SIMULTANEOUS UAV RELAY POSITIONING AND AREA COVERAGE IN C# AND UNITY

Software Architecture for Robotics

EMARO+

Maria Eduarda Andrada, Avgi Kollakidou

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Supervisors:
Prof. Fulvio Mastrogiovanni
Alessio Capitanelli
Andrea Nistico
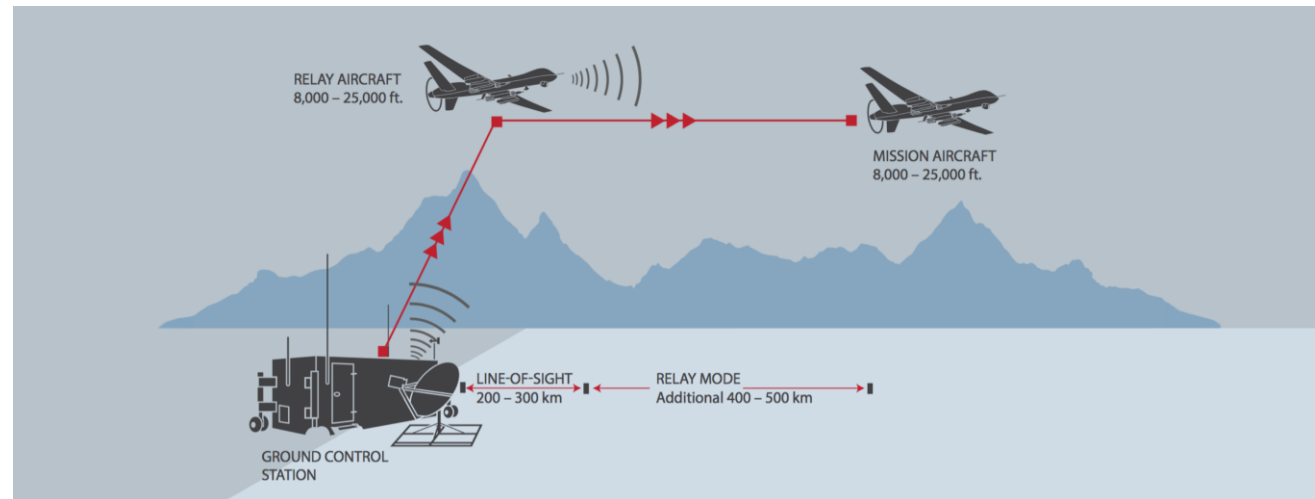
Implementation of UAV relays and their advantages

UAVs are versatile and can be used in various fields, such as:

| Surveying and Mapping of unknown areas | Traffic Surveilance | Monitoring of forest areas | Monitoring of unsafe areas after a catastrophe |

General Objectives

✓ Path-planning algorithm implementation in C#

✓ Visualization in Unity3D

- Allows the surveillance of a predifined target

- Ensures undisturbed communication with a home base through a number of UAVs

- Takes into account obstacles and maintains reachability

- Achieves the continouus coverage of the area with a frequent visitation of all sectors

- Visualization and testing of the outcome in a user friendly environment

Process Outline

Input of Initial Conditions by User in
Unity Interface

Shortest path problem - source to
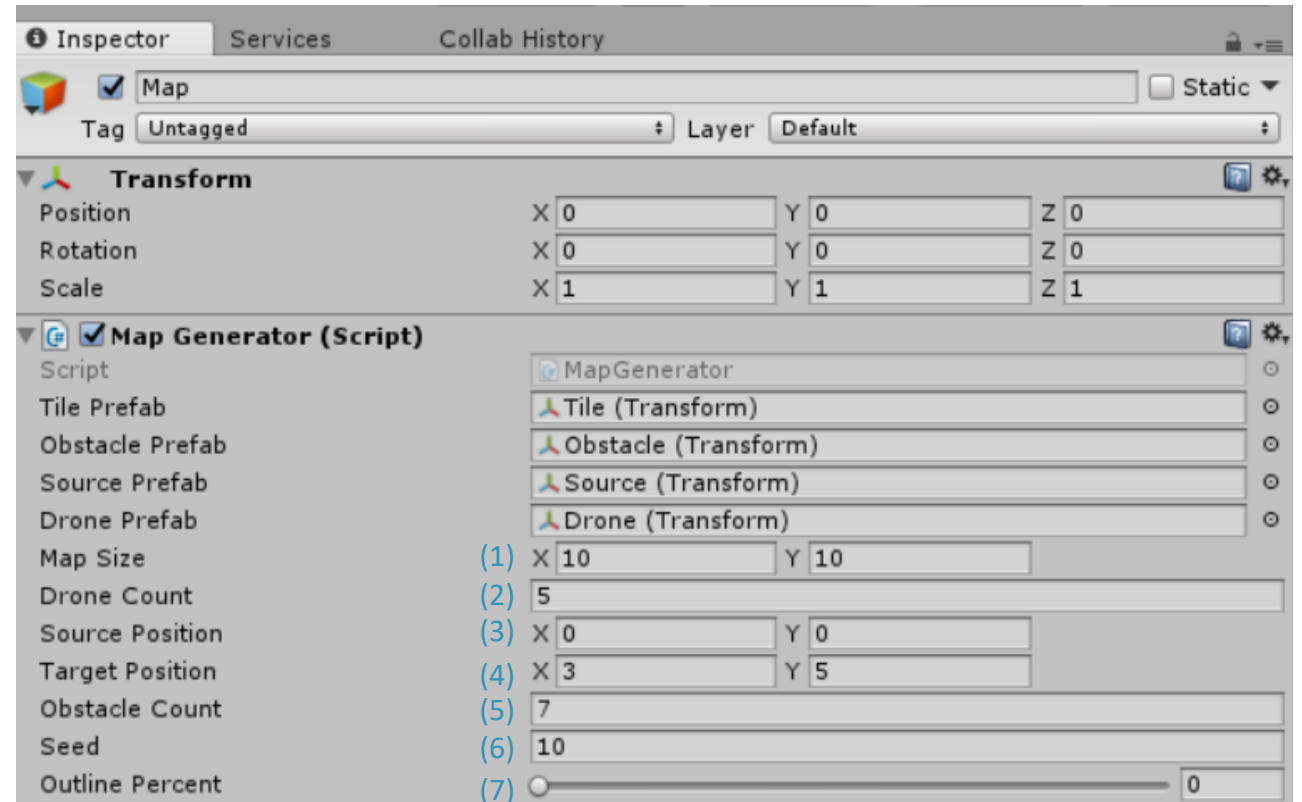target - solved by the Dijkstra Algorithm

Optimization of the path according to
the Dual Ascent Algorithm
(e.g. Nr of vehicles used)

Visualization the map, obstacles and
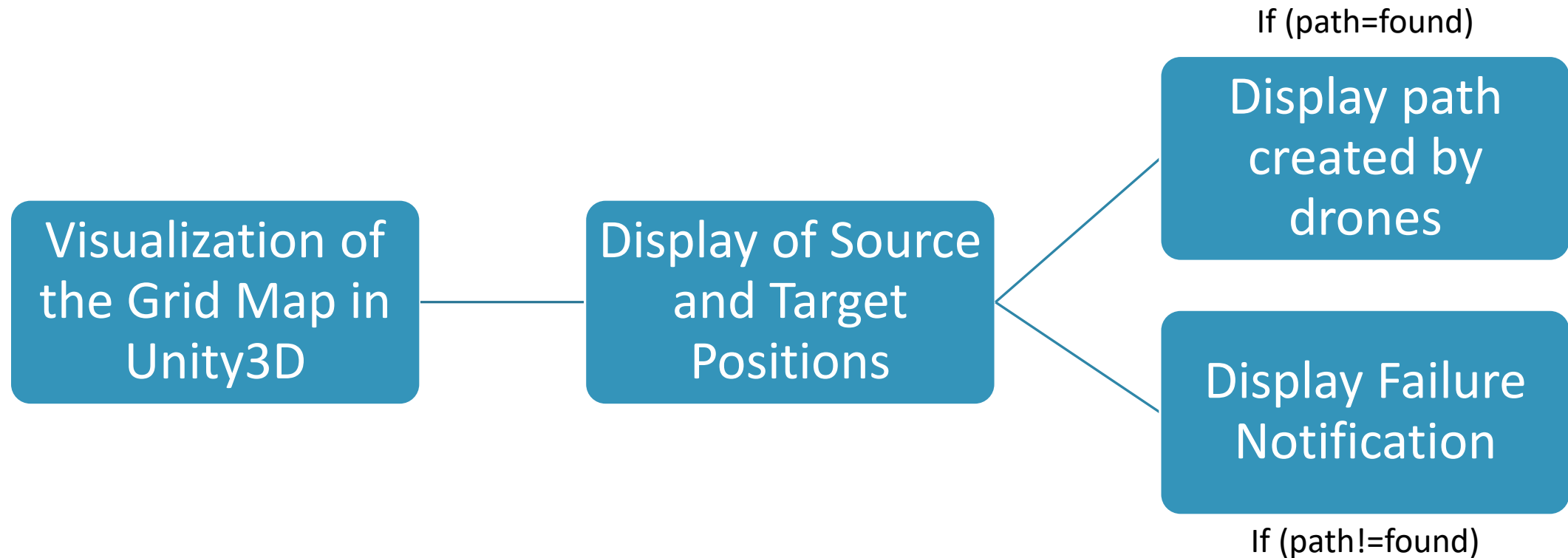positioning of the UAVs in Unity

Initializiation

The user can initialize the algorithm with the desired values for:

1. Size of Grid Map
2. Maximum Nr. Of Vehicles
3. Source Position (Home-Base)
4. Target Position
5. Nr. Of obstacles
6. As the obstacles are created arbitrarily the seed variable is used for the acquisition of a new set of obstacle positions.
7. The grid map outline can also be changed to match the user's liking
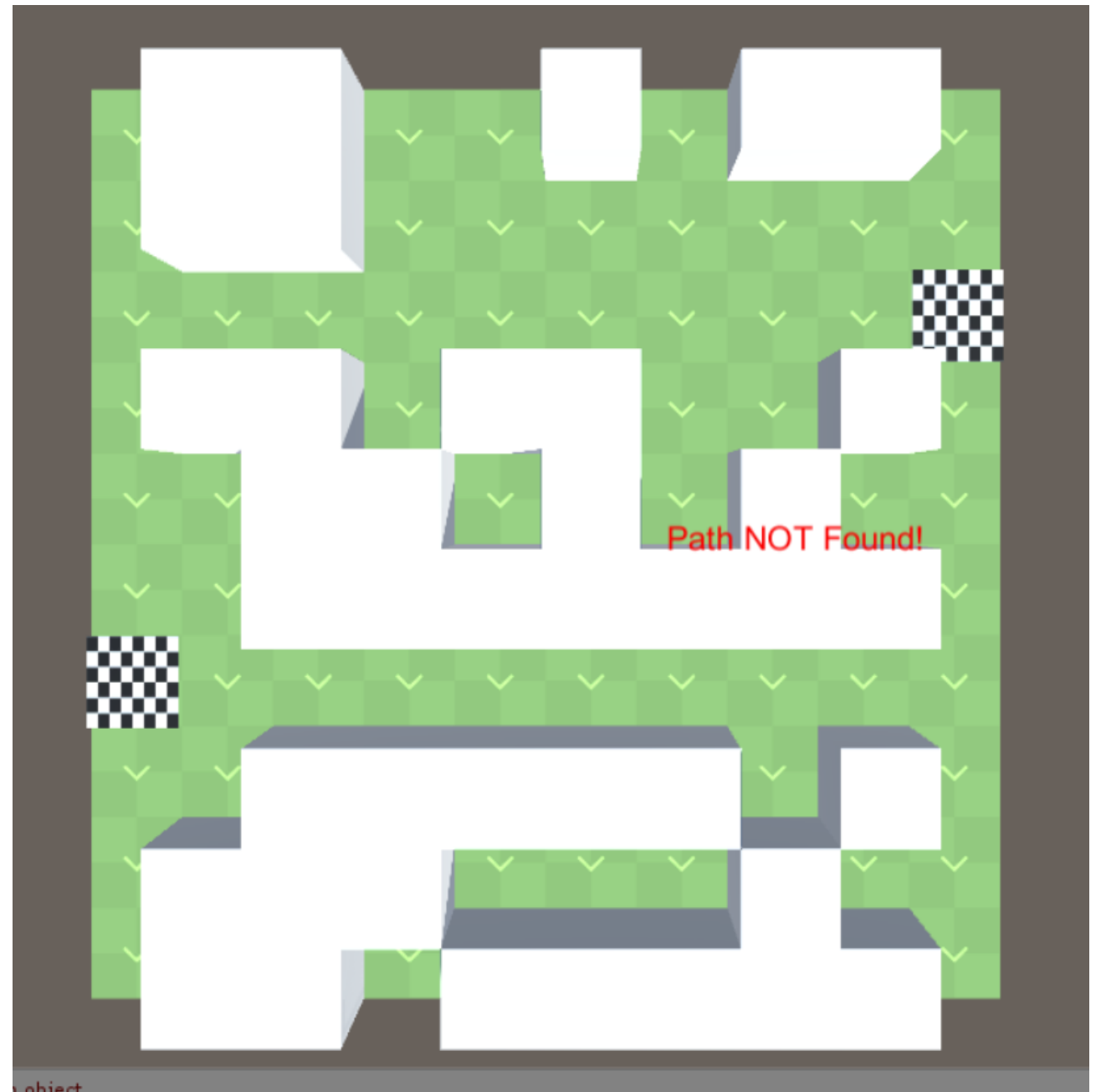
Inspector Tab of Unity3D

Result

If (path=found)

Visualization of the Grid Map in Unity3D	Display of Source and Target Positions	Display path created by drones

Display Failure Notification

If (path!=found)

Path Found

Path Found!

Path Not Found

The algorithm could not provide a path that satisfies the restrictions provided by the user.

Path NOT Found!

Thank you.

MARIA EDUARDA ANDRADA   duda.andrada@live.com

AVGI KOLLAKIDOU   kollakidouavgi@gmail.com