

YIRAN JU

+1 (604) 999-5308 [✉ april20190710@gmail.com](mailto:april20190710@gmail.com) [in](https://www.linkedin.com/in/YiranJu) YiranJu [GitHub](https://github.com/AprilJu) AprilJu

Education

University of British Columbia, Canada

Expected May 2024

Bachelor of Applied Science in Computer Engineering, Minor in Commerce

GPA: 3.7/4.33

2021,2022 Dean's Honor List

Relevant Courses: *Linear Algebra (A+), Deep learning (A+), Operating Systems (A+), Computer Engineering Design Studio (A+), Electronic Materials and Devices(A+)*

Research Experience

University of British Columbia

Sept, 2023 – Apr, 2024

Thesis Research Project: Exploring Uncharted Chemical Space using Graphical Neural Network

- Designed and implemented a graph-based representation where nodes represented molecules and edges indicated chemical similarity, enabling the prediction of MS/MS spectra.
- Developed a robust data preprocessing pipeline, including graph creation, splitting, dimensionality reduction, and feature engineering.
- Processed large-scale datasets (NIST2020 and GNPS) to generate graph structures optimized for GNN training and analysis.

University of British Columbia

Sept, 2022 – Mar, 2023

ReX Undergraduate Research Project: Investigating Penney's Game

- Analyzed results from the computation of characteristic ratios in Penney's Game by employing Python for computational analysis and probabilistic simulations.
- Combined Probability Theory, Markov Chains, and Game Theory in the study.
- Presented findings at the Multidisciplinary Undergraduate Research Conference (MURC).

Nanjing University of Aeronautics and Astronautics

Jan, 2021 – Aug, 2021

Research Assistant

- Developed a high-precision multivariate polynomial equation-solving system in C++, customized to the intricate configurations of a 6R Robotic Arm, utilizing the Dixon elimination method for enhanced precision and efficiency.
- Contributed to the collaborative design and development of an All-in-One robotic joint featuring a torque motor, harmonic reducer, optical absolute encoder, and magnetic relative encoder. Improved joint structure through structural reuse and optimization, resulting in a 35% reduction in weight, a 1.6-fold increase in precision, and a 14-decibel decrease in noise.

Professional Experience

PNDbotics

Dec, 2024 – Present

Machine Learning Research Intern

- Developed a whole-body imitation learning framework utilizing an adversarial motion prior for applications in humanoid robotics.
- Designed and trained control policies using the Proximal Policy Optimization (PPO) reinforcement learning algorithm.
- Conducted large-scale training on 4096 parallel simulation environments using NVIDIA's Isaac Gym, enabling efficient and robust policy optimization for humanoid robotic motion control.

University of British Columbia

Sept, 2023 – Dec, 2023

Teaching Assistant | CPEN 331 - Operating Systems

- Offered comprehensive guidance to students, aiding in the grasp of fundamental operating system concepts, and provided practical support in OS161 and C programming.

Nanjing Panda Electronics Equipment Co. Ltd.

May, 2023 – Aug, 2023

Research And Development Intern

- Engaged in active collaboration within a cross-functional engineering team to enhance the functionality of Inverse Kinematics Software for Industrial Manipulators.
- Conducted thorough research and analysis to identify enhancement opportunities in pre-existing software, resulting in a 50% increase in computation speed and a precision improvement by three significant figures.
- Collaborated in writing comprehensive test cases, utilizing Google Test to ensure code validity and reliability.

Publication

Ju, Yiran; Yu, Meng. **An Innovative Inverse Kinematics for Bionic Robot Arms Based on Directional Tangent Matrix.** *2023 2nd International Conference on Automation, Robotics and Computer Engineering (ICARCE 2023)*. Paper ID: AR-23-387. Published in *IEEE Xplore*

- Introduced an innovative inverse kinematics method using the Directional Tangent Matrix for Bionic Robot Arms, significantly simplifying equations for efficient and flexible real-time applications.
- Remarkably outperformed Charles Wampler's 1991 approach, solving the "Mount Everest" of kinematic problems in just 5ms compared to his 10-second solution time on an IBM 370-3090.

Ju, Yiran; Yu, Meng; Shi, Baoqian. **An Improved Robot Calibration Approach Based on Fixed Axis-Invariant.** Accepted for presentation at the IEEE ICRC 2024 Conference.

- Suggested an improved approach for measuring robot structural parameters, utilizing axis invariants for heightened accuracy and efficiency.
- Redefined fixed-axis rotation, and then employed a laser tracker to gauge the positions of two tracking balls on the robot's end, and used this data to determine joint axis directions, positions, and angle or line positions.
- Validated this improved approach, highlighting its capability to enhance the robot's absolute positioning accuracy by informing the robot's DH parameters by experimental measurements.

Projects

APP Controlled 3D Dance Cube | *Android Application, ESP8266, FPGA* **Jan – Apr, 2023**

- Developed "Dance Cube", an innovative 3D LED visual tool integrating hardware and a WiFi-connected Android app.
- Deployed local ML model that estimated human pose in the camera frame into the cube in 3D.
- Engineered Cloud integration for DE1-SOC board via custom UART interface and HTTP server. Enabled seamless Android app communication with Nios 2 processor through WiFi and efficient HTTP requests.

A Real-Time Multiplayer Trivia Game | *JavaScript, MongoDB, Android Studio* **Sept – Dec, 2023**

- Implemented WebSocket protocol to establish fluid, bidirectional communication between server and clients, facilitating instant synchronization of game states and player actions.
- Integrated MongoDB for dynamic data management of user profiles, game configurations, and in-game activities, ensuring swift data handling for a real-time gaming experience.
- Executed comprehensive front-end testing with Espresso to verify UI functionality and game operations, enhancing user experience reliability and smoothness.

Online Discussion Forum Development | *JavaScript, MongoDB, HTML* [Git](#) **Sept – Dec 2022**

- Designed and implemented a dynamic online discussion forum that facilitates the creation of topic-specific chat rooms and supports live interactions among users.
- Optimized client-server communication by integrating MongoDB and Node.js, and fortified user security by setting up middleware for input validation and protection against Cross-Site Scripting (XSS), resulting in a seamless and secure user experience.

Operating System Implementation Project | *C, os161, Linux Environment, GDB* [Git](#) **Sept – Dec 2022**

- Analyzed and adapted core aspects of OS functionality, focusing on efficient resource handling and process synchronization.
- Implemented a set of system calls, utilizing C and enhanced file system mechanisms to streamline data management and access.
- Successfully navigated the complexities of kernel-level programming, leading to a more robust and functional OS161 system.

Entertainment Biped Robot | *ItsyBitsy M4 micro-controller, JavaScript* **Jan– Apr, 2022**

- Implemented a dancing biped robot using and interfacing with the ItsyBitsy M4 micro-controller board and servo motors.
- Complete the CircuitPython programming for ItsyBitsy M4 board and other sensors, color TFT LCD and keypad implemented with it.

Technical Skills

Programming Languages: C/C++(OOP/OOD), Python, Java, JavaScript, Verilog, Assembly

Software & Tools: Git, CMake, GDB, Linux Environment, MongoDB, Node.js, OpenGL, PyTorch, Latex