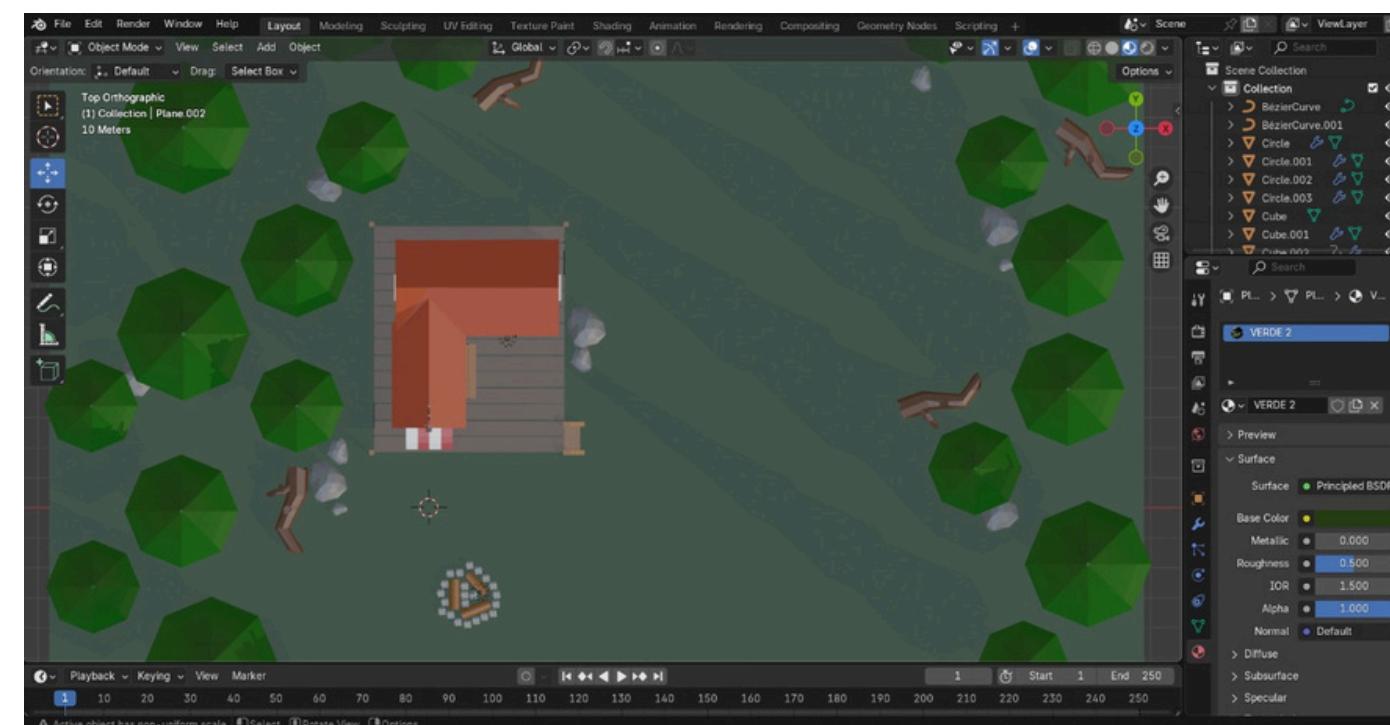
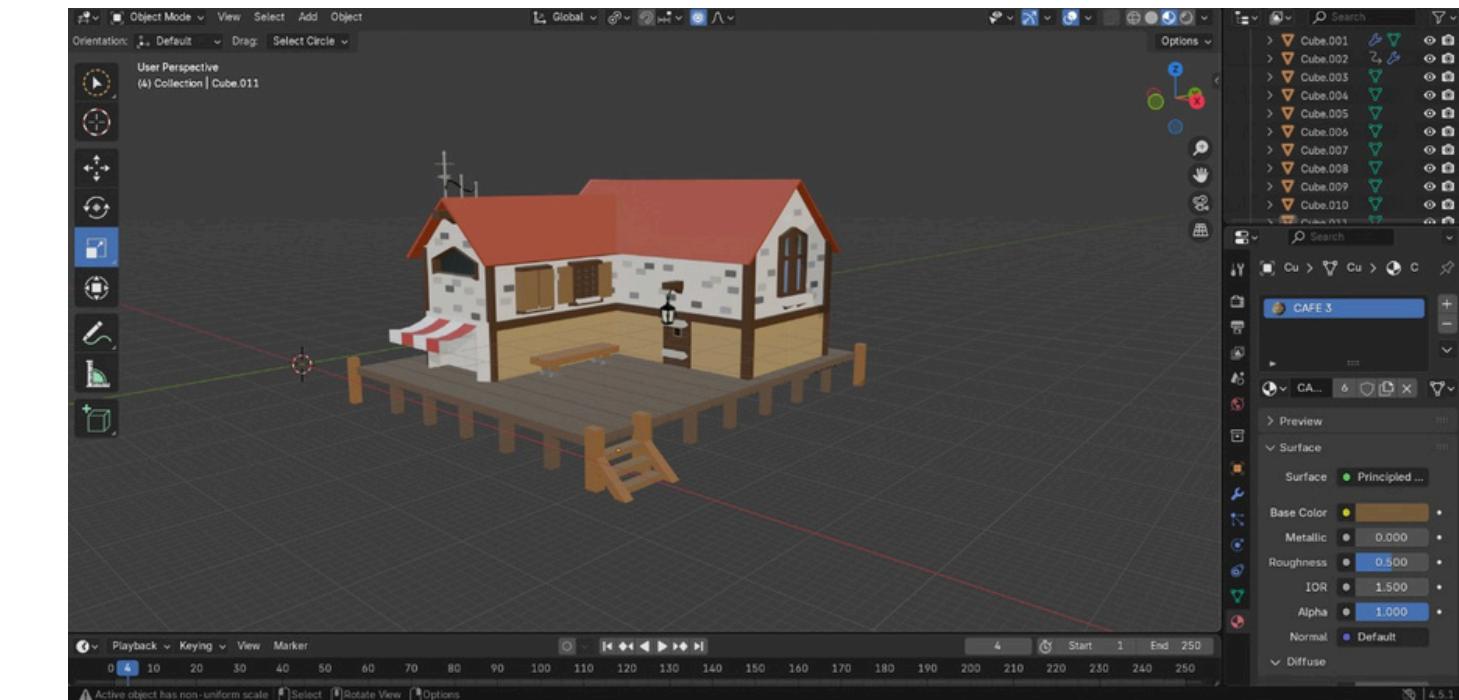
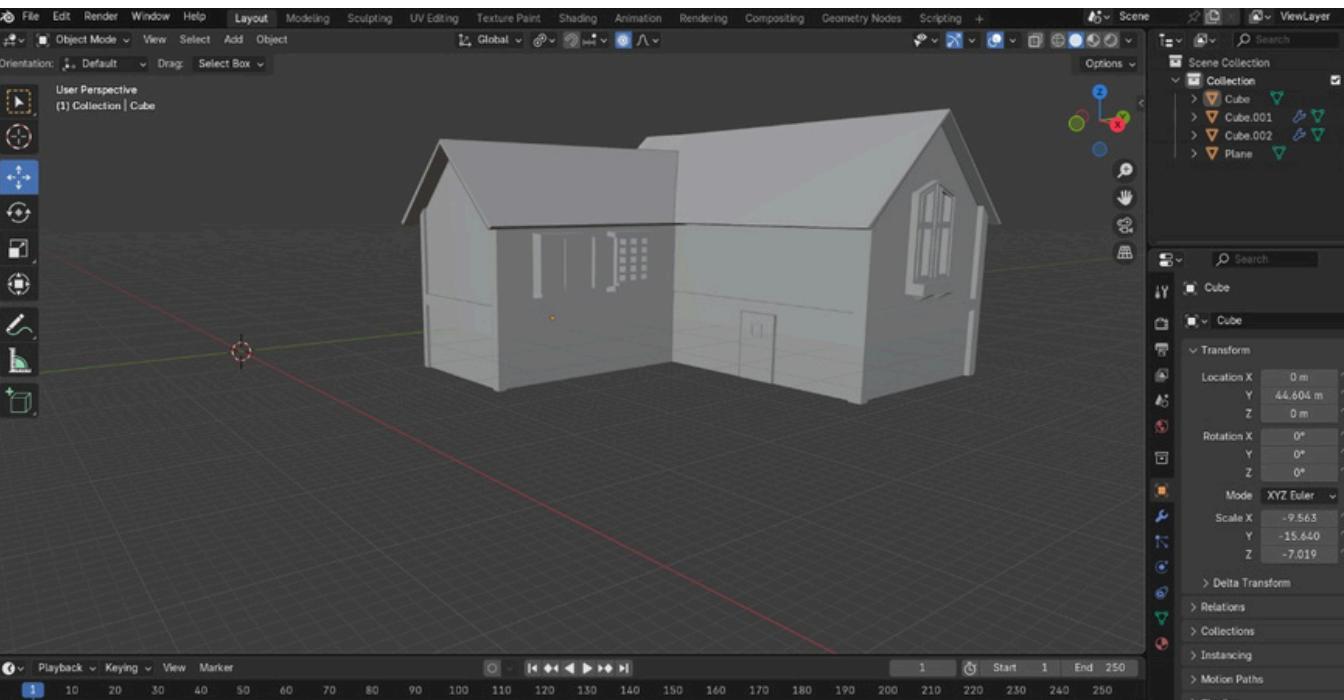
**ANIMALS**



Other agents present in  
the environment.



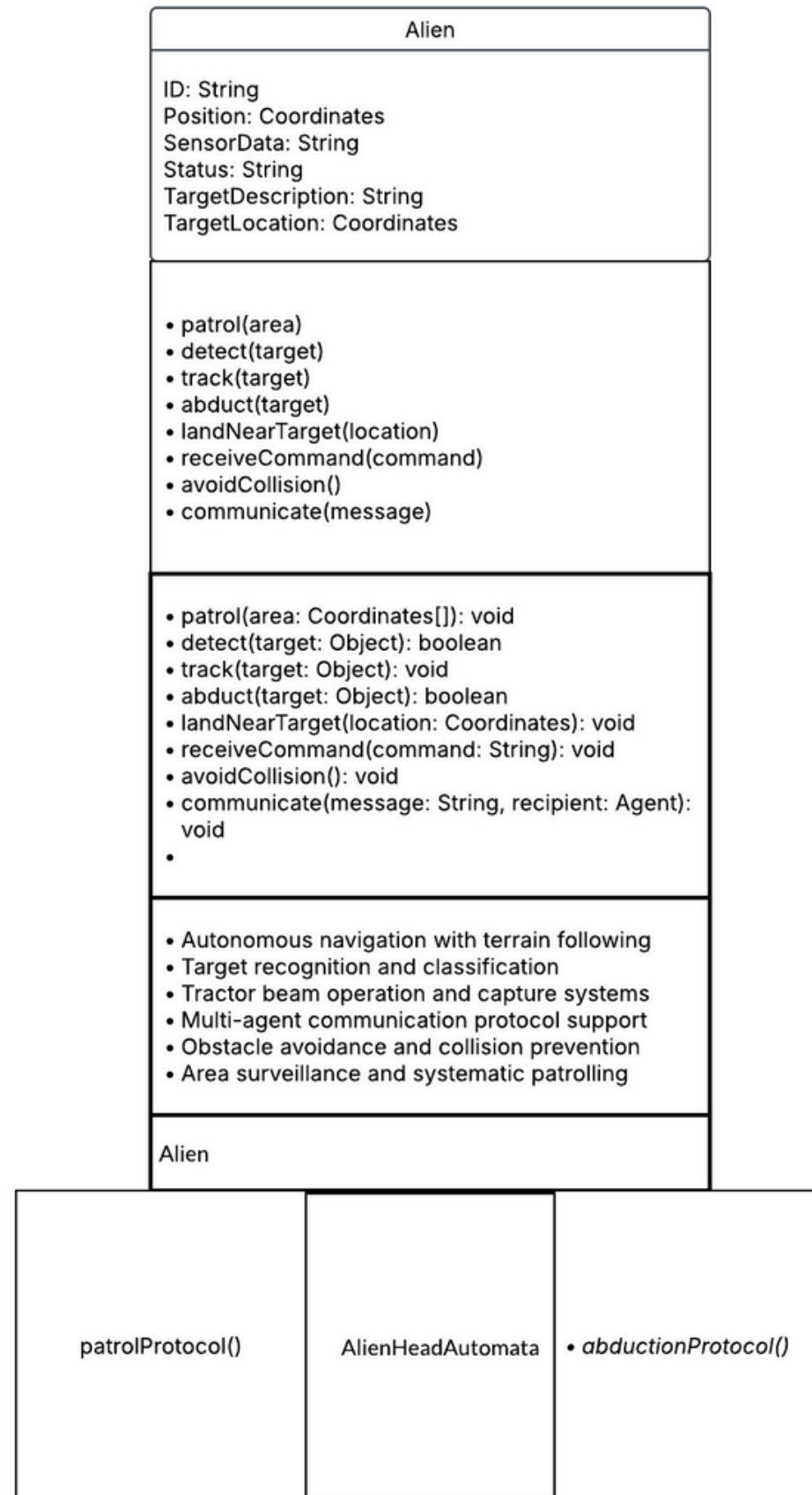
# 3D MODELS



4



# FINAL AGENT UML



# UFO KEY STRATEGIES

1. Receives and **process instructions**.
2. Navigate around the area looking for the target.
3. Identify cows with *probabilistic recognition* based on description.
4. Follow the target and position above the cow.
5. Communicate the results to the server.





# FINAL DESIGN

The final architecture includes three core modules: Environment, Perception, and Action.

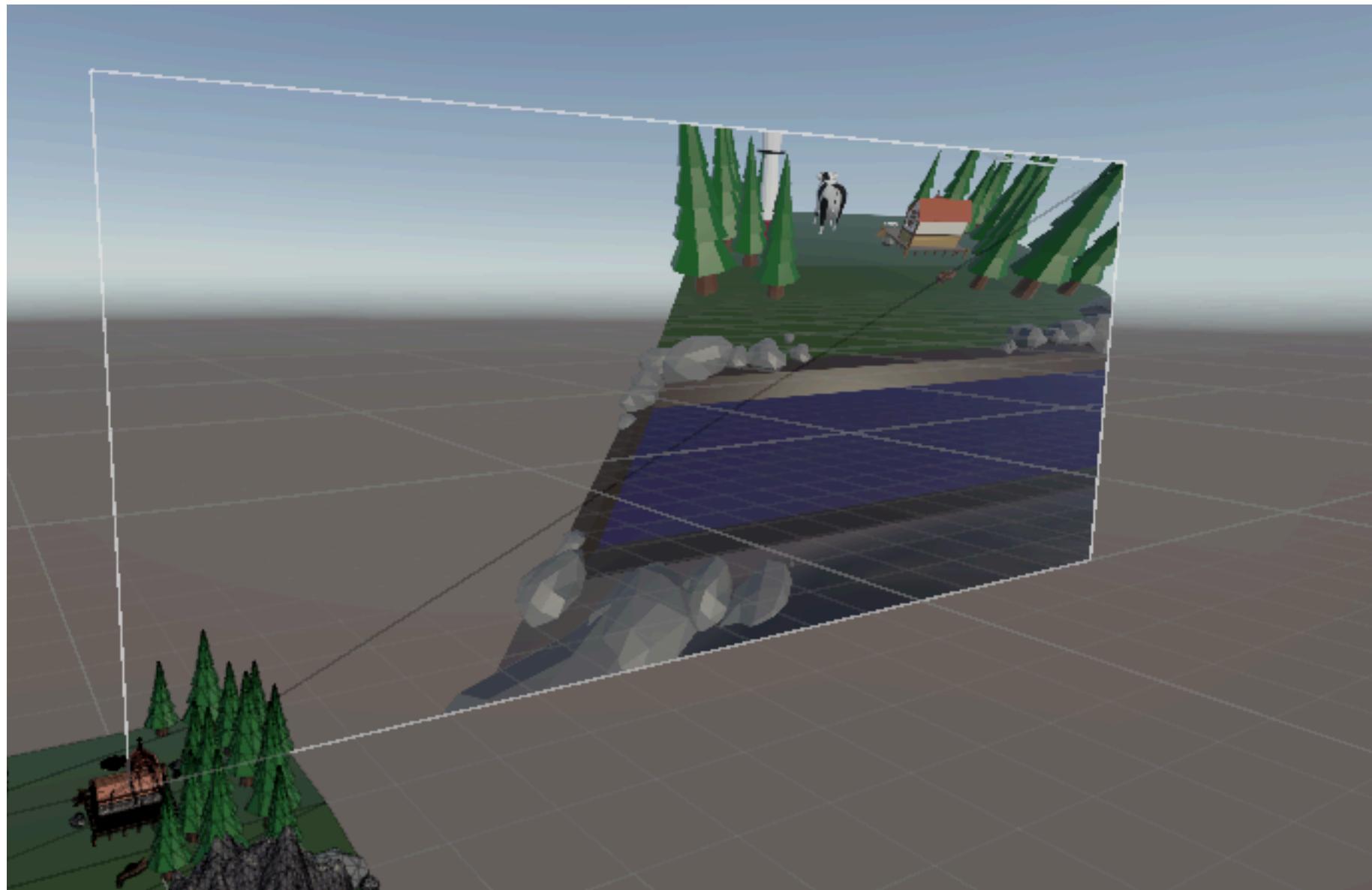
Each module is modeled as an agent, interacting through well-defined communication protocols to ensure autonomy and coordination.

# MISSION FLOW

The UFO receives the mission with target description and coordinates, travels to the designated area, scans and identifies the correct cow, and performs the abduction using the tractor beam. It then confirms the mission completion to the control station.

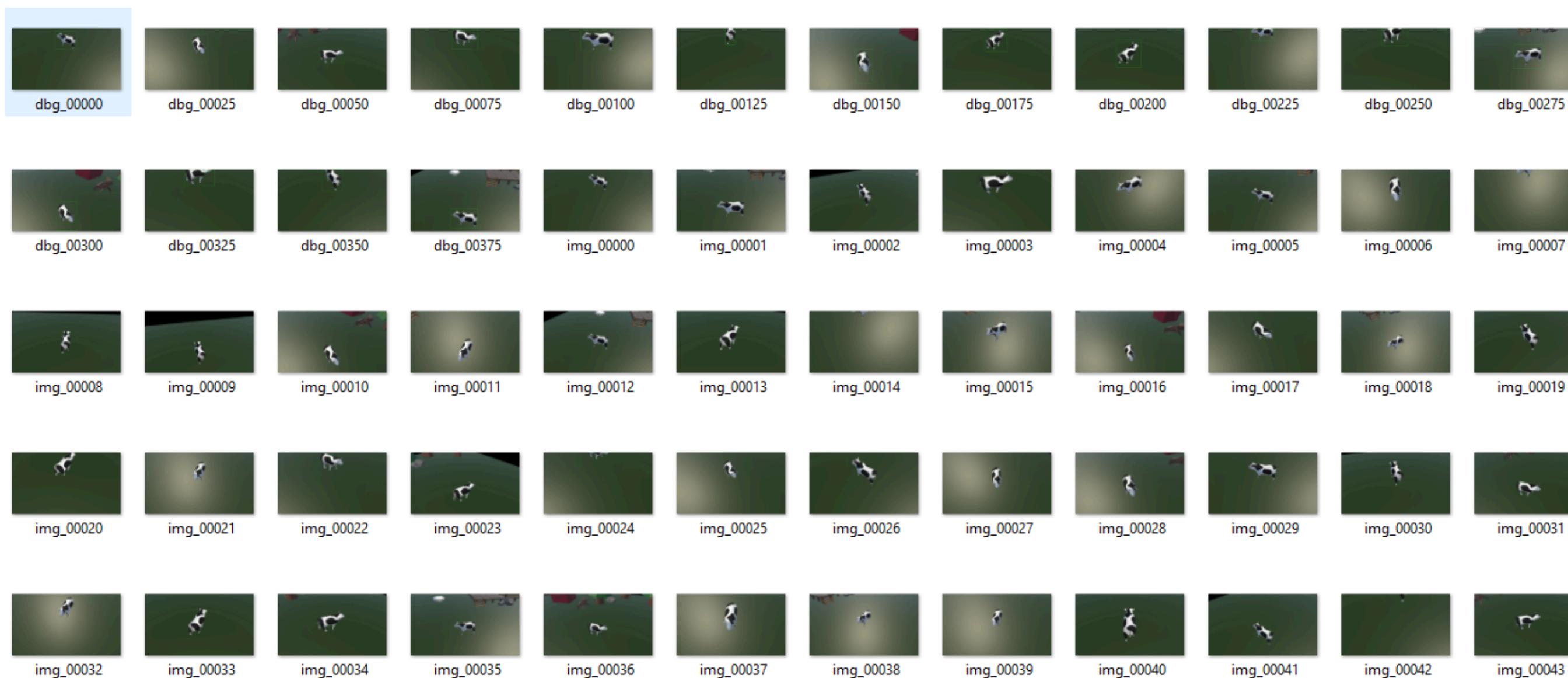


# CAMERA IMPLEMENTATION



```
[INFO] 127.0.0.1:51146 - "POST /detect HTTP/1.1" 200 OK
[YOLO] 0 cow(s) best=0.00 size=1280x720 160 ms
[INFO] 127.0.0.1:51146 - "POST /detect HTTP/1.1" 200 OK
[YOLO] 1 cow(s) best=0.32 size=1280x720 149 ms
[INFO] 127.0.0.1:51146 - "POST /detect HTTP/1.1" 200 OK
[YOLO] 1 cow(s) best=0.32 size=1280x720 132 ms
[INFO] 127.0.0.1:51146 - "POST /detect HTTP/1.1" 200 OK
[YOLO] 1 cow(s) best=0.31 size=1280x720 138 ms
[INFO] 127.0.0.1:51146 - "POST /detect HTTP/1.1" 200 OK
```

# CAMERA IMPLEMENTATION



# LIVE DEMO

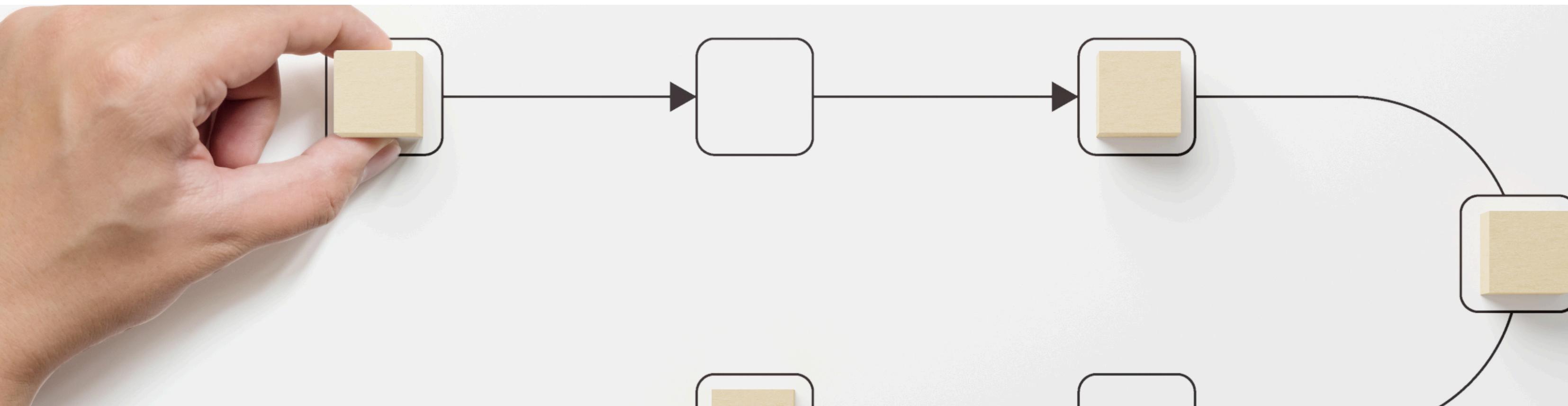


# STRENGTHS AND LIMITATIONS

**Strengths:** Modular design, full autonomy, scalable architecture, and original scenario.

**Limitations:** Simplified simulation, dependence on computer vision accuracy.

**Future Improvements:** Stronger recognition algorithms and enhanced target behavior simulation.



# CONCLUSIONS

The AlienMAV system demonstrates how autonomous multi-agent architectures can perform complex missions. The UFO successfully interprets commands, navigates terrain, identifies targets, and completes abductions. This highlights the potential of distributed AI and robotics in advanced simulations and autonomous operations.





**iTHANK YOU!**