PACMAN (**P**ath **A**ssembling **C**artographer, **M**apping under **A**utonomous **N**avigation)
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Abstract

In this poster, we present PACMAN: a self-driving ground robot capable of autonomously following a path and generating a geolocated map of said path.

Results

Capable of following a straight path for ~150 ft, and saving all GPS points followed. Has both an autonomous and manual mode, controlled by a PS4 controller.

Simulation

Full 3D model for navigation testing, with simulated 3D world and path.

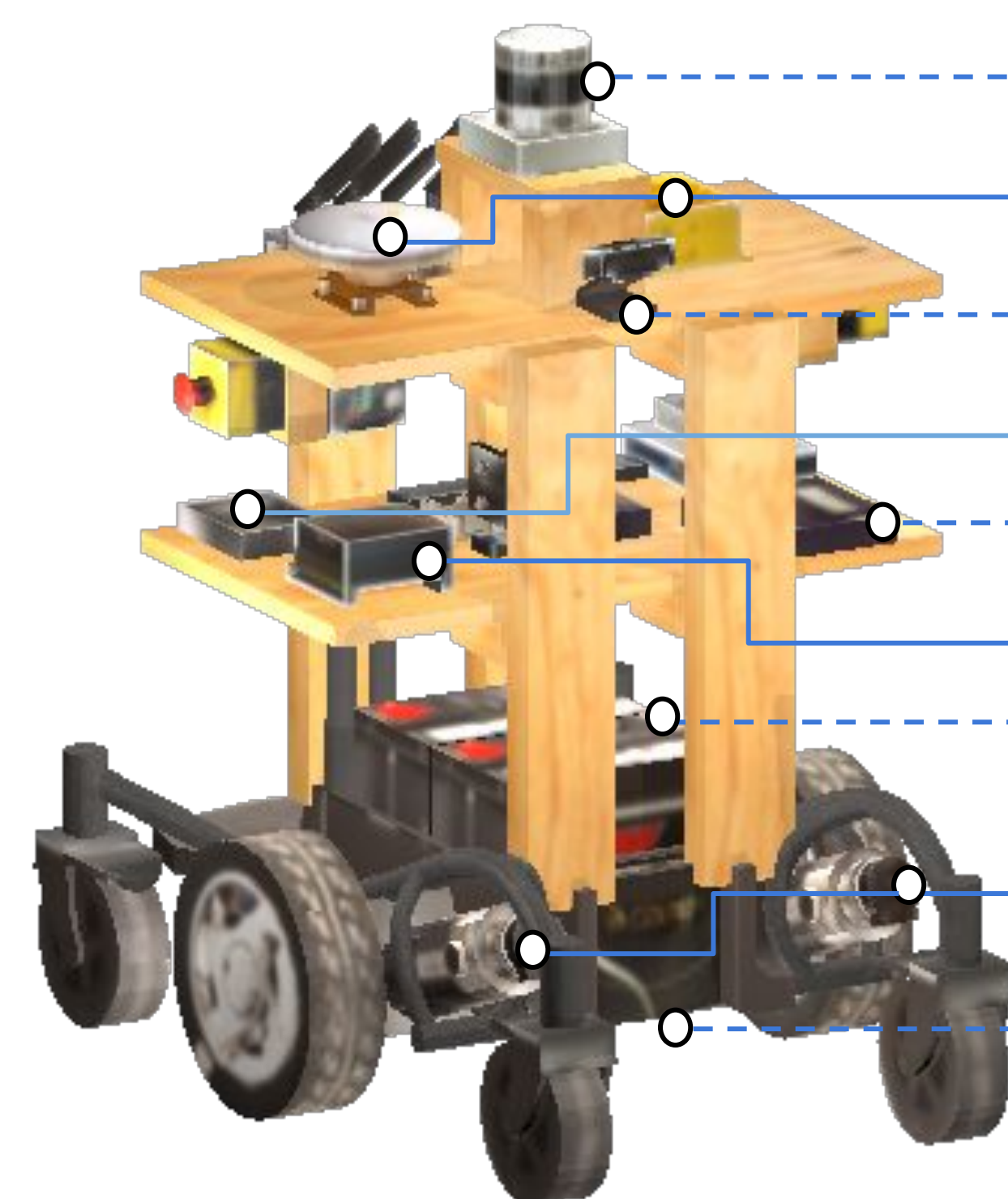

PACMAN following sidewalk in simulated environment

Real-time recording of PACMAN traveling around a square path

Software

- Interface via SSH
- ROS (Robot Operating System)
- Nodes in Python and C++
- All processes start at boot
- Semantic Segmentation for Path Planning
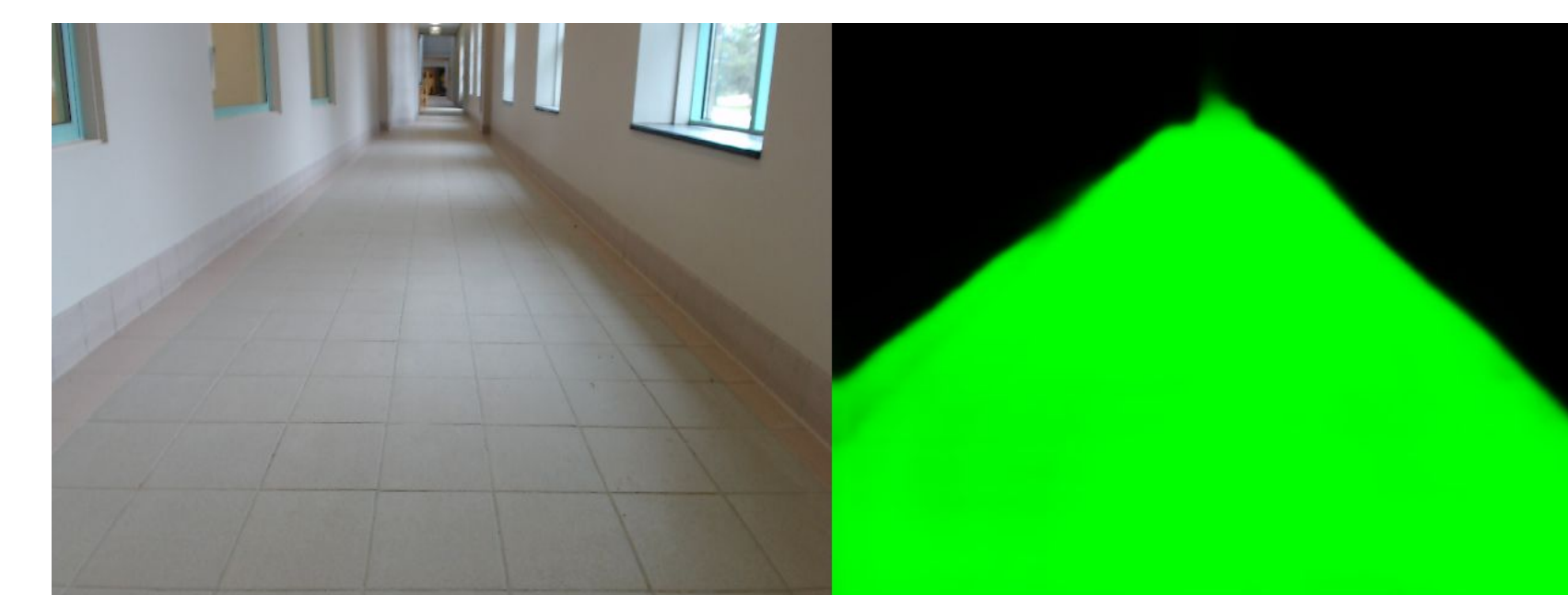
Hardware and Sensors

Full 3D Model

- Ouster OS1-16 LiDAR
- Swiftnav Piksi Duro RTK GNSS
- Logitech C920 Webcam
- Cradlepoint Cellular Router
- Roboteq MDC2230 Motor Controller
- Jetson Xavier
- Two 12V, 50Ah batteries in series
- Pair of US Digital E3 Motor Encoders
- GOLDEN Wheelchair Base

PACMAN Sensor data (LiDAR: top, Camera: bottom-left, Segmentation: bottom-right)

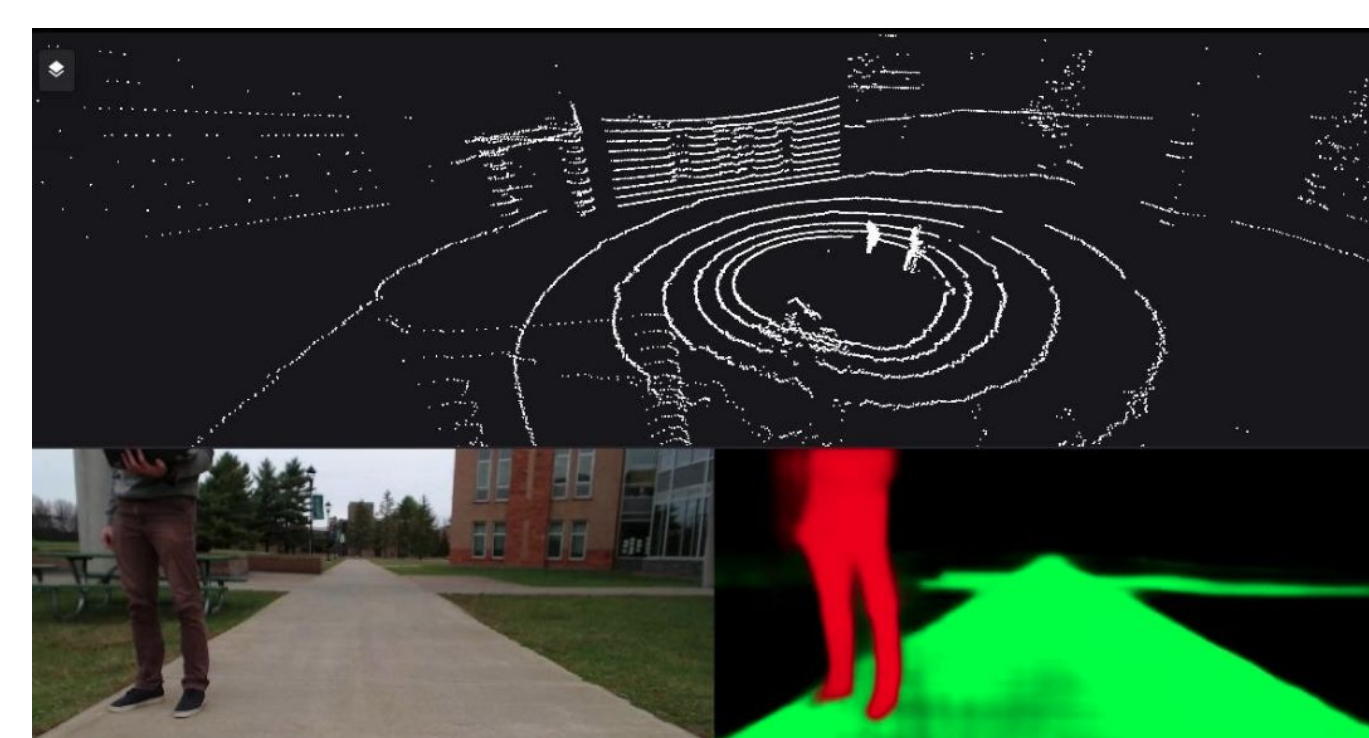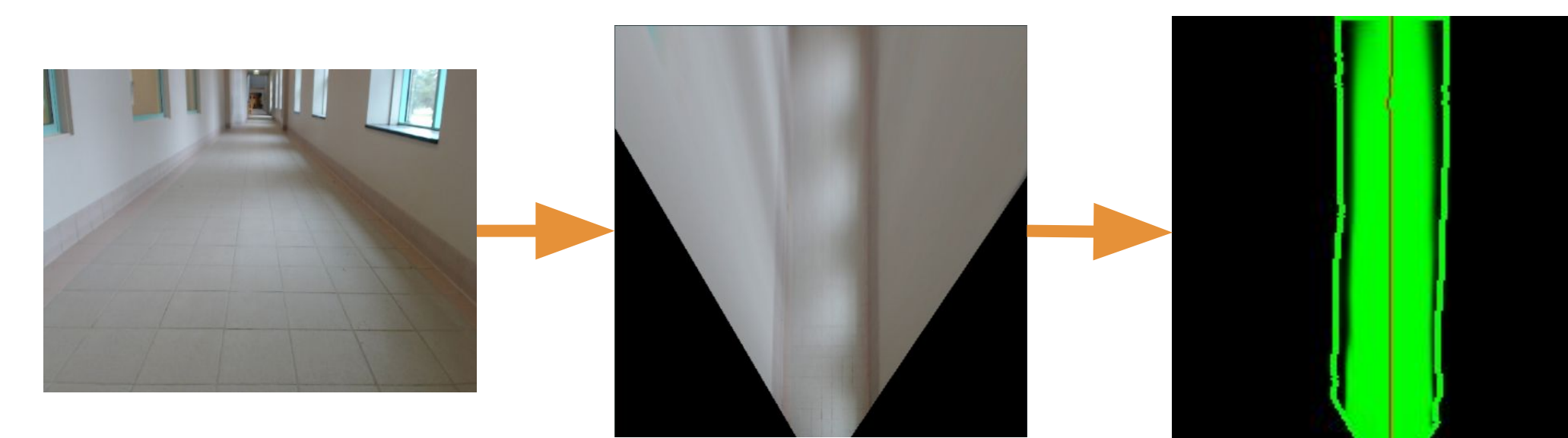*PACMAN following path Near CAMP*   *Generated GPS Track*

Semantic Segmentation

Deep learning model out of MIT. Isolated path category for navigation.

Path Planning

With a homography, Dijkstra's algorithm, and the path as the costmap, generated a line to follow (in red).