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| **University of Southern Denmark – Course AM24** |
| Multi-Agent Systems |
| Planet Exploration |
| **Group 3** |
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# Introduction

A project created for the summer course of AM24 – Multi-Agent Systems, using Madkit and Turtlekit.

The project involves multiple agents for planet exploration with robots; ore is harvested from the planet and stored in bases, using explorers to find the ore, and transporters to move the ore to the base. The explorers and transporters have a limited amount of energy available, when energy is almost depleted they return to base to recharge. Energy is consumed by actions; move, send message, perceiving the environment. The explorers have a limited perception scope and can only detect ore that is nearby. The transporters can pick up the ore when they are at the same position. Each base has a limited capacity of ore, and each transporter can carry a limited amount of ore.

|  |  |
| --- | --- |
| Base Capacity | C |
| Ore Density | D |
| RobotEnergy | E |
| Grid Size | G |
| Mode | M |
| Number of Bases | N |
| RobotPerceptionScope | P |
| RobotCommunication Scope | I |
| Robot Memory Size | S |
| Max Simulation Time | T |
| Transporter Ore Capacity | W |
| Explorer Amount | X |
| Transporter Amount | Y |

The table shows the parameters of the project and the associated symbols which are used throughout the report.

The motivation of the project was:

* Becoming familiar with Madkit and TurtleKit, understand the tools and examining the online documentation and examples.
* Learning to develop Multi-agent systems, and create communication between the agents.
* Creating smart agents that are not just reactive, but proactive.
* Test, experiment and improve the agents, and examine others groups solutions to see the different possibilities and gain experience.

# Design



# Base

# Explorer

# Transporter

# Experiments

|  |  |  |
| --- | --- | --- |
| Base Capacity | C | 200 |
| Ore Density | D | 0.05 Uniform distribution |
| RobotEnergy | E | 5000 |
| Grid Size | G | 200x200 |
| Mode | M | Cooperative |
| Number of Bases | N | 1 |
| RobotPerceptionScope | P | 5x5 |
| RobotCommunication Scope | I | 11x11 |
| Robot Memory Size | S | 15 |
| Max Simulation Time | T | 10000 |
| Transporter Ore Capacity | W | 8 |
| Explorer Amount | X | 10 |
| Transporter Amount | Y | 10 |

# Discussion and Further Development

# Conclusion

# Appendix