

# **REALISTIC ENVIRONMENT MAPPING AND INTEGRATION TO UNITY 3D**

Baris Cem Baykara  
Tallinn University of Technology

12.05.20

# OVERVIEW

- Background
  - Why
  - What
  - Where
- Method
  - Flight Missions
  - Ground Mission
  - Processing
- Unity 3D
  - Generated Terrain
  - Detail Spawning

## **BACKGROUND**

### **WHY?**

#### **PURPOSES:**

- Develop and test autonomous vehicles
- Efficient testing of vehicles in different terrain types
- Safety Validation

## BACKGROUND

### WHAT?

#### REALISTIC 3D MODEL OF DIVERSE ENVIRONMENT

- Collecting aerial data with RGB camera
- Photogrammetric processing of data
- Integrating with Unity 3D



# BACKGROUND

## WHERE?

### PILOT AREA: TalTech Campus

#### REASONING FOR CHOSING:

- ISEAUTO Track
- Different types of buildings
- Urban details (Buildings, road signs, cars, vegetation etc.)



## **METHOD**

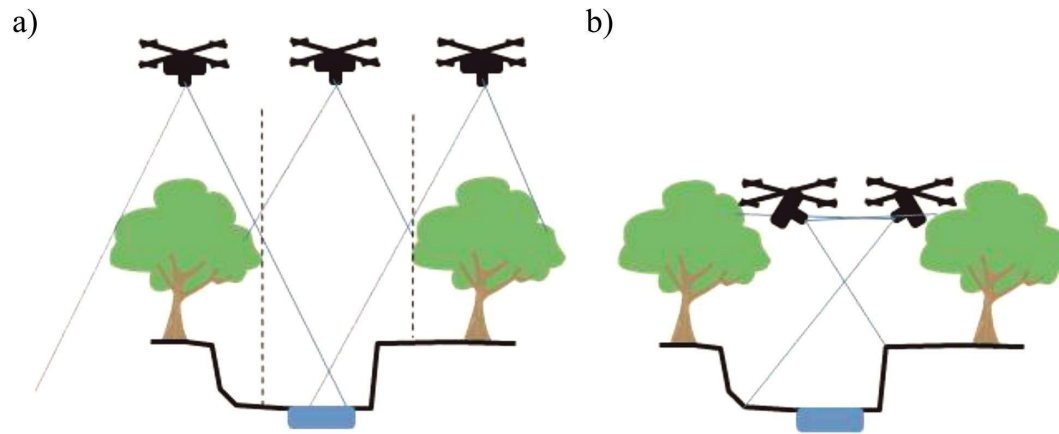
### **FLIGHT MISSIONS**

**FLIGHT MISSIONS ARE PERFORMED ON THE SAME FLIGHT TRACK WITH CONSTANT ALTITUDE AND OVERLAPPING**

- Grid Mission
- Overlap
- Different camera angles



## FLIGHT MISSIONS DIFFERENT ANGLES



## METHOD

### DATA PROCESSING

#### PHOTOGRAMMETRIC PROCESSING CREATES DENSE POINT CLOUDS AND EVENTUALLY 3D MODEL

- Aligning of cameras
- Generating dense point cloud
- Classifying point clouds
  - For mask generation of different terrain details (Terrain type, vegetation etc.)

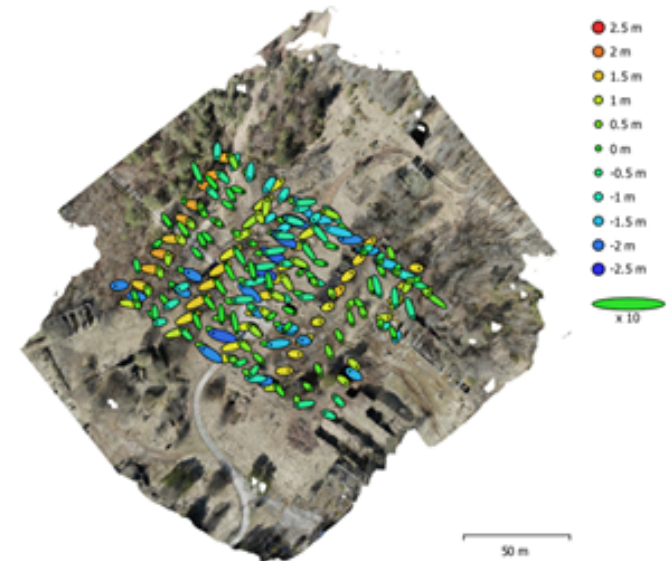


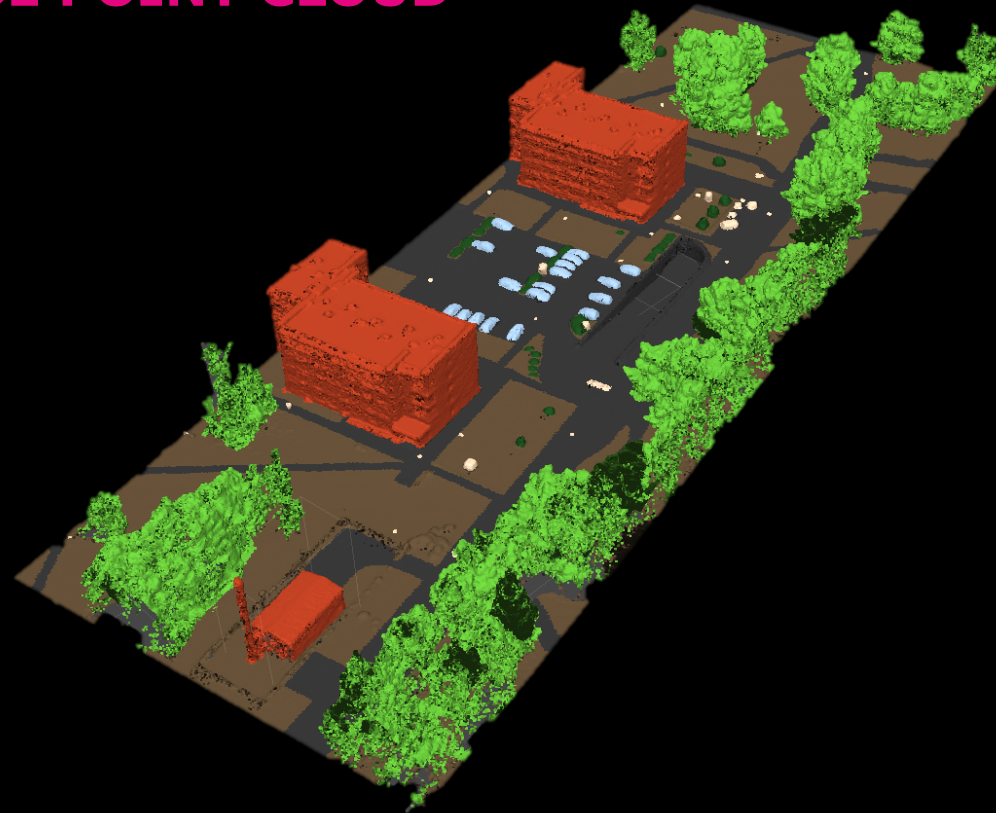
Fig. 3. Camera locations and error estimates.



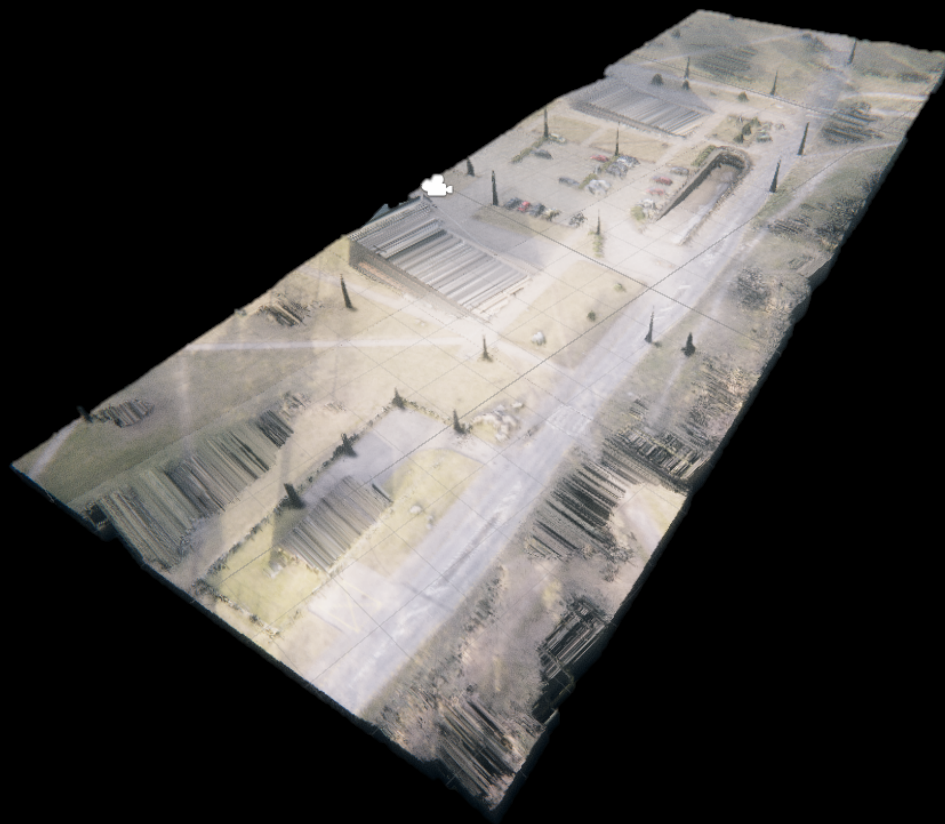
# PROCESSING GENERATED DENSE POINT CLOUD



# PROCESSING CLASSIFIED DENSE POINT CLOUD




# UNITY 3D UNITY TERRAIN



## UNITY 3D DETAIL SPAWNING







**TAL  
TECH**

**THANK YOU**  
**BARIS CEM BAYKARA**

Baris Cem Baykara  
Tallinn University of Technology

12.05.20