Alexander Kyu

Software Engineer, Data Scientist, HCI Researcher and Designer

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PROFESSIONAL/TECHNICAL EXPERIENCES

Researcher and Software Consultant at CMU *Jan 2023 – Present*

- Conducted comprehensive literature reviews in sensing for Hand-Pose Estimation, state-estimation filters, and biomechanical modeling.
- Engineered ground-truth data acquisition systems for diverse projects, utilizing Vicon motion capture and open-source computer vision algorithms.
- Developed and Executed end-to-end ML pipelines, encompassing user-study design, data collection and augmentation, and ML model development.
- Pioneered the implementation and assessment of edge computing for real-time, embedded ML models in hand-pose estimation applications.
- Analyzed and Enhanced the performance of state-estimation filters and biomechanical modeling in lower-body pose estimation systems.
- Served as a UX Engineer Consultant for Bloomberg, focusing on software UX research and design.

Software Engineer at Intuitive Surgical *Jan – Dec 2020, May – Aug 2022*

- Designed and Improved automated testing efforts for System Tests using Pytest and PyQT frameworks.
- Integrated and Programmed real-time robotic kinematics data into internal development tools, enhancing 3D system visualization with ReactJS.
- Integrated Snowflake DB with anonymized real-world surgical robotics data, improving the fidelity of surgical simulation testing.
- Executed rigorous software testing protocols, ensuring ISI's robotic systems adhered to FDA regulatory standards.

Backend Software Engineer at Optum *May – Aug 2019*

- Engineered a robust backend framework for a Shared-Decision Making tool, aimed at optimizing treatment decisions for Physicians and Patients. Utilized Spring IO, Apache Maven, MongoDB, and Docker to create a RESTful API architecture.
- Conducted in-depth user interviews with physicians, insurance providers, and patients to tailor the user experience and streamline interactions.
- Developed a comprehensive business development strategy for the software tool and successfully presented it to business executives, demonstrating potential value and applicability.

PROJECTS

Async Agents: Multi-Agent Framework and Interactive Visualizer

- Developed an open-source, asynchronous communication framework for multi-agent systems, integrating LangChain with the OpenAI API, and deploying on a Flask server.
- Crafted a 3D interactive web application using React and ThreeJS, employing directed force graphs to effectively visualize interaction and communication pathways among agents.

EITPose: Wearable and Practical EIT for Continuous Hand Pose Estimation

- Orchestrated an end-to-end ML pipeline for hand-pose estimation using Electrical Impedance Tomography (EIT), an innovative sensing modality.
- Collaborated with the MIT HCIE Lab to expand and refine the capabilities of an open-source EIT-kit.
- Authored and submitted a short paper on this work to the CHI'24 proceedings.

WebdARw: Interactive Augmented Reality Drawing App

- Innovated an augmented reality app for iPhones, enabling users to draw in both 3D space and on 2D surfaces. This was achieved through the adept use of Unity, and the app was deployed with Xcode and Cocoa API.
- Constructed an accompanying web application using React and Material UI, with a backend powered by Google Firebase (Realtime DB and Cloud Storage). This allowed users to save, access, and view their drawings and models conveniently from anywhere.

EDUCATION

Carnegie Mellon University
School of Computer Science
Master of Human-Computer Interaction
Aug 2022 – Aug 2023
GPA 4.0/4.0
Pittsburgh, PA

North Carolina State University and **University of North Carolina at Chapel Hill**
College of Engineering
B.S. in Biomedical Engineering
Minor in Computer Science
Aug 2017 – May 2022
GPA 4.0/4.0
Raleigh, NC

Zhejiang University
Study Abroad – China: Engineering, STS, and International Studies
Summer 2018
Hangzhou, China

KEY SKILLS

- Programming: Python, JavaScript, C#
- Web Development: Node.js, ReactJS, Flask, Socket-IO, WebGL, ThreeJS
- ML/AI: Tensorflow, Keras, Scikit-learn, LangChain, Autogen, Stable Diffusion
- AR/VR Development in Unity
- Frontend Design: Figma, Adobe CC
- APIs & Databases: RESTful, MongoDB, Firebase, Snowflake DB
- Embedded Systems & IoT: Raspberry Pi, Arduino, Google Coral TPU
- Version Control: GitHub, SVN, Bitbucket
- Agile and Quality Management: MKS Integrity, Arena, Jama
- UX Research: Qualitative & Quantitative Analysis

RELEVANT COURSEWORK

- Data Structures and Algorithms
- C and Software Tools
- Operating Systems
- Programmable User Interfaces
- Neural Networks
- Computer Vision
- Machine Learning and Sensing
- Biomedical Signal Processing
- Wearable Health Technologies
- User-Centered Research and Evaluation
- Rehabilitation Robotics