Mingde Yin

+1 (613)-413-8235 ◇ mingdey.in ◇ mingdeyin@gmail.com ◇ linkedin.com/in/mingde-yin ◇ github.com/itchono

SKILLS

- Spacecraft dynamics, orbital mechanics
- Launch vehicle guidance
- Cislunar and interplanetary trajectory design
- Multidisciplinary optimization
- Control theory (State-Space, MPC, Robust)
- Python, C, C++, MATLAB, Simulink, ROS 2
- Spacecraft avionics systems design
- Spacecraft environmental testing

EDUCATION

Bachelor of Applied Science, University of Toronto — Sep 2019 - Apr 2024
BASc in Engineering Science, Major in Aerospace Engineering — 4.00 GPA

- Computational numerical methods and optimization
- Orbital mechanics and astrodynamics
- Finite-element analysis and CFD
- Aircraft design and control
- Subsonic and supersonic aerodynamics
- Classical state estimation and control

PROFESSIONAL EXPERIENCE

Optimization and Avionics Intern — May 2022 - Feb 2023
SpaceRyde Inc. — *Toronto, ON*

Orbital Launch Vehicle Design and Trajectory Optimization

- Designed new component models for the Ryder orbital launch vehicle to improve mass correlation accuracy and revised conceptual design using multidisciplinary optimization.
- Developed revised Δv budgets based on optimized explicit ascent guidance profiles to various target orbits.
- Investigated cislunar and deep-space trajectories for new upper stage performance targets.

Airborne Attitude Control System (Propeller-based attitude control)

- Developed motor/propeller sizing tool for yaw control system of a stratospheric balloon launch platform, based on NASA high-altitude propeller performance correlations and adjusted for flight at stratospheric altitudes.
- Sourced and integrated hardware for the propulsion system, including brushless motors, drives, and propellers. Performed environmental qualification testing using TVAC system to verify functionality in flight conditions.
- Designed new LQR controller to handle a wide range of loading cases while remaining performant and stable (Simulink).
- Integrated controller into GNC software stack (C++, ROS 2) and validated pointing performance on the ground.

Thrust Vector Control System for Rocket

- Developed preliminary simulator for designing GNC stack of 3D thrust vector control system for a hybrid rocket engine.
- Implemented basic dynamics, sensor models, estimation filters, and a simple controller (Lyapunov-tuned PID) to characterize the system and inform downstream design decisions.

High Altitude Balloon Flights

- Led a subscale testing campaign using high altitude meteorological balloons as a flight platform.
- Implemented simplified flight software stack using Python and ROS 2, performing data collection, telemetry, RF, and flight management functions. The full avionics stack was tested using representative environmental trials on the ground.
- Successfully flew vehicle to 21.6 km altitude and recovered all experiments.

Nanosatellite Design Team - Orbit Subsystem Lead — Mar 2020 - Dec 2022
UTAT (University of Toronto Aerospace Team) - Space Systems Division, FINCH Mission — *Toronto, ON*

- Led a team of 8 to perform orbit selection and trajectory analysis for a 3U cubesat imaging mission.
- Developed custom 12th order numerical integrator and physics model for propagation of spacecraft orbit (C, Python); 50 to 200x faster than equivalent open-source Python library, validated using AGI STK and NASA GMAT. Custom software allowed for better integration into the rest of our design analysis toolchain.
- Worked with ADCS subsystem on development of GNC simulator, EKF, and B-dot controller for detumbling.

Computational Microfluidics Researcher — May 2021 - Aug 2021
Laboratory of Complex Fluids, Department of Chemical Engineering, University of Toronto — *Toronto, ON*

- Validated theoretical ultra-low Reynolds flow model of suspensions in microfluidic geometries using COMSOL Multiphysics CFD. Tuned a custom solver to get faster and more consistent performance.
- Several points of interest were noted and used to develop experiments for verification in the lab. Outcomes of these experiments will be used to iterate upon the model in the future.