AUTONOMOUS LOW SPEED EV PLATFORM DEVELOPMENT (YEAR 2)

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This project develops the foundation for an autonomous material transport platform using a low-speed electric vehicle. Current work focused on restoring the vehicle to a functional remote-controlled state and developing vision-based line detection capabilities. Future iterations will integrate obstacle detection, autonomous navigation, and redundant safety systems for operation in pedestrian environments.

PROBLEM

- Inefficient manual transport between campus machine shops (iLabs)
- Labor shortages at small-scale farms: Automated flat top design provides platform for crop harvesting robots

KEY REQUIREMENTS

- Line-following navigation
- Obstacle detection + stopping
- Modular payload system
- Redundant safety

APPROACH

- Figure 1, Jetson Orin Nano as core processor for line-detection and obstacle detection
- USB camera for line-detection
- Figure 2, 2D LiDAR sensor for obstacle detection.
- Figure 3, E-stop parking brake for redundant safety precautions.

Fig 1: Jetson Nano

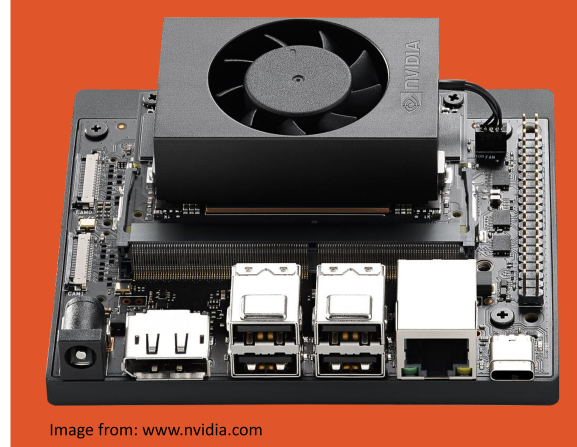

Fig 2: Lidar Sensor

Fig 3: E-stop Parking Brake

Fig 4: Woodpecker Platform Rendering

WOODPECKER PLATFORM

The project is built on the Woodpecker chassis, a modular low-speed EV platform designed with a net-negative carbon footprint. By leveraging this existing system as a base, the team focuses on integrating autonomous navigation and safety features while supporting a sustainable approach to material transport.

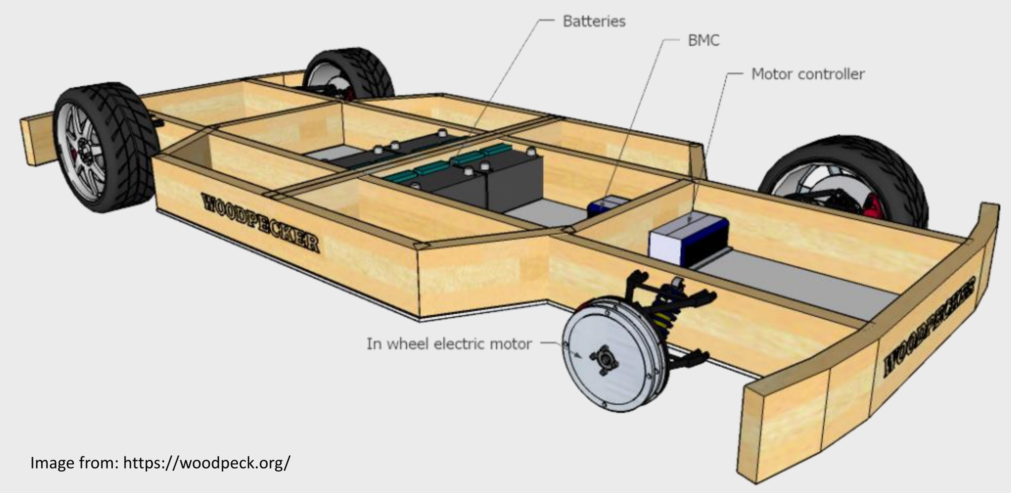

Fig 5: Woodpecker Platform

PROJECT SPONSOR

This project has been made possible by with the help of Micheal O'Halloran, Oregon State University and Joseph Piacenza III.

Mr.O'Halloran's goal for the EV is to help on smaller scale farms with tasks such as automated seed planting and fruit/vegetable picking.

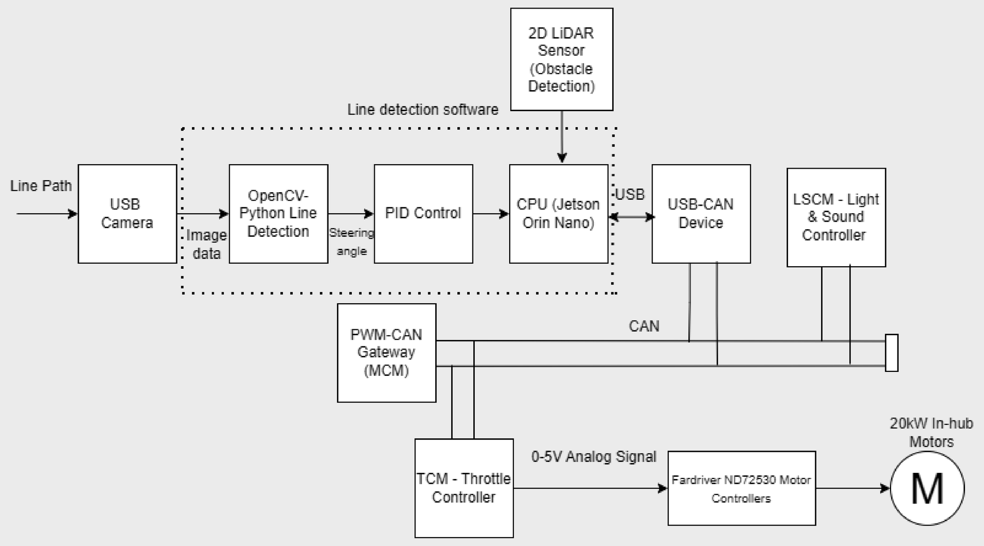

Fig 6: Block Diagram

ITEMS ACHIEVED:

- Integrated wireless control of four-wheel power steering, throttle, and braking
- Custom configured 20kW in-hub motors
- Installation of centralized power bus system
- Line-detection program that controls steering automatically
- Finalized Wiring harness
- Planned Obstacle detection Architecture

Fig 7: Motor Testing Progress

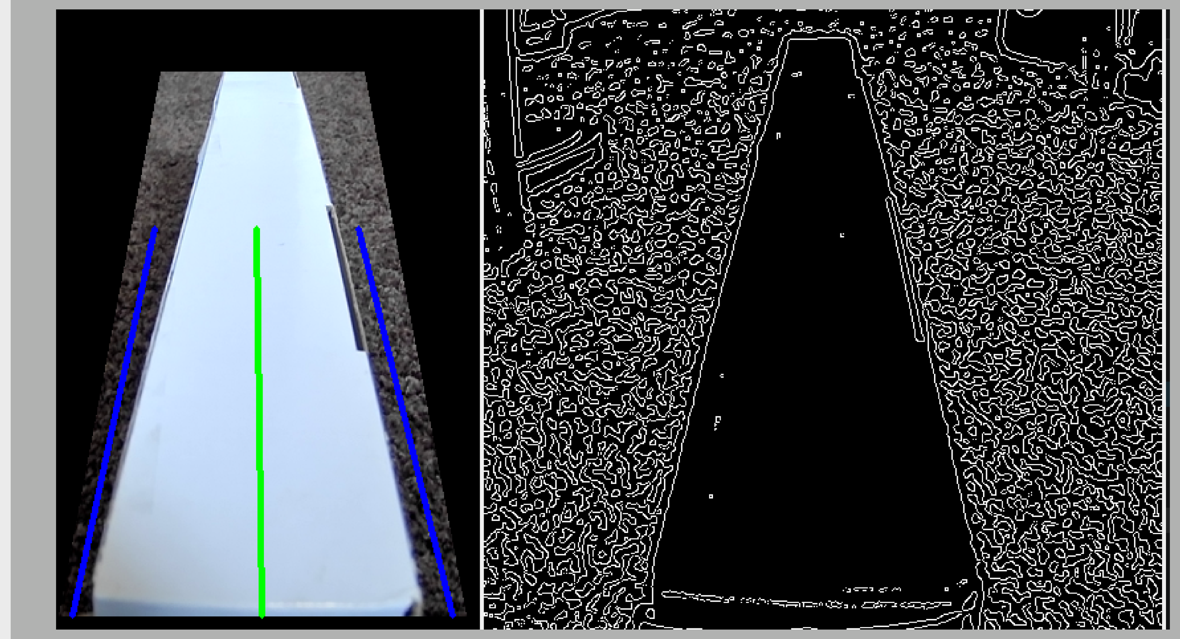

Fig 8: OpenCV-Python Line Detection

FUTURE

- Agricultural applications; modular design to fit cherry-picking robot.
- SLAM or RTK autonomous system, allowing for more broad transport applications.
- Permanent campus deployment. Allowing ease of material transport between iLabs.

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