Curriculum Vitae / Resume - Terry Tao
Graduate Program - Robotics

University of Michigan - Ann Arbor | ANN ARBOR, MI — SEPT 2022 – EXPECTED APRIL 2025
B.S.E Robotics Engineering | GPA 3.8 / 4.0
- U.S citizen. Senior in Robotics, applying for Robotics SUGS starting F25

Formula SAE (MRacing) | ANN ARBOR, MI — SEPT 2022 – PRESENT
Autonomous Director (3 years) + Founder of Autonomous System
- Leading a team of 35 members, including 4 subsystem leads
- System Overview: Jetson Orin, Novatel RTK INS, Ouster LiDAR, Stereolabs camera, custom power + interface board, manual e-stop, model-based optimal controls, emergency pneumatic brakes, electronic power steering
- Managed sponsorships of over $40,000 worth of camera, LiDAR, GNSS and processing hardware

Freshman Year:
- Trained a YOLOv7 traffic cone detector to achieve 90% accuracy and 8ms inference time
- Wrote a ROS driver for stereo 3D object detection with a custom TensorRT model, tested to be accurate for cones up to 10m

Sophomore Year:
- Mounted two inexpensive low-resolution 32 channel LiDARs with a 0.66° pitch difference to increase vertical resolution and achieve the same range (detect traffic cones up to 25m) as a much more expensive higher resolution LiDAR
- Transitioned to planar RANSAC from Patchwork++ (learning based ground removal) to decrease false negative rate by 70% and improve LiDAR inference time by 60%
- Validated mapping algorithm with real driving data, achieved a 0.1m covariance between measured map and ground truth

Junior Year:
- Modelled a FORCESPRO nonlinear model predictive controller to obtain a 5s skidpad time in simulation
- Ensured 50% braking performance under any single point failure with DFMEA and failure tree analysis after designing e-brakes
- Designed Jetson-to-vehicle interface board to handle power distribution, ADC, autonomous system state logic, shutdown circuit relays, status indicators, and several CAN to USB devices through a custom USB hub

H3D Gamma | ANN ARBOR, MI — MAY 2024 – AUGUST 2024
SLAM Intern
- Automated extrinsic lidar-camera alignment for H3D's Jetson environment using a targetless method
- Advised H3D to not fuse GNSS and instead solely rely on the INS after evaluating GNSS as a source of odometry within Cartographer
- Decreased Cartographer CPU runtime by 50% by building OpenBLAS from source with ARMv8 optimizations
- Simulated radiation in a Nav2 and Gazebo environment to test control policies for a future radiation mapping robot.
- Tested a centroid-sampling-based frontier exploration policy to search any indoor environment for radiation in simulation

Ford Motor Company | ALLEN PARK, MI — MAY 2023 – AUGUST 2023
ADAS L3 Self Driving Intern
- Flagged DOC (Duty of Care safety envelope) violation events during L3 test drives using a custom vehicle deceleration model
- Compared driving policies based on DOC violation frequency to find which policy had an acceptable risk for Ford
- Synchronized CAN logs with INS logs by automating data acquisition and post processing to determine root cause of flagged events

Ground Effect Plane Controls | Class Project — FALL 2023
- Combined ground effect dynamics with traditional fixed-wing 6DOF model in MATLAB and Simulink to solve EOMs
- Decoupled the altitude, airspeed, and heading controllers to make tuning of nested PID controllers more straightforward
- Result is a simulated plane capable of navigating any set of waypoints in order, at a setpoint altitude of 5m above water under reasonable wave and wind disturbances

SLAM Robot | Class Project — FALL 2023
- Applied a model-based state estimator, LiDAR occupancy grid mapping, particle filter for fusing, and an exploration policy
- Result is a robot capable of mapping out a small maze and finding the exit autonomously

Stewart Platform (6DOF parallel manipulator) | Personal Project — 2021
- Designed, built, tested manipulator that has 6 hobby servos, 6 linkage rods, 12 ball joints and mostly 3D printed parts
- Solved for the inverse kinematics and controlled position of end effector using PID on an Arduino microcontroller
- Dampened the acceleration on end effector in all axes using measurements from an IMU with a closed loop controller

Java | Python | C++ | OpenCV | ROS1&2 | Julia | Git | MATLAB | Pytorch | Simulink | LaTeX | EKF | Regression
Solidworks | Siemens NX | Fusion 360 | YOLO | NVIDIA Jetson | Canalyzer | Ubuntu | CAN | RTK GNSS (RTCM) | SSH