Yiran Ju

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Education

University of British Columbia, Canada **Expected May 2024**

Bachelor of Applied Science in Computer Engineering, Minor in Commerce, Dean's Honor List *GPA: 3.7/4.33*

Coursework: *Linear Algebra (A+), Deep learning (A+), Operating Systems (A+), Circuit Analysis (A−), Software Construction (A−), Computer Engineering Design Studio (A+), Electronic Materials and Devices(A+)*

Research Experience

Nanjing University of Aeronautics and Astronautics **January – August, 2021**

Research Assistant

- Engineered a high-precision multivariate polynomial equation-solving system in C++ leveraging the Dixon elimination method, specifically tailored for the intricate configurations of a 6R Robotic Arm.
- Collaborated in the design and development of a comprehensive All-in-One robotic joint. This advanced joint integrates a torque motor, harmonic reducer, optical absolute encoder, and magnetic relative encoder, culminating in a versatile actuator system.

Research Project: Investigating Penney's Game **September, 2022 – March, 2023**

UBC Faculty-Supervised

- Analyzed results from the computation of characteristic ratios in Penney's Game using search algorithms and probabilistic simulations.
- Presented findings at the Multidisciplinary Undergraduate Research Conference (MURC).

Professional Experience

University of British Columbia **September – December, 2023**

Teaching Assistant — CPEN 331 - Operating Systems

- Provided comprehensive guidance for students in understanding core concepts of operating system and offering practical assistance in OS161 and C programming.

Nanjing Panda Electronics Co. Ltd. **May – August, 2023**

Research And Development Intern

- Contributed to a cross-functional engineering team aimed at elevating the functionality of the Inverse Kinematics Software for Industrial Manipulators.
- Conducted in-depth research and analysis to pinpoint potiential enhancement within the pre-existing software.
- Collaborated in writing comprehensive test cases, utilizing Google Test to ensure code validity and reliability

Projects

APP Controlled 3D Dance Cube | *Android Application, ESP8266, FPGA* **January – April, 2023**

- Spearheaded the development of "Dance Cube", an innovative 3D LED visual tool integrating hardware and a WiFi-connected Android app. This fusion allowed real-time human movement projection using ML pose estimation, and offered user-specific analytics, resulting in a state-of-the-art interactive experience.

Online Discussion Forum Development | *JavaScript, MongoDB, HTML Git* **September – December 2022**

- Designed and implemented a dynamic online discussion forum that facilitates the creation of topic-specific chat rooms and supports live interactions among users.
- Successfully enhanced UI, optimized client-server communication, integrated MongoDB for data persistence, and fortified user security, resulting in a seamless and secure user experience.

Operating System Implementation Project | *C, os161, Linux Environment, GDB Git* **September – December 2022**

- Embarked on a comprehensive Operating System Implementation Project, mastering core components such as concurrency, synchronization, and virtual memory management. Successfully innovated file system mechanisms and facilitated system calls, culminating in advanced insights into OS design and functionality.

Entertainment Biped Robot | *ItsyBitsy M4 micro-controller, JavaScript* **January – April, 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.

Publication

An innovative vector polynomial system and analytical inverse kinematics
Manuscript Submitted to Applied Mathematical Modelling

- Proposed an innovative vector polynomial system and analytical inverse kinematics for robotic engineering.
- Ensured real-time inverse solutions for high DOF systems by leveraging the Natural Continuation Theory based on Partial Velocity.
- Provided examples of real-time inverse solutions for robot arms with roughly-intersecting axes with less than 5 milliseconds cost.

An improved robot calibration approach based on fixed axis-invariant
Manuscript Submitted to ICRCA 2024 Conference

- Proposed an enhanced method for measuring robot structural parameters leveraging axis invariants.
- Redefined fixed-axis rotation, and then employed a laser tracker to gauge the positions of two tracking balls on the robot's end, and use 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.

Technical Skills

Languages: C/C++(OOP/OOD), Python, Java, JavaScript, Verilog, Assembly
Software & Tools: Git, CMake, GDB, Linux Environment, MongoDB, Node.js