YIHAO (Charles) CAI

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USA Citizenship Status: Green Card Pending (Due to Covid)

EDUCATION

Worcester Polytechnic Institute (Worcester, MA, USA)   Sep. 2021 – May. 2023 (Expected)

- **Major**: Robotics Engineering – **Master of Science** (GPA: 3.75/4.0)
- **Relevant Course**: Robot Dynamics/Control, Human Robot Interaction, Motion Planning, Operating System, Software Security

Nanjing University of Posts and Telecommunications (Nanjing, Jiangsu, China)   Sep. 2016 – Jun. 2020

- **Major**: Telecommunications Engineering – **Bachelor of Science** (GPA: 3.43/4.0)
- **Relevant Course**: Digital Signal Processing, Signals & Systems, Automation Control Theory, Computer Networks, etc.

WORKING EXPERIENCE

ABB Inc. (USA)   Jan. 2023 – May. 2023 (Expected)
R&D Engineer, Department of Robotics & Discrete Automation | Internship   *San Jose, CA*

- Working as a R&D engineer, my duty is to find and integrate cutting-edge solutions in Computer Vision and Machine Learning fields to improve the performance of pick-and-place robots used to build automatic logistics sorting pipelines for warehouse
- For developer role, I migrate robot computation platform from giant ABB IPC (Industrial Power Controller) onto Nvidia AI SoC (Jetson AGX Orin) by setting up the local framework for testing and optimizing the entire model inference process
- As a researcher, I explore the state-of-the-art methodologies about 3D semantic instance segmentation and apply corresponding algorithms with collected RGBD dataset to generate customized models for accurate object detection in robot applications

Hillstone Networks Co., Ltd   May. 2021 – Aug. 2021
Software Develop Engineer, Department of Cloud Security   *Beijing, China*

- Utilize Kubernetes to organize Docker container-clusters, and design a security scheme following CIS Benchmarks to protect against container threats; Implement RPC frameworks (Http, Restful, gRPC) to build microservice modules using Golang
- For low-level layers on OS, I apply Linux kernel mechanisms including SELinux, AppArmor, eBPF and IPC namespace; for high-level ones, I create policies for securing interactions among Docker modules (dockerd, containerd and runc, etc.), increasing container security performance in product around 15%

Whale Cloud Technology Co., Ltd   Jul. 2020 – Mar. 2021
DevOps (Delivery) Engineer, Department of International & Operation Center   *Nanjing, China*

- Build an automation framework using Shell for deploying middleware (Nginx/Dubbo/Zookeeper/Redis) on servers; Maintain Oracle user database by creating stored procedure statements and interacting with Shell scripts
- Test and debug logistics of business code through logfile. Monitor and examine network performance for traffic flow by sending packets via socket program, and utilize Tcpdump to analyze them with Wireshark (filtered by iptables chain rules)

PROJECT / RESEARCH EXPERIENCE

Photo App Development (Full-stack)   May. 2022 – Aug. 2022

- Design and create App UI layout using Flutter including interaction with SaaS platform Firebase, response/request by Restful API, and widget status management through Riverpod; In addition, I build an automation Flutter test framework (Frontend)
- For backend side, I set up an environment for auto-configuring PostgreSQL database and also establish a benchmark test framework to estimate database RLS (Row-Level-Security) performance (*Github*)

WPI HiRO (Human-Inspired Robotics Laboratory) Lab Researcher   Aug. 2021 – Sept. 2022

- I create an IBVS (Image-based Visual Servoing) framework with two 6-Dof Kinova arms model by combination of Unity3D and ROS for shared autonomous teleoperation which uses Oculus VR headset for remote scenario telepresence (*Github*)
- Development of physical wearable system with RealSense Cameras (sensing), HTC VIVE Trackers (body data) and VR Headset (gaze data + presence) in Unity3D using C#. Design User Study and analyze data for research on active telepresence (*Github*)

[National University Sci & Tech Innovation Program – *SLR (Sign Language Recognition)*](#)   **Sept. 2018 – Jan. 2020**

- Data Extraction of sign language features from a batch of video frames captured by KinectV2 (C++ & Python) plus image-processing algorithms from OpenCV (Edge Detection, Threshold Segmentation, Image Filtering) for optimization
- Implementation of Neural Networks (C3D, LSTM, R(2+1)D, etc.) to train model and model parameters tuning on server

[An Intelligent Housekeeper System Design Based on Physical Raspberry Pi using C++](#)   **Dec. 2018 – May. 2019**

- Build a master controlling system from scratch by deploying wires on bread board with GPIO pins Including single module implementation (Laser and Temp sensor, MQ-5 Gas Sensor, ADC etc.) and module communication (using SPI, I2C, UART etc.)
- Code for analog sensors using C++ and design a user-friendly GUI with Qt Creator in Raspberry Pi (Broadcom BCM2835)

[Summer Mathematical Modelling Competition Activity](#)   **Jun. 2018 – Sept. 2018**

- Master common mathematical models and algorithms like regression model, correlation analysis and grey prediction, etc.
- Responsible for creating mathematical models applied to daily life and improve the parameters (Matlab)

[University Automation Science Laboratory Robotics Research Project – 2 years](#)   **Jan. 2017 – Dec. 2018**

- Manipulate physical robot platform (TurtleBot, DOBOT Arm, etc.) to perform basic tasks (Navigation, Locomotion, etc.)
- Build a framework for robot hand-eye coordination system using Halcon and Matlab, plus implementation of it for object detection and grasping without collision using motion planning algorithms from MoveIt library

EXTRA-CURRICULAR ACTIVITIES

- Member of Cyber Security and Rho Beta Epsilon Club in WPI   **2021 - Present**
- Founder Member of University Piobot Robotics Club in NJUPT   **2017 - 2019**
  Team Leader of Robotics Arm Team, organizing instruction lessons and participating in national robotics competitions and projects

HONORS / AWARDS

- Paper with field focused on HRI to be published on ICRA (On Process)   **2023**
- Candidate of Tau Beta Pi Honor Society (WPI Massachusetts Alpha Chapter)   **2022**
- Paper published on IWPR 2020 (DOI: http://dx.doi.org/10.1117/12.2574424)   **2020**
- First Prize in 2018 National Artificial Intelligence Internet Innovation Competition   **2018**
- Third Prize in National University Mathematics Modelling Competition   **2018**
- Third Prize in 2018 China National Service Robot Competition   **2018**
- First Prize in Provincial University Advanced Mathematics Contest   **2017**
- Faculty Honors: Faculty Academic Excellence Scholarship, Civilian Award   **2016 – 2017**

SKILLS

- **Programming Languages:**
  - **Skilled:** C/C++, C#, Python, MATLAB, Shell/Tcl, Golang, Dart, Assembly
  - **Mastered:** HTML5/CSS, .Net Framework, JavaScript, PL/SQL, VHDL/Verilog
- **Tools/Platforms:**
  - **Software:** Microsoft Office, Matlab, Unity3D, Gazebo, Wireshark, SolidWorks, AutoCAD, Blender, IDA Pro
  - **IDE:** Vim/Emacs, RoboWare Studio, Android Studio, VSCode, Eclipse, CLion, PyCharm, Qt Creator, MASM
  - **Framework:** ROS, OpenCV, CMake, Docker/Kubernetes, Git/SVN, Oracle Database, TensorFlow/Keras, Flutter