MONARCH TRACTOR

How do we deploy autonomy safely?

State of the art perception

3 layers of perception safety

- 360 Human safety with Object detection
- Semantic Segmentation
- Pointcloud obstacle detection

SW and HW integrity checks:

- Camera monitoring
- Failsafe SW design

Implement aware Autonomy

- Implement recognition pipeline
- Implement tracking & safety algorithm

Human in the loop design

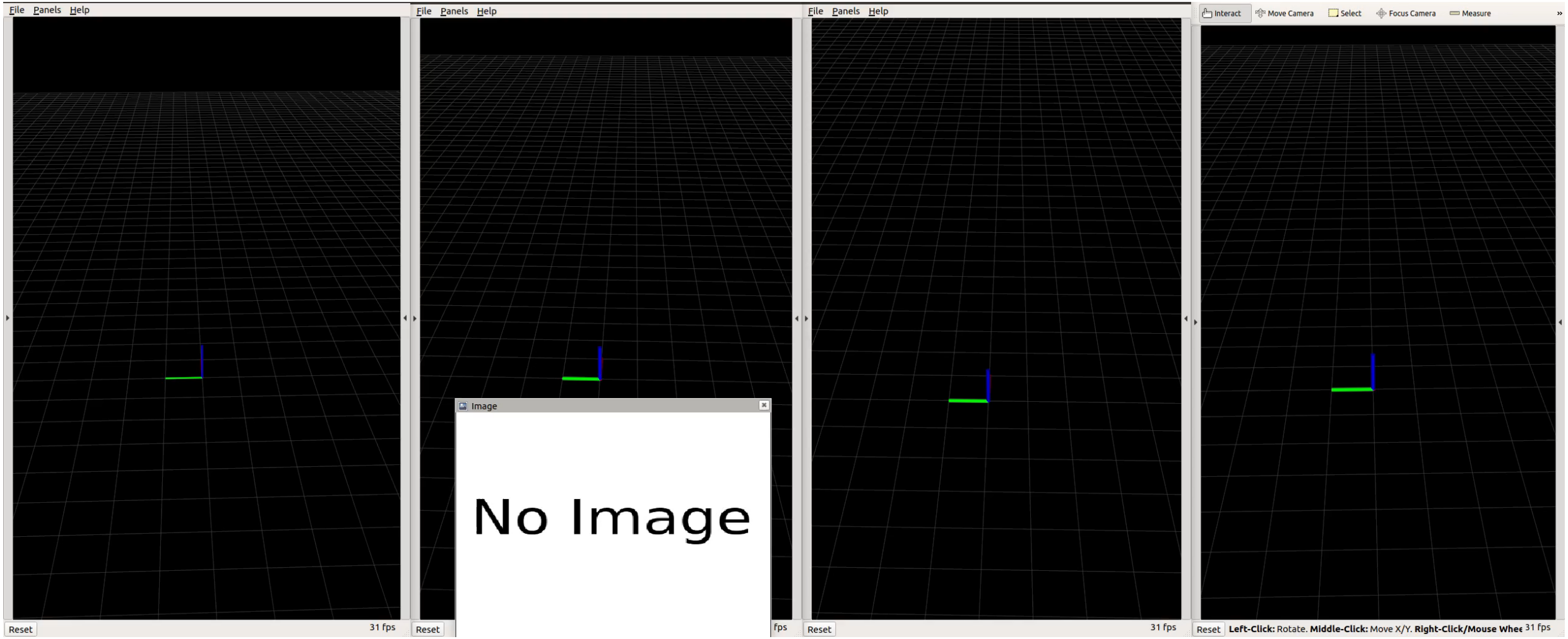
- App-based monitoring and review of safety triggers





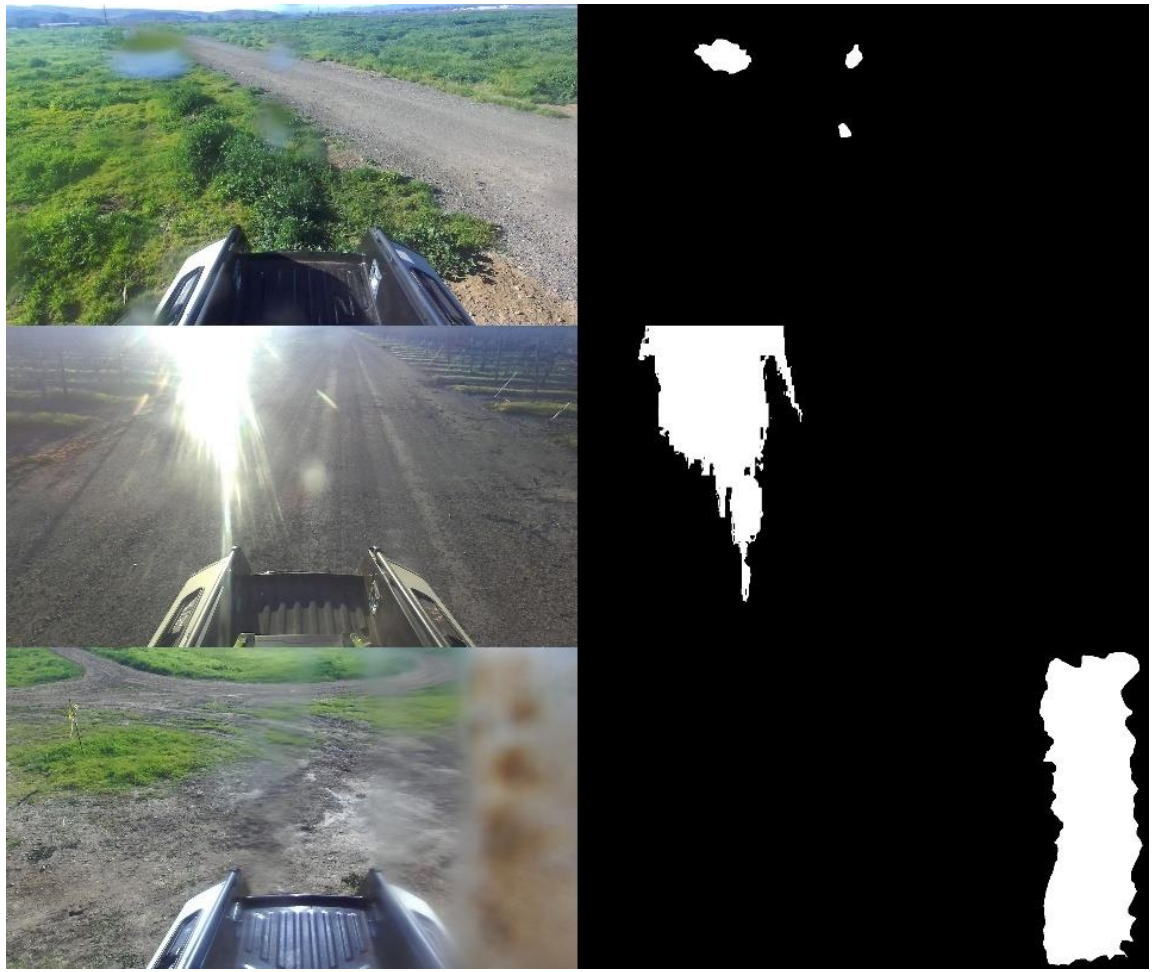

VIDEOS – Vison Based Scene Segmentation

VIDEOS – Monarch Point Cloud Obstacle Detection



Perception – 2D – Camera monitoring

- Detect various issues with camera such as:
  - Soiling
  - Blur
  - Glare
  - Obstruction



Perception – 2D – Camera monitoring

Implement Awareness Framework

- Challenge:
  - Hundreds of different farm implement models. Many are custom made.
  - Implements change the footprint and kinematics of the vehicle.
  - Farmers invested millions in farm implement fleets

- Goal:
  - Enable Monarch tractors to:
    - **Recognize** the implement make and model attached
    - **Track** the position of the implement for safety
    - **Monitor** the operation of the implement and detect faults

- Solution:
  - Implement Awareness Framework


LUPO
REVERS

Robust Processes

Software enforced ODD restriction

- Geofencing
- Slope & speed restrictions

Implement certification process

- Only registered, recognizable and Autonomy certified implements
- Testing and Review process before certification

Phased deployment approach

- Phased approach from on-seat to off-seat with remote supervision.

Customer management

- Training materials
- Keep out policy
- Feature managed Autonomy

Autodrive: Autonomous Operations

1. Manual Drive

Manually operate the electric, easy to drive MK-V Dairy Tractor with feed pusher or existing implements

2. Autodrive Activation & Validation

Prepare and setup the site and tractor for Autodrive operations with Monarch support

3. Assisted Autodrive

Verify that you and your staff can operate Autodrive safely and without significant Monarch support

4. Autodrive w/ Supervision

Autodrive Operations can be conducted with minimal to no intervention by Monarch remote support

5. Autodrive

Manage Autodrive Operations with no intervention, access WingspanAI, see reports, submit tickets and manage this process on your own.

Safety & Compliance Gates

- 10 hours of on-seat operations
- If a safety incident occurs the clock is reset

Customers can transition from 1-Manual to 4-Autodrive in as little as 2-4 weeks