

MICHIGAN STATE
UNIVERSITY

Beta Presentation

Remote Interface for Small Scale Autonomous Racecars

The Capstone Experience

Team Michigan State University CSE

Daphne Martin

Ali Abboodi

Zach Estep

Skanda Vijaykumar

Christian Wilkins

Patrick Hogan

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Fall 2025



*From Students...
...to Professionals*

Project Overview

- PoliMOVE-MSU team
- Indy Autonomous Challenge
- Small-scale testing to reduce financial risk
- Needs to be used by both researchers and kids
- Improve and simplify user interface
- Create 2 screens: simple and advanced
- Add touchscreen driving for easy use
- Add ability to drive two cars at once



Team Member's Technical Tasks

Technical Tasks Assigned

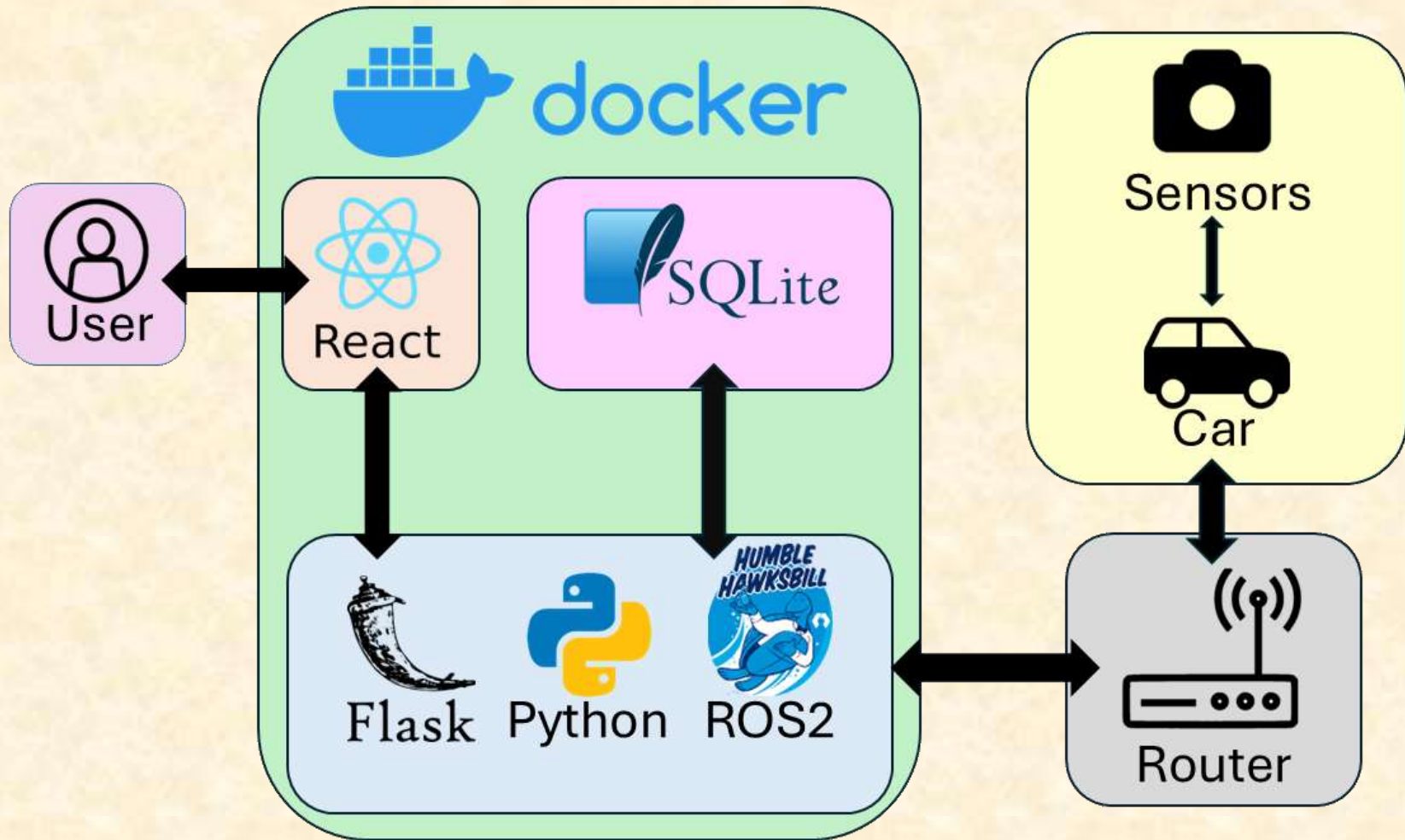
- Skanda Vijaykumar
 - Replay/Recording all data
 - 2D Lidar
 - Steering Angle component
 - Online Map + GNSS Chart
- Ali Abboodi
 - Network stats + Brake throttle
 - Speed Runtime
 - Vehicle stats
 - Basic joystick
- Christian Wilkins
 - Advanced View, Layout tools, Dark Mode
 - SSH, SFTP Connection to car on web app, Connection manager modal
 - Upload and download bag files via SFTP on web app, plus UI modal
 - Terminal Component and Manager on web app, plus UI of this
 - UI Components (Joystick, Offline map, Card component, all styling)
- Daphne Martin
 - Launch files for laptop and car
 - Two car implementation and simulation testing
 - Nav2 stack implementation
 - Waypoint following for online map
- Zach Estepp
 - Hardware implementation and troubleshooting
 - Smooth input control
 - Replay for car control
 - Code base cleanup and repository management
- Patrick Hogan
 - Offline mapping back end
 - IMU Data + Visualizer
 - 3d lidar software
 - GNSS data

Technical Tasks Completed

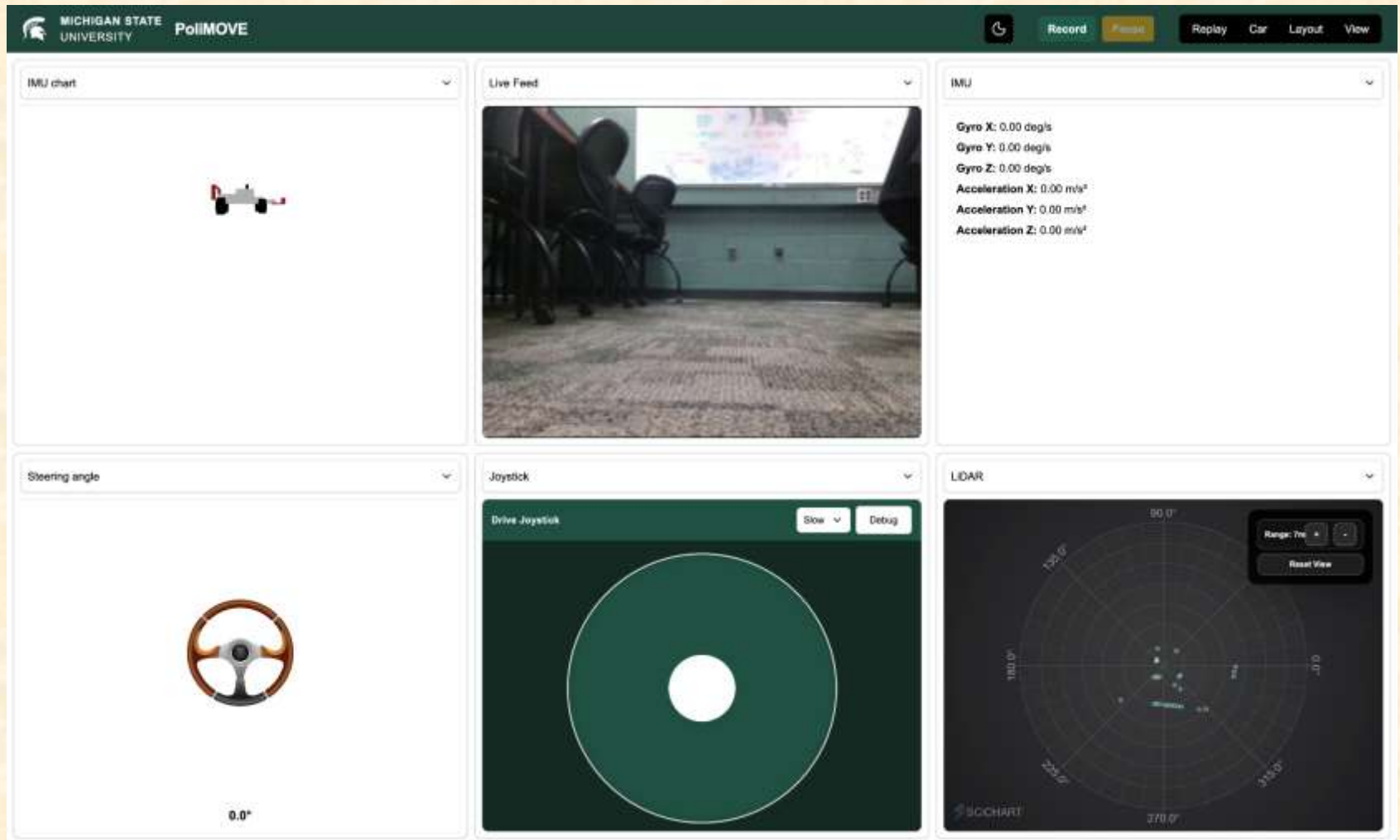
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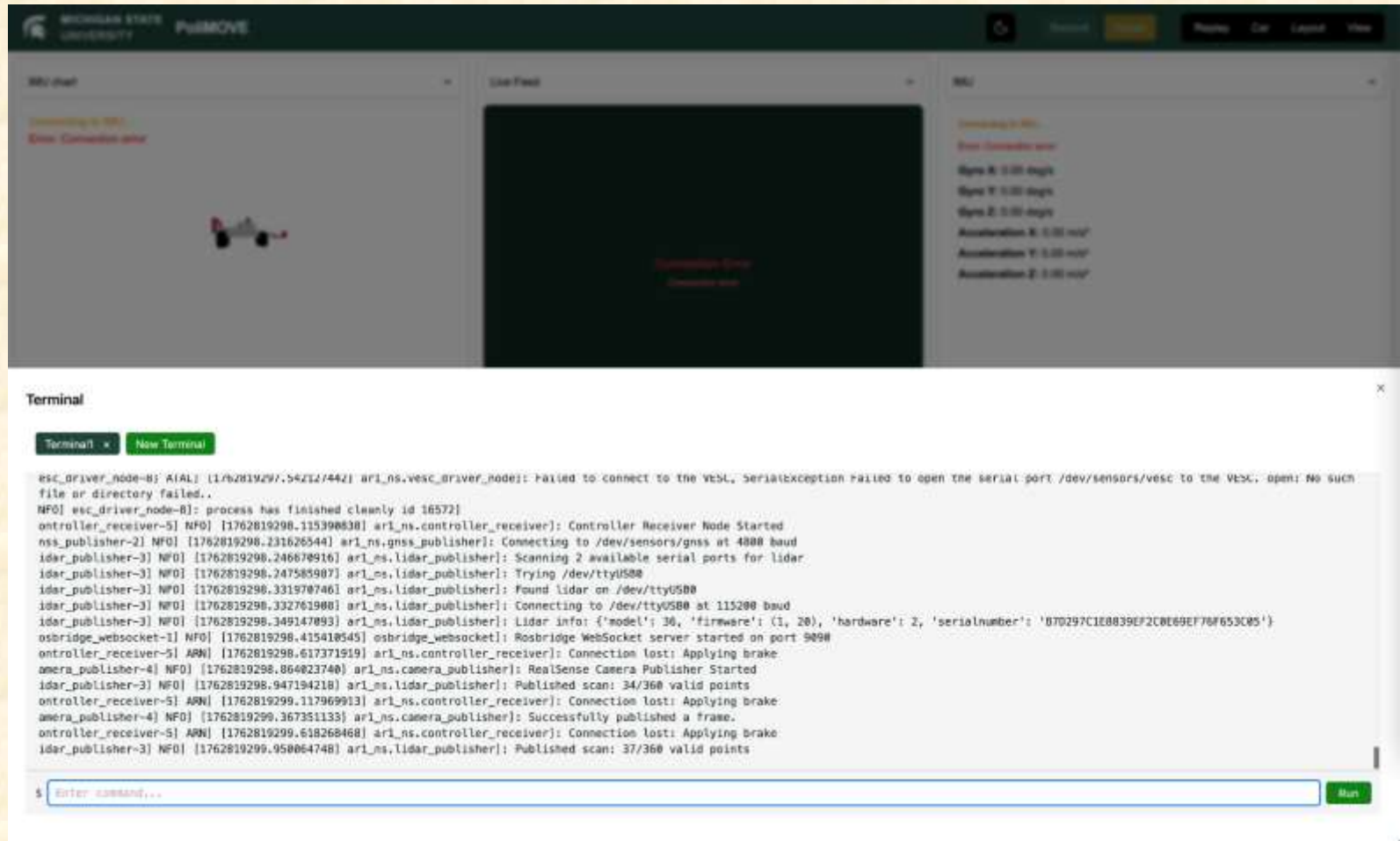
System Architecture



Advanced View



Advanced View with Terminal



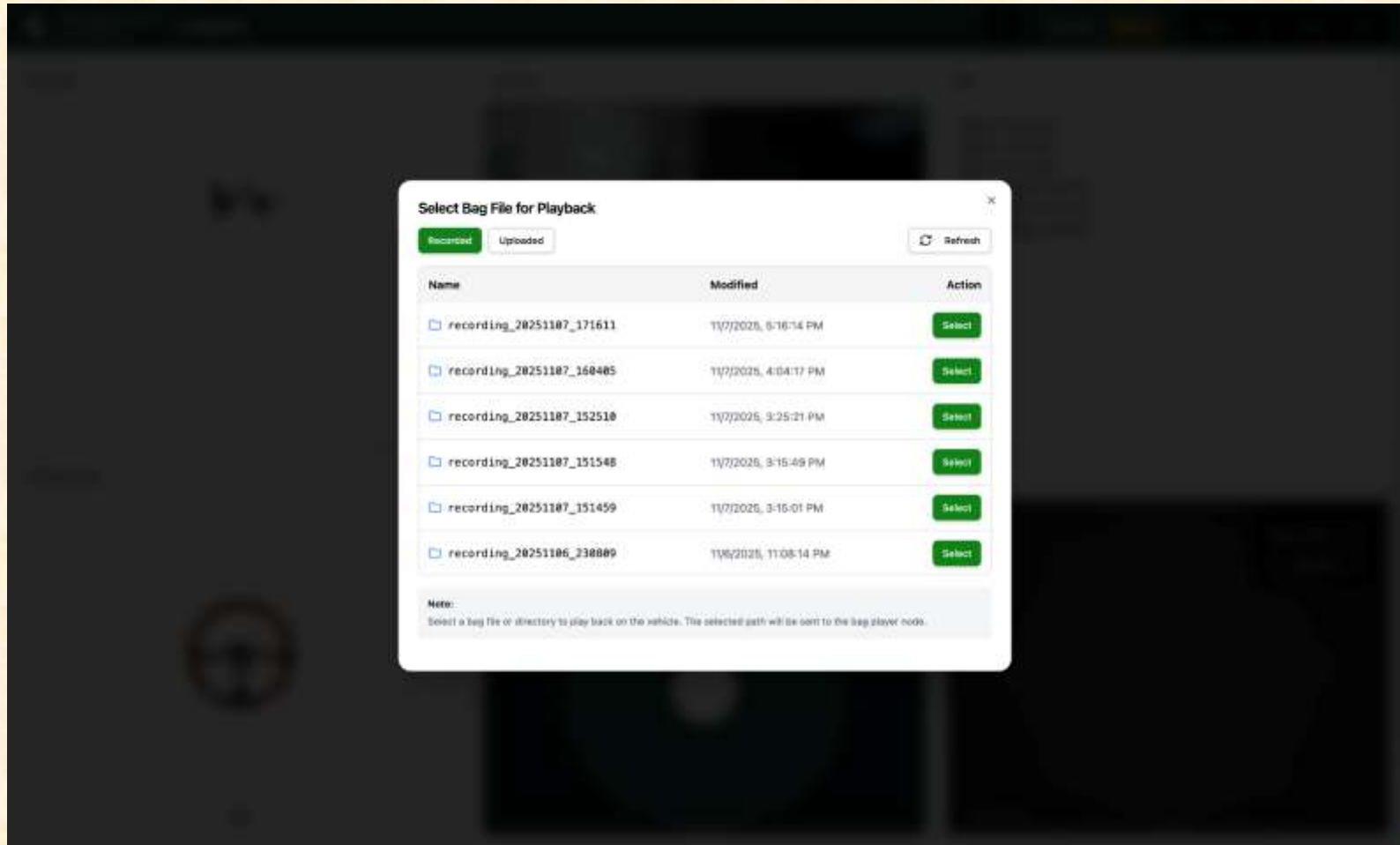
The screenshot displays the PuTTY application window titled "MICHIGAN STATE UNIVERSITY PuTTY". The main window is divided into three panes. The left pane shows a "TTY Shell" with a small car icon and the text "Connecting to ROS2... Error: Connection error". The middle pane is labeled "Live Feed" and is currently black. The right pane shows "TTY" output with sensor data: "Connecting to ROS2...", "Error: Connection error", "Gyro X: 0.00 deg/s", "Gyro Y: 0.00 deg/s", "Gyro Z: 0.00 deg/s", "Acceleration X: 0.00 m/s²", "Acceleration Y: 0.00 m/s²", and "Acceleration Z: 0.00 m/s²". Below the main panes is a "Terminal" section with a "Terminal" tab and a "New Terminal" button. The terminal window contains the following log output:

```
esc_driver_node-Bj A[AL] [1/b281929/.54232/442] ari_ns.vesc_driver_node]: Failed to connect to the VESC. SerialException Failed to open the serial port /dev/sensors/vesc to the VESC. open: No such file or directory failed..
NFO] esc_driver_node-Bj: process has finished cleanly id 16572]
ontroller_receiver-5] NFO] [1762819298.115398830] ari_ns.controller_receiver]: Controller Receiver Node Started
nss_publisher-2] NFO] [1762819298.231626544] ari_ns.gnss_publisher]: Connecting to /dev/sensors/gnss at 4800 baud
idar_publisher-3] NFO] [1762819298.246678916] ari_ns.lidar_publisher]: Scanning 2 available serial ports for lidar
idar_publisher-3] NFO] [1762819298.247585907] ari_ns.lidar_publisher]: Trying /dev/ttyUSB0
idar_publisher-3] NFO] [1762819298.331970746] ari_ns.lidar_publisher]: Found lidar on /dev/ttyUSB0
idar_publisher-3] NFO] [1762819298.332761908] ari_ns.lidar_publisher]: Connecting to /dev/ttyUSB0 at 115200 baud
idar_publisher-3] NFO] [1762819298.349147893] ari_ns.lidar_publisher]: Lidar info: {'model': '30', 'firmware': (1, 20), 'hardware': 2, 'serialnumber': '070297C1E8839EF2C0E69EF70F653C05'}
osbridge_websocket-1] NFO] [1762819298.415418545] osbridge_websocket]: Rosbridge WebSocket server started on port 9090
ontroller_receiver-5] ARN] [1762819298.617371919] ari_ns.controller_receiver]: Connection lost: Applying brake
amera_publisher-4] NFO] [1762819298.864823740] ari_ns.camera_publisher]: RealSense Camera Publisher Started
idar_publisher-3] NFO] [1762819298.947194218] ari_ns.lidar_publisher]: Published scan: 34/360 valid points
ontroller_receiver-5] ARN] [1762819299.117969913] ari_ns.controller_receiver]: Connection lost: Applying brake
amera_publisher-4] NFO] [1762819299.367351133] ari_ns.camera_publisher]: Successfully published a frame.
ontroller_receiver-5] ARN] [1762819299.618268468] ari_ns.controller_receiver]: Connection lost: Applying brake
idar_publisher-3] NFO] [1762819299.958064748] ari_ns.lidar_publisher]: Published scan: 37/360 valid points
```

The terminal window has a prompt "\$" and a text input field containing "Enter command...". A green "Run" button is located to the right of the input field.



Advanced View with Replay Select



Simple View

 MICHIGAN STATE UNIVERSITY

PollMOVE

Live Feed



Vehicle Stats

Speed: 5.00 m/s

Brake:



Throttle:



Joystick



Map

GNSS Connected - No GPS Fix

Lat: 42.725100° Lon: -84.479100°





Network Stats

Latency: 0 ms

RTT: 0 ms

Packet Loss: NaN%

Last Connection: unknown

Last Seen Location:

42.725100, -84.479100

Last Seen at: unknown s

Queue Size: 0 bytes



What's left to do?

- Features
 - Physical Testing of 2 Car
- Stretch Goals
 - Boot over Ethernet
 - Waypoint Following
 - Middleware
 - One Click Start
- Other Tasks
 - Documentation
 - Codebase Cleanup
 - Bug Fixes
 - GNSS Chart Reconfiguration



Questions?

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