Yifu Yuan

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Education

(Incoming) **Carnegie Mellon University** | Pittsburgh, PA — *Aug 2024 - May 2026*
Master of Science in Robotics Systems Development (MRSD)

3.97/4.0 **Worcester Polytechnic Institute** | Worcester, MA — *Aug 2020 - May 2024*
Bachelor of Science in Robotics Engineering
Bachelor of Science in Computer Science

Courses: Robot Dynamics | Control System | Machine Learning | Motion Planning | SLAM | Embedded System | Computer Vision

Skills

Robotics ROS 1/2, Gazebo, MuJoCo, Rviz, Arduino, SOLIDWORKS, Fusion360, Maya, EAGLE, Pspice, Altium,
Programming C/C++, MATLAB, Python, Java, Catkin, CMake, Git, LaTeX, R, SQL

Professional Experience

BiQu - Bimodal Quadruped Robot, ALMaS Lab — *Aug 2023 - Present*
Control & Perception Lead | Advisor: Prof. Mahdi Agheli
- Implemented the Optimal Control for Switched Systems (OCS2) with WBC, achieved robust locomotion for Unitree Go1
- Established high-precision SLAM using stereo camera and IMU with RTAB-Map
- Deployed Robot-Centric Elevation Mapping and optimized the Grid Map segmenting algorithm to extract solid convex safe regions for solving optimal foot placement

Humanoid Robot - Upper Torso, ALMaS Lab — *Aug 2022 - May 2023*
Design Lead | Advisor: Prof. Mahdi Agheli
- Innovated the physical structure of the robot torso in SOLIDWORKS with great compliance by using 3D printed TPU parts for the intervertebral discs of the spine
- Engineered the actuating system with parallel manipulators for the robot torso to achieve 3-DoF rotational movement

Cloud-based AI for Neural Data, The Yousefi Laboratory — *Mar 2022 - Present*
Research Assistant | Advisor: Prof. Ali Yousefi
- Developed a portable EEG device by customizing the single-channel EEG analog circuit using Pspice and EAGLE
- Implemented BLE module and PWM control with nrf52840 to enable Bluetooth connection and audio stimulation
- Employed CNNs in TensorFlow to extract time-invariant features for sequence residual learning in down-streaming modules, achieved 79% overall accuracy in sleep stage classification

Projects

Dynamical Modeling of serial arm robots — *Jan 2023 - May 2022*
- Implemented Newton-Euler Recursive Formulation and Lagrangian Formulation to simulate the dynamical modeling of a serial arm robot in MATLAB
- Programmed the gravity compensation and torque-based motion control of the ABB IRB 910 using MATLAB Robotics System Toolbox

Autonomous Path Planning and Navigation Robot — *Oct 2022 - Dec 2022*
- Applied SLAM on the robot with laser distance sensor to map the environment and localize itself using G-mapping and AMCL
- Implemented A* algorithm in Rviz for optimal path planning for the robot to explore and navigate in the static environment autonomously with obstacle avoidance
- Utilized Kalman Filter to help robot re-localize itself after external disturbance and long-distance displacement

3-DoF Manipulator — *Aug 2022 - Oct 2022*
- Formulated robot's cubic and quintic trajectory to control the motion of the robot arm and sort objects by implementing robot's forward/inverse kinematics
- Developed object detection and classification with over 90% accuracy by enhancing the image with spatial filtering and HSV color threshold
- Crafted the URDF of the robot arm from scratch and animated the 3D CAD model following the real robot arm action in real-time

Mapping Robot — *Mar 2022 - May 2022*
- Developed robot motion planning and localization in C++ with AprilTag detection and IR sensors
- Created mapping algorithm with over 85% accuracy based on environment sensing using ultrasonic range finder sensor
- Implemented MQTT sever to transfer mapping data from robot to PC

Solar Panel Robot — *Jan 2022 - Mar 2022*
- Designed the robot with a four-bar mechanism using 3D printing
- Formulated PID control for velocity and steering of the line-following robot using line tracker and wheel encoders
- Developed robot decision algorithm with state machine in C/C++ based on environment sensing using ultrasonic range finder and IR receivers

Team Task Management Tool — *Oct 2021 - Dec 2021*
- Built user and task management frameworks for the database using MySQL
- Deployed AWS Lambda functions with API Gateway, added custom logic to Amazon S3 bucket