Terry Tao

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U.S citizen. Senior in Robotics, available May 2025 - Aug 2025 for internship. Expected sequential M.S.E Sept '25 – May '26

Formula SAE (MRacing) | Autonomous Director + Founder SEPT 2022 - PRESENT

- Managed sponsorships of over $30,000 worth of camera, LiDAR, GNSS and processing hardware
- Researched and tested and failed and made compromises until landing on a super good enough solution for all decisions
- Used Jetson instead of x86 because of lower mass, lower power consumption (35W continuous), and easy access to GPIO
- Mounted two Velodyne 32 channel LiDARs with a 0.66° pitch difference to increase vertical resolution and detect cones at twice the distance possible with a single LiDAR. Evaluated point reflection intensity reliability for cone color detection
- Decided on stereo cone distance estimation because it had better position accuracy than monocular PNP distancing
- Wrote a Stereolabs ROS driver for 3D object detection with a custom TensorRT model. Tested to be reliable for cones < 10m
- Used RANSAC and clustering instead of patchwork++ and a learning-based detector to decrease the false negative rate
- Improved inference time (run on GPU) and tunability (nonlinear cost) by using MPPI instead of auto-differentiation MPC
- Tested Novatel INS fix time, horizontal and heading accuracy, antenna mounting points, and NTRIP ports
- Designed and did DFMEA on pneumatic emergency brakes, ensured 50% braking performance under any single point failure
- Wrote DBC files for communicating between the Jetson and the ECU, car sensors, and actuators
- Designed the board that interfaces between the Jetson and the rest of the car. Handles power distribution, ADC, CAN to SPI, system state logic, shutdown circuit relays, and safety critical signals
- Spied on other successful European driverless teams (They have an 8 year head start on our team)
- Read rules docs very closely and found where we need to strictly follow the rules and where we can stretch interpretation
- Team chef

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
- Evaluated GNSS as a source of odometry within Cartographer, advised H3D to not fuse GNSS and solely rely on the INS
- Decreased Cartographer CPU runtime by 50% by building OpenBLAS from source with ARMv8 optimizations
- Fixed inconsistent ORBSLAM3 orientation on initialization, fixed ORBSLAM3 segfault bugs
- Used Nav2 and gazebo to make a radiation simulator for a future radiation mapping robot. Developed a 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

- Developed a kinematics-based model to flag Duty of Care (safety envelope) violation events during L3 test drives
- Developed safety metrics used to compare different driving policies based on DOC violation frequency
- Automated data acquisition and post processing to compare CAN logs with GNSS-RTK logs with MATLAB

University of Michigan - Ann Arbor | ANN ARBOR, MI AUG 2022 – EXPECTED APRIL 2025
B.S.E Robotics Engineering | GPA 3.8

Ground Effect Plane Controls | Class Project FALL 2023

- Used MATLAB and Simulink to create a 6DOF EOM solver with additional ground effect dynamics
- Designed decoupled altitude, airspeed, and heading controllers, tuned nested PID controllers
- Applied waypoint following, result is a 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

- Tuned wheel velocity PID and trajectory following PID, applied differential drive wheel odometry
- Applied an action model state estimator, LiDAR occupancy grid mapping, particle filter for fusing action and sensor models

Stewart Platform (6DOF parallel manipulator) | Personal Project 2021

- Designed the manipulator which has 6 hobby servos, bench power supply and 3D printed parts on Solidworks
- Solved for the inverse kinematics, implemented PID position control of end effector using an Arduino microcontroller
- Dampened the acceleration on the 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