Computer Vision in Ascend

August Lind

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Background

- August Lind
- 20 years
- Drøbak
- 2. Cybernetics and robotics
- A* consultant
- Perception Member, Team 25
- Chief engineer, Team 26

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SUAS 2024

Mission:

- Drop 5 bottles on markers
- Shape, color, text
- Very tiny markerks

Solution

- Detection
- Classifying
- Localisation

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Object detection in SUAS 24

YOLOv8 object detector

Custom class set: “standard” and “emergent” object.

Pretrained model, fine tuned on custom data

- Generated using Blender

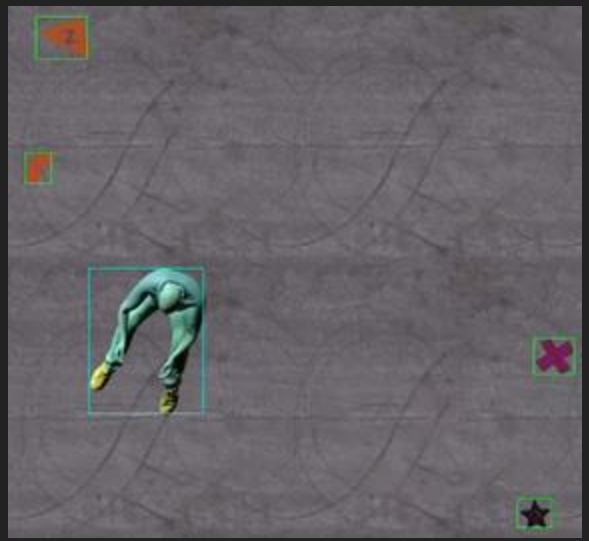
Validate on real images (ROS bags)

Runtime implementation:

- Nvidia TensorRT @ Jetson Orin NX
- Blazingly fast:)

Problems:

- False positives



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Object classification in SUAS 24

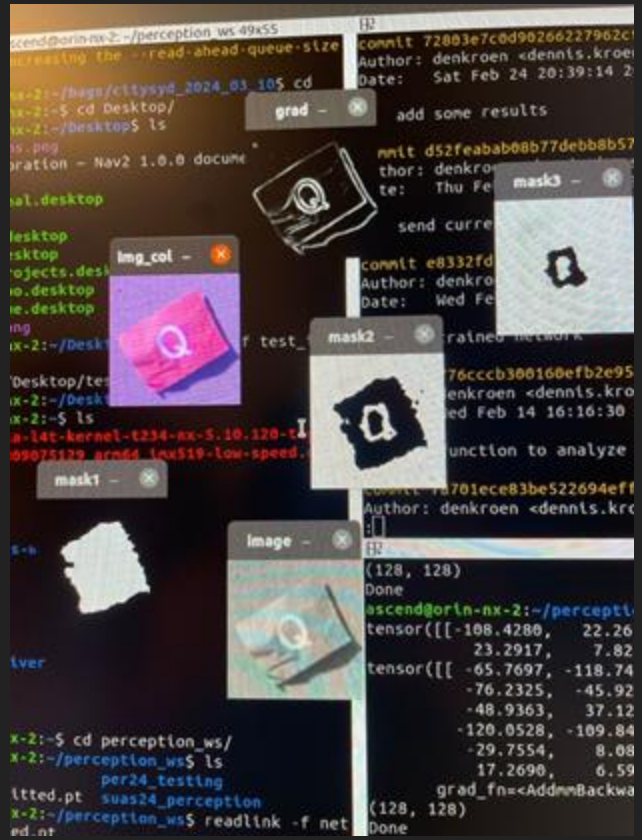
General idea:

- Classify shape (8 classes) and symbol (26 classes) separately
- Find masks to extract pixels with color - segmentation
- Use traditional methods to classify color

Approaches:

- UNet to do both classification and segmentation
- VGG-16 for only shape classification
- Exotic “Separable group convolutional network” for symbol

Benchmarked different approaches to select the best one



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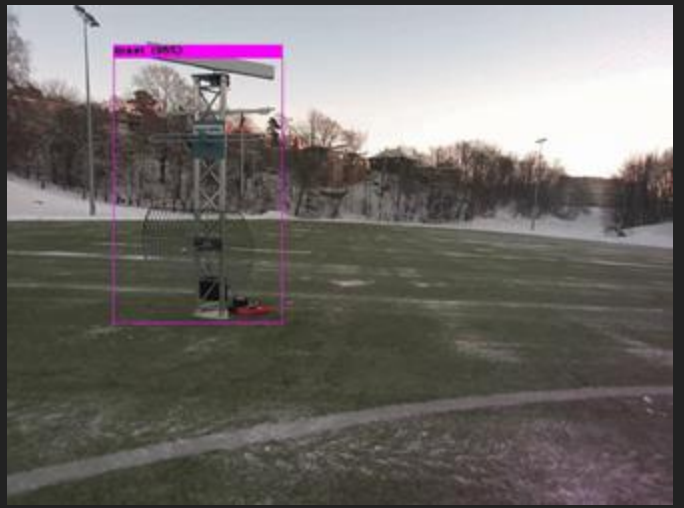
IARC Mission 9

Mission:

- Change antenna module on a moving pole

Sub tasks

- Detektere mast
- Pole detection
- Detect correct side of pole
- Estimate pole movement



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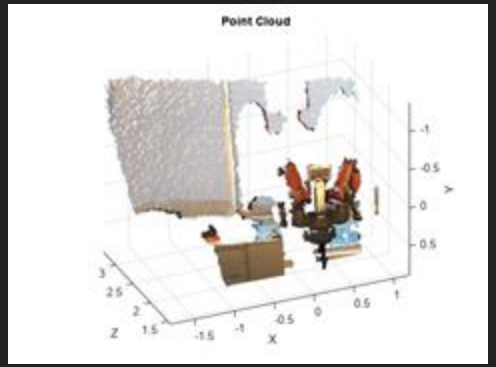
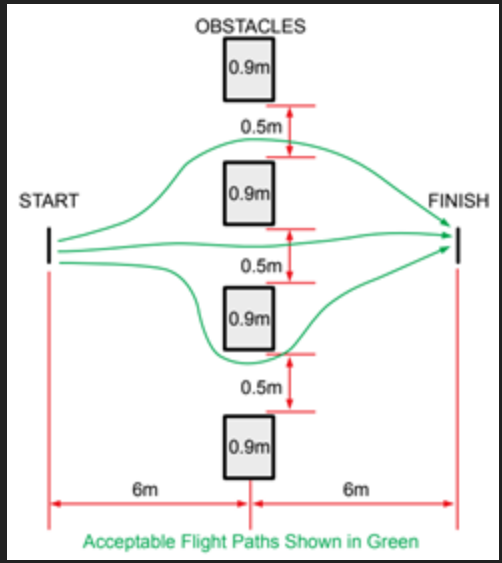
Computer Vision in IARC 10



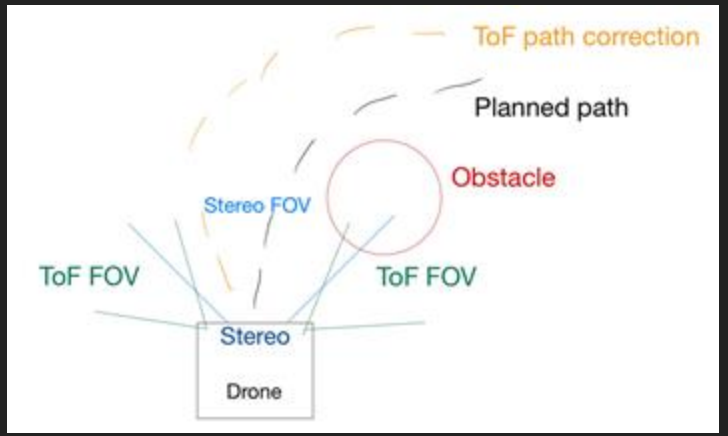


Problem

- Four Drones
- Max 1lbs/453g
- Object avoidance

Solution?

- Frustumbug - paper
- Octomap with custom code
- Stereo Camera - ToF setup



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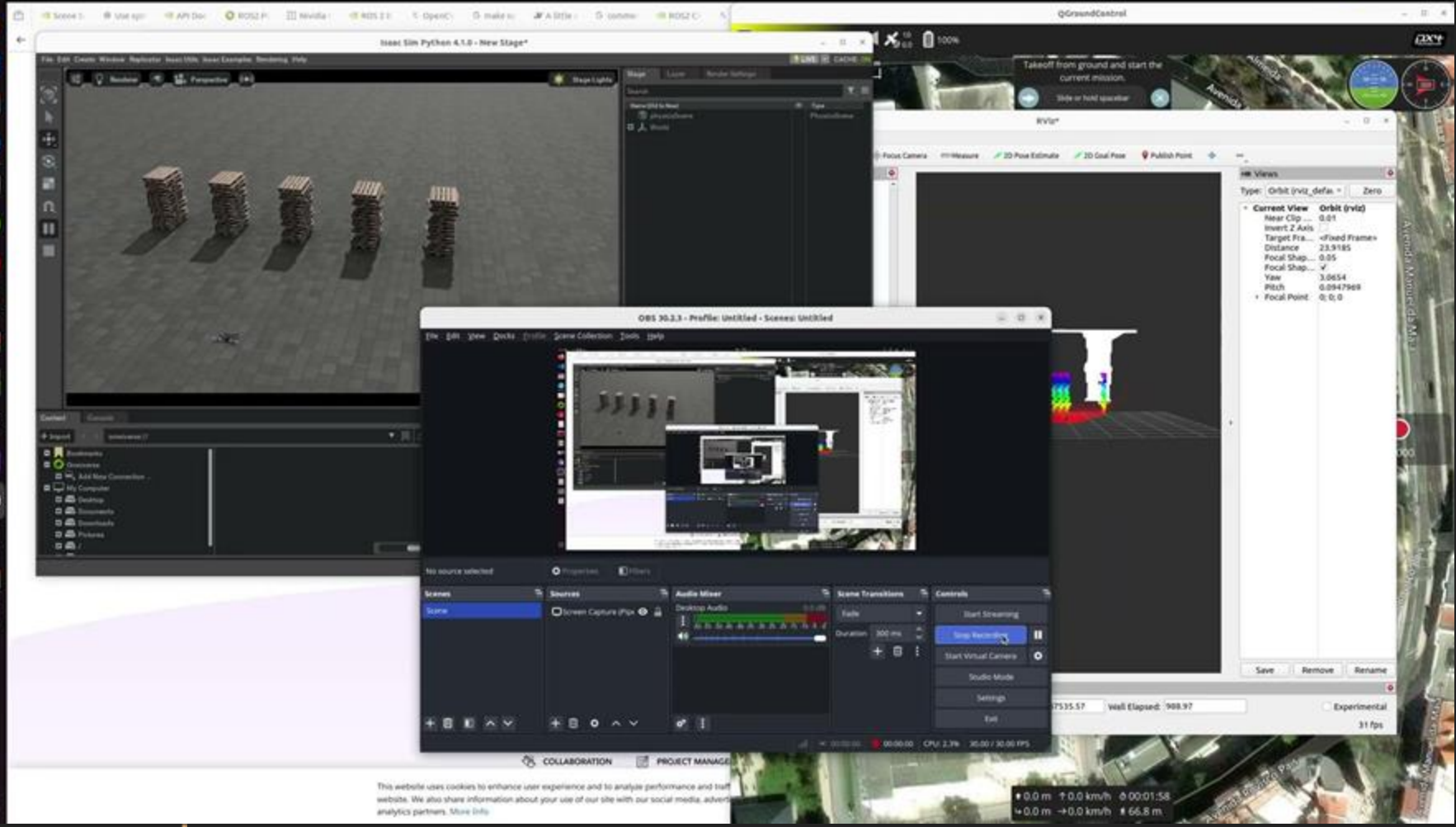

It doesn't always work…

Thank you for your time!