Yubo Wang

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Technical Skills

Programming: C/C++, CMake, Python, Java, Javascript, MATLAB, ROS, CUDA, PyTorch, Git, Linux, System Verilog
CAD: SolidWorks, Fusion 360, AutoCAD, OnShape. **EDA:** Altium Designer, KiCAD
Embedded Systems: FreeRTOS, STM32HAL, Arduino, PlatformIO, RISC-V Assembly, I2C, SPI, CAN, UART, LabVIEW
Prototyping: Machining, Soldering, PCB assembly, Additive Manufacturing (DMLS & FDM), Geometric Dim.&Tol.
Analysis & Simulation: ANSYS (Fluent, Mechanical), Simulink, Gazebo, IsaacSim

Education

University of Toronto Sept. 2023 – Apr. 2028
BASc in Engineering Science, Aerospace Engineering Major, Minor in Robotics. **CGPA: 3.87**

Experience

Robotics & Navigation Research Intern - Autonomous Space Robotics Lab May 2025 – Present

- Developed a **marine robotics platform** to create a marine **navigation and localization** dataset for **SLAM** research.
- Brought up **full compute and sensor stack** on Nvidia Jetson in **thermally limited** environment integrating imaging & side-scan **Sonar, RGB-D stereo camera, LiDAR, and Radar** sensors onto an autonomous surface vehicle (ASV).
- Wrote **sensor drivers**, data acquisition and processing pipeline, data visualizer in **C++ & Python** on **ROS2 Humble**.
- Preparing and processing dataset for publication in the **International Journal of Robotics Research (IJRR)**.
- Investigated use of Radar and LiDAR for **Teach and Repeat** navigation in marine environments.

Propulsion System Technical Lead - UTAT Rocketry Sept. 2023 – Present

- **Leading a 30+ member team** developing propulsion system for a liquid bipropellant sounding rocket targeting 10,000 ft.
- Led development of team's **first-ever liquid-fueled engine**, culminating in a **hot-fire test**.
- Designed thrust chamber, propellant feedsystems, & GSE using **SolidWorks** and **OnShape**, and simulated in **ANSYS**.
- Performed **GD&T**, created **technical drawings** for in-house & outsourced manufacturing including **metal 3D-printing**.
- Brought up **electronics suite** for **DAQ** and fluid control system to support engine testing.
- Resolved feedsystem pressure loss issues through **Ansys Fluent CFD** simulation and redesign of injector.
- Created custom scripts for **design and simulation** of new regeneratively cooled thrust chamber.

Robotics & RL Software Research Intern - McGill Aerospace Mechatronics Lab May 2024 – Sept. 2024

- Implemented a novel **Reinforcement Learning**-based Shared Autonomy path planning algorithm in **Python** and **C++**.
- Trained and validated a Proximal Policy Optimization **(PPO)** model trained using **Gymnasium** for shared autonomy.
- Created a simulation environment in NVIDIA **Isaac Sim** for testing and validation.
- Developed a new **autonomy software stack** deploying the model on **ROS1** in **Python** from perception to control on a robotic arm.
- Used YOLOWorld for **object detection** and **pose estimation** from RGB-D camera.

Driverless Division Senior Member - University of Toronto Formula Racing Sept. 2023 – Sept. 2024

- Debugged and improved **C++** SLAM and planning modules in **ROS2** on **Ubuntu**, improving update rate by **over 60%**.
- Created a **Dynamic Bicycle Model** for EKF state estimation using IMU, GPS, and wheel odometry.
- Optimized **Python Lidar & Vision Perception** Stack on **YOLOv8**, improving inference performance by **over 30%**.
- Contributed towards **CAN interface** for FSM state synchronization and control of vehicle steering and throttle.

Organization President, Team Captain - STL Robotics July. 2020 – June 2023

- Led a team of 10 to take **Provincial champions** in **2023 VRC Ontario Championship**.
- Managed all aspects of larger 60+ student organization spanning 6 teams including **project management, fundraising, outreach, and mentorship**.
- Coordinated **weekly workshops** teaching **CAD, machining, electronics, and programming** to members.
- Managed the mechanical design and manufacturing of multiple competition robots using **Fusion 360** and **AutoCAD**.
- Developed **C++** codebase for multiple competition robots including **PID control, wheel odometry, and path planning algorithms**.

Projects

Thrust-Vector-Control and Propulsive Landing of a Model Rocket June 2024 – Present

- Developing full **embedded, GNC, electronics, and mechanical** system for a thrust-vectoring model rocket.
- Developed firmware in **C++** w/ **FreeRTOS**, integrating sensors and actuators over **SPI, I2C, UART, and PWM**.
- Designed and assembling **4-layer flight control computer** capable of active control and charge firing for recovery.
- Designed **ADCS/GNC** system using custom **Quaternion Unscented Kalman Filter** fusing **IMU and Magnetometer** and **cascading PID control loops**.
- Developed **6-DOF Simulink** flight model for control system tuning and **Hardware-In-The-Loop** Simulation.
- Developed bi-directional communication protocol over **LoRa w/ Error Correction.** for telemetry and ground control.
- Iteratively designed and additively manufactured custom **3D-printed** thrust vectoring mount.

High-speed Lifting-body Quadcopter Nov. 2024 – Feb. 2025

- Designed a 5-inch class quadcopter with a custom 3D-printed lifting body airframe.
- Validated and improved stability using **Ansys Fluent CFD** simulation and real-world scale model testing with Load Cell.
- Selected and assembled electronics including **STM32F7 flight controller**, **BLHeli ESCs**, and **FPV system**.
- Performed maiden **flight tests**, reaching speeds over 100 km/h and demonstrating excellent stability.

Dynamic Loitering Drone Feb. 2024

- Designed, built, and flew large **quadcopter** within 24 hours for MakeUofT Hackathon capable of dynamic loitering.
- Used **ROS2** on Raspberry Pi interfacing with **Ardupilot** to implement **PID control** and **Fiducial marker tracking**.
- Modelled in **CAD** and **3D-printed** custom drone frame and landing gear.

Kilonewton Matboard Bridge Dec. 2023

- Created matboard bridge supporting a load of **1.2 kN**, setting a **class record** as the only team to exceed 1 kN.
- Designed and simulated bridge using **Matlab** and custom **FEA** to optimize material usage.
- Collaborated with a team of 4 to design and fabricate the bridge on a tight timeline.

Hybrid Rocket Engine Oct. 2022 – Aug. 2023

- Designed, simulated, and tested a 0.5 kN thrust **N2O-Paraffin hybrid rocket** engine and test stand.
- Developed **telemetry** and **remote control** system on **Arduino** in C++ for engine testing with telemetry from load cells, pressure transducers, and thermocouples.
- Designed custom parts for **CNC Machining** and **Metal 3D-printing** including **injection system**, **ignitor**, and **nozzle**.

Awards & Certifications

Basic Machining Certification – *George Brown Polytechnic* Nov. 2023

Machine Shop Training and Certification – *University of Toronto Department of MIE* Dec. 2023

RPAS Basic Operations Drone Pilot Certificate – *Transport Canada* Apr. 2021

University of Toronto Excellence Award Research Grant, value of $7500 – *University of Toronto* May 2025