Hang Yin

(773) 290-0885 | hangyin2023@u.northwestern.edu | hang-yin.github.io/portfolio | github.com/hang-yin

EDUCATION

Northwestern University **Evanston, IL**
M.S. in Robotics *Sep. 2022 - Dec. 2023*
B.S. with honors in Computer Science, summa cum laude *Sep. 2019 - June 2022*

PROJECTS

EKF Simultaneous Localization and Mapping from Scratch *ME 495 Sensing, Navigation, and ML for Robotics*
- Implemented Extended Kalman Filter SLAM pipeline in ROS2, using C++ for a Turtlebot3 differential drive robot
- Performed circular regression and classification to detect cylindrical landmarks from LiDAR data
- Built simulated environment in RViz from scratch and wrote C++ libraries for differential drive kinematics, collision, and odometry

Robot Jenga Assistant *ME 495 Embedded Systems in Robotics*
- Programmed a 7 DoF Franka Emika Panda robot arm to play Jenga with ROS2, MoveIt 2, openCV, and Tensorflow
- Wrote a custom MoveIt library to move the end effector either through inverse kinematics or in cartesian path while avoiding collision
- Performed transfer learning on a pre-trained convolutional neural network for hand detection to enable turn-taking during gameplay

Graph Convolutional Network for Sentiment Analysis *CS 397 Seminar in Statistical Language Modeling*
- Modeled both syntax and semantic information of natural language by combining pre-trained embeddings (BERT) with dependency parse trees using edge-conditioned Graph Convolutional Networks
- Evaluated language model on IMDB Movie Review Dataset
- Implemented baseline models including Feed Forward Network, BiLSTM, CNN, and sentence level Graph Convolutional Network

iExpressionNet Deep Learning Model *EE 435 Deep Learning Foundations*
- Developed a Convolutional Neural Network to detect facial expressions based on the FER-13 dataset
- Established transfer learning to achieve 90%+ accuracy on user-specific dataset

Mobile Manipulation with KUKA youBot Simulation *ME 449 Robotic Manipulation*
- Simulated mecanum-wheeled robot motion with a 5 DoF robot arm to manipulate the position of a block in CoppeliaSim
- Generated end-effector trajectory and implemented feed-forward + PI controller to follow that trajectory

Quadrotor Design and Control *ME 410 Mechatronics - Quadrotor-based Project*
- Built and programmed a quadrotor with a wifi-enabled Raspberry Pico and onboard IMU for autonomous flight
- Implemented code in C++ for IMU, complementary filter, joystick control, PID closed loop control, and Vive IR sensor integration

IMU & EMG Controlled Robot Arm *CE 346 Microprocessor System Design*
- Designed and built a 2-jointed robotic arm with a mechanical gripper as its end-effector and a Microbit v2 as its microprocessor
- Controlled the servos on the arm and the gripper with pitch and roll from an IMU and signal from an EMG muscle sensor respectively

Pen Recognition and Control *Independent Project*
- Located a pen in 3D space with a computer vision pipeline, which includes aligning depth map to RGB image, thresholding image in the HSV color space, filtering image with dilation and erosion operations, constructing contours and the centroid of the pen
- Programmed the PincherX 100 Robot Arm to grab the pen given its coordinates with respect to the camera in 3D space

TreeHealth Mobile Application *CS 394 Agile Software Development*
- Built a React Native mobile app with CI/CD pipeline for tree researchers to visualize data from dendrometer, sap flow sensors, etc.
- Utilized Victory Chart library to display data from multiple sources with a unified scale so that it shows how different factors interact

RESEARCH EXPERIENCE

Human Computer Interaction Research **Evanston, IL**
Northwestern Delta Lab *Mar. 2021 – Jun. 2022*
- Designed and developed a scripting interface with JavaScript and React for mentors to translate their high level understanding of students' ineffective research and learning strategies into machine detectable conditions in a team of two
- Conducted user studies and analyzed quantitative and qualitative results to help with prototype iteration
- Wrote a grant proposal and awarded funding for research through the Undergraduate Research Grant program
- Compiled results including how scaffolding questions, combination of top-down and bottom-up script construction, and reflect and expand prompt can help mentors to proactively detect situations in the future and respond to them more effectively into a 6-page paper

LEADERSHIP EXPERIENCE

Team Mulan *June 2018 – Sep. 2019*
- Co-founded and recruited members for team Mulan, the first all-girl robotics team in China
- Mentored the team on mechanical design, software control, and sponsorship management (fundraised 30k USD in 2019)

Skills: Python, C++, C, JavaScript, MATLAB; PyTorch; Git; ROS2, Gazebo; React, NodeJS; Linux, Docker, GDB; CI/CD, Unit Testing