

Beren Chang

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Technical Skills

- **Programming & Modeling:** Python, MATLAB, C, C++, ROS/ROS2.
- **Simulation & Design Tools:** Gazebo, Webots, Simulink, Solidworks.
- **Mathematics & Algorithms:** Control theory (e.g. PID, MPC), signal processing (e.g. EKF, ARMA).
- **Hardware & Systems:** OptiTrack motion capture system, VESC controller, CAN bus protocol.
- **Development & Version Control:** Linux, Git, Qt.

Professional Experience

DTV Motor Corporation

Mississauga, ON, Canada

ROBOTICS CONTROLS ENGINEER

Oct. 2024 – Present

- Constructed a simulation environment for tracked vehicle based on ROS2 and Gazebo.
- Develop the whole autonomous system including ultrasonic sensors, stereo camera, UWB anchor.
- Optimized the smoothness of steering transition of the dual track differential system, **reducing instability by 60%**.
- Designed and refined several remote-control systems to enhance product demonstrations and usability.
- Improved the control system by implementing a hybrid current and speed control strategy, enabling smooth and efficient performance during uphill/downhill travel and while executing precise circular maneuvers.

CONTROLS ENGINEER INTERN

May. 2021 – Dec. 2021

- Redesigned the control system architecture using the CAN Bus protocol, significantly improving communication reliability. **Reduced total vehicle parts costs by 2%**.
- Solved dual-track steering control challenges using PID and MPC algorithms, improving maneuverability.
- Developed and tuned an EKF for real-time environmental noise suppression, **reducing noise interference by 35%**.

Projects

ROS-based CAN Bus communication for the DTV Dual-Track Chassis

Feb. 2025 - Jul. 2025

- Integrated joystick input with CAN Bus messages for precise maneuverability and improved user experience.
- Developed CAN Bus APIs to enhance the DTV Dual-Track Chassis' compatibility with controllers and manipulators.
- Conducted testing and debugging using CANalyzer and diagnostic tools to validate performance.
- Optimized data transmission to minimize latency and enhance responsiveness in dynamic operating conditions.

DTV Sensor Fusion System

Jun. 2025 - Present

- Designed a ROS2-based sensor fusion architecture integrating ultrasonic ranging, stereo camera VSLAM, and UWB.
- Implemented an EKF with custom motion and measurement models tailored to dual-tracked vehicle kinematics.
- Integrated VSLAM to provide real-time pose estimation and drift-reduced odometry updates to the EKF.
- Used UWB anchors as global position constraints to improve localization robustness in indoor environments.
- Deployed and optimized the full pipeline on NVIDIA Jetson for real-time embedded operation and data logging.

Simulation and Experimental Validation of Steering Control for the DTV Dual-Track System

Oct. 2024 - Feb. 2025

- Simulate the performance of DTV dual-track system in Gazebo with ROS2.
- Created a C++ controller node to address performance issues caused by complex track system physics.
- Validated the effectiveness of the simulated controller in real experiments.

Education

University of Waterloo

Waterloo, ON, Canada

MASTER OF APPLIED MATHEMATICS

Sep. 2022 - Oct. 2024

- Research Focus: Stability Analysis and Formally Guaranteed Tracking Control of Quadrotors.
- Recipient: International Master's Award of Excellence.

BACHELOR OF MATHEMATICS IN APPLIED MATHEMATICS AND STATISTICS

Sep. 2018 - Jun. 2022

- Graduated with Distinction.
- Recipient: University of Waterloo President's Scholarship of Distinction.