Vishnu Kakaraparthi

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Education

PhD in Computer Science — Arizona State University
Master of Business Administration — Quantic School of Business and Technology
Master of Computer Science — Arizona State University
Bachelor of Computer Science and Engineering — SRM University

Work Experience

Movement Interactive – HijiBand — January 2025 - Present

AI Researcher | Python, Fall Detection, Wearable Sensors — *Tempe, AZ*

- Developing an advanced **fall detection system** using machine learning and wearable sensors to enhance safety for older adults and at-risk individuals.
- Specializing in **post-fall analysis** to determine if a user requires assistance, integrating AI-driven motion analysis and physiological monitoring for real-time decision-making.
- Optimizing classification models for **high-accuracy fall detection**, reducing false positives while ensuring rapid response capabilities.

Boomi Inc — May 2024 – August 2024

Gen AI Engineering Intern | Python, AWS, AWS Bedrock, Chainlit, LangChain, CrewAI — *Remote*

- Engineered AI-powered documentation for Boomi Agentic Scribe, **leveraging Retrieval-Augmented Generation (RAG)** to dynamically fetch relevant information from other company-specific documentation, **reducing manual documentation efforts by 900%** and **improving content accuracy by 95%** through dynamic prompt classification and LLM routing.
- Integrated Chainlit for real-time conversational AI, **boosting user engagement by 70%** and streamlining documentation requests, resulting in a **5% reduction in support tickets.**
- **Reduced model retraining time by 95%** by integrating LangChain for optimized LLM workflows, ensuring faster, context-aware documentation updates across multiple integration pipelines.

BrainChip Inc — Zalmotek, Mercedes-Benz — June 2023 – August 2023

Machine Learning Intern | Python, Keras, Neuromorphic Chips, Quantization — *Laguna Hills, California*

- Led a Neuromorphic-driven multimodal anomaly detection project, achieving **4x smaller weights, 500x energy efficiency, and 4x faster processing than the GTX 1080** through quantization while integrating advanced sensors for enhanced real-world accuracy in distracted driving and other applications.
- Spearheaded distracted driving technology with Neuromorphic chips, leveraging sensor-based advancements for energy and processing efficiencies, and positioning for collaboration with Mercedes-Benz for Vision EQXX Concept, highlighting AKD1000 capabilities in automotive safety.

Toy Upgrade (ASU Startup) — June 2018 – January 2020

Head of Engineering | Python, Soap Box Labs API — *Tempe, AZ*

- Led a 5-member team to develop an educational toy, **increasing engagement by 30%**.
- Implemented a pronunciation matching system using Soap Box Labs API, customized for children, resulting in a **notable 20% enhancement in spoken word verification accuracy**.

Heyludwig - Partners Dog Training (Startup) — June 2018 – January 2020

Technical Lead | Python, Dialogflow — *Tempe, AZ*

- Led development and seamless deployment of a chatbot using Dialog Flow, resulting in a **25% improvement in user interactions** and accessibility, and orchestrated a **15% reduction in response time,** optimizing overall user experience.

Ericsson India Pvt Ltd. — January 2016 – April 2016

Research and Development Intern | Java, Apache Spark, Spark ML, Elastic Search, Kibana — *Gurugram, India*

- Chaired Churn Prediction project, **attaining 64.8% accuracy in foreseeing potential subscriber loss** by analyzing call behavior patterns with Call Detail Records (CDRs) and correlating with past churn instances.
- Coordinated Facebook Stream Analytics, **achieving 87.6% accuracy in categorizing** Facebook posts into Customer Service, Network, Promotions, and other segments for each service provider through multiclass logistic regression.

Research Experience

Ph.D. Research **July 2019 – Present**

Doctoral Researcher *Arizona State University*

- Led the development of groundbreaking wrist-centric technology and innovative machine learning algorithms for a wrist-worn camera device, advancing human action understanding and expanding its applications.
- Co-PI for the Global Sport Institute and WearTech initiative grants, creating tools for sports enthusiasts and elderly individuals to track physical activities and manage pill-taking effectively.

Master's Research **January 2018 – December 2018**

Master's Researcher *Arizona State University*

- Collaborated with global brands like Adidas, Pizza Hut, and Edgenuity to develop tools leveraging affective computing and Tobii eye-tracking technology, revolutionizing user experience data collection and analysis.
- Conducted cutting-edge research on cognitive activity using Brain-Computer Interfaces (BCI), EEG, GSR data, and eye-tracking to model trust and motivation, optimizing e-commerce sales through A/B testing.

SRM University **January 2016 – July 2016**

Bachelor's Thesis Research *Kattankulathur, India*

- Evaluated diverse machine learning methods to predict Indian stock market closing prices, achieving 0.79 accuracy for Random Forests and 0.77 for Deep Neural Networks.

Professional Services

Reviewed over **100 peer-reviewed journal papers, workshops, and conference papers**, making significant contributions to the academic community. Served as a **PC Member & Reviewer** for multiple prestigious conferences and journals, including:

- ACM Conference on Human Factors in Computing Systems (CHI)
- Conference on Human-Robot Interaction (HRI)
- ACM-Symposium on Eye Tracking Research & Applications (ETRA)
- ACM Transactions on Multimedia Computing, Communications, and Applications (TOMM)
- Computer-Human Interaction of Australia (OzCHI)
- International AAAI Conference on Web and Social Media (ICWSM)
- Pacific Visualization Symposium (PacificVis)
- International Conference on Human-Computer Interaction (HCII)

Leadership and Organizational Roles

- **Co-Chair**: Special Sessions – International Conference on Smart Multimedia (ICSM 2025)
- **Co-Chair & Committee Member**: ACM-Symposium on Eye Tracking Research & Applications (ETRA 2025)

Projects

Dementia Framework | *Policy Informatics* **January 2022 – February 2022**

- Developed and presented a Participatory Design Framework for Dementia Technology, integrating key pillars of Technology, Laws, Architecture, Markets, Norms, and Education.

Technological Tools for Dementia Care | *Python* **August 2021 – December 2021**

- Analyzed the relationship between technological tools and dementia patients, proposing low-fidelity solutions such as environmental sensors and addressing challenges with location services and usability.

LIDAR Object Detection | *Python, o3d, laspy, TensorFlow, ROS* **February 2019 – May 2019**

- Pioneered LIDAR object detection algorithms such as PointNet, PointNet++, and VoxelNet, enhancing precision in environmental perception for robotics applications.

Vision Based Manipulator Movement with Fetch | *Python, ROS, OpenCV* **February 2019 – May 2019**

- Implemented a visual serving technique using depth estimation for the Fetch robot to locate and reach target objects, overcoming challenges with obstructed views and tangled cables.

Bacteria Detection using Transfer Learning | *AWS Sagemaker, Amazon API Gateway, OpenCV* **June 2018 – July 2018**

- Developed and deployed a Transfer Learning model for NanoCheQ, achieving a significant accuracy improvement of 35% over the existing OpenCV model.
- Shipped a production-ready solution using AWS Sagemaker and Amazon API Gateway, detecting bacteria types with a remarkable accuracy of 94.9%.

Auto Scaling Image Recognition API using AWS | *Python, TensorFlow, AWS, SQS, and S3* **Feb 2018 – May 2018**

- Built an elastic application from scratch using AWS to automatically scale on-demand, leveraging Python, TensorFlow (Inception-V3), SQS, and S3.

DropBy | *Java, GCP, Android Studio* **Mar 2018 – Apr 2018**

- Developed a Google Cloud Platform-powered Android app for event crowdsourcing with features like auto-scaling, sentiment analysis, messaging, and media-sharing.

Semantic Search on Movie Summary | *Python, Keras, NLP* **January 2018 – May 2018**

- Headed a team of four to model a question-answering system based on movie summaries using Convolution Neural Networks, Coreference Resolution, Sentence Embedding, Event, and Named Entity Networks, **achieving 54.7% accuracy.**

Spatial Hot Spot Analysis from Geo Spatial-Temporal Data | *Spark, Apache Sedona* **August 2017 – November 2017**

- Constructed an efficient hot spot analysis model, utilizing Getis-Ord statistic, Apache Spark, Scala, and Ganglia, to swiftly analyze a 50 GB+ NYC Taxi and Limousine Commission dataset, identifying 50 most statistically significant locations based on passenger count and showcasing accelerated processing speed and robust statistical insights.

Classification of Higgs Boson Particle | *Python, Keras, TensorFlow, scikit-learn, pandas* **January 2017 – May 2017**

- Modeled an ensemble of 3 neural networks and six random forest models using TensorFlow and scikit-learn, trained on 11 million records, and **achieved 71% accuracy.**

Knowledge Base Based Question Answering System | *Python, Stanford NLP, SPARQL* **Spring 2017**

- Implemented a robust Question Answering System using Python, Stanford NLP, and SPARQL to query DBpedia, developing Semantic Parsing, Query Formulation, and Graph Matching modules for firm-related queries.

Maximize NYC Taxi Driver Revenue Visualization | *JavaScript, D3, crossfilter, dc.js* **Spring 2017**

- Implemented a visualization system based on Shneiderman's Information Visualization mantra with coordinated views to analyze 1 billion taxi trips, developing query-based visualizations to extract insights on pickup locations, fare, tip, and passenger count, helping taxi drivers increase productivity and revenue through interactive data views.

SRM - PURA (Providing Urban Amenities in Rural Areas) | *MySQL, PHP, APIs* **Spring 2013 – Fall 2015**

- Contributed to the PURA project focused on e-learning, IT empowerment, e-governance, agriculture, healthcare, and women empowerment for rural areas by integrating APIs, providing back-end design in MySQL and PHP, and implementing Tamil translation on hover.

SRM-SE (SRM Search Engine) | *Server and Network Administration* **Spring 2013 – Fall 2015**

- Contributed to SRM Search Engine by diversifying search results, filtering junk, clustering relevant results, and displaying them in a user-friendly manner, with a focus on server and network administration.

Publications and Patents

- **Striking the Privacy-Model Training Balance: A Case Study using PERACTIV Device**, HCII 2024. Link
- **Innovating Medication Adherence for Smart Cities: Leveraging PERACTIV and Automated Annotation Pipeline**, International Conference on Smart Multimedia 2024.
- **A Hand-Directed System for Identifying Activities**, U.S. Patent App. #20230324993. Link
- **Wrist View: Understanding Human Activity Through Hand**, HCII 2023. Lecture Notes in Computer Science, vol 14021. Link
- **PERACTIV: Personalized Activity Monitoring - Ask My Hands**, HCII 2022. Link
- **Machine Learning Algorithm Hypothesis on Smart Gyroscopic Tuned Dampers for Earthquake Resistance Building**, International Journal of Multidisciplinary Research and Development, vol. 2, pp. 705-707, 2015. Link

Awards and Honors

WearTech Grant (Greater Phoenix Economic Council (GPEC)) | *Cognitive Ubiquitous Computing (CUbiC) Lab* **July 2021 –**

- Secured a $20,000 grant as Co-PI to research improving medication adherence among elderly individuals living alone.
- Developed innovative video-detection algorithms to address pain points in unsuccessful pill-taking activities using a wrist-worn camera device.

Global Sport Institute Grant | *Cognitive Ubiquitous Computing (CUbiC) Lab* **January 2021 – December 2021**

- Secured a $20,000 grant as Co-PI to develop tools for tracking physical activities and improving remote training experiences.
- Developed a wrist-worn camera device to track physical activities and reduce reliance on personal trainers, especially for sports enthusiasts and elderly individuals living alone.

Third Prize - All India Software Development SESCON-15 **2015**

- Part of the third prize-winning team at the SESCON-15 competition conducted at Sri Eshwar College of Engineering.

First Prize - Denken Fest Coding Competition **2014**

- Won first prize in the coding competition, Denken Fest, conducted during Aaruush at SRM University.

Academic Excellence Award **2014**

- Awarded the Academic Excellence Award by Indus Foundation.

First Prize - CTF (Capture the Flag) at eHack **2013**

- Won first prize in the CTF competition conducted by Infysec as a group and placed sixth in the individual competition.

Teaching Experience

Graduate Teaching Assistant | *SCAI, Arizona State University* **January 2019 – July 2023**

- Taught over 200 students Human-Computer Interaction (CSE 463) under Dr. Hasti Seifi, covering topics such as prototyping, usability principles, and heuristics from Spring 2023. Assisted in designing course structure, quizzes, examinations, and grading.
- Course Instructor for FSE 100: Introduction to Engineering (Fall 2020, 2022, and 2023), covering fundamental concepts in the engineering design process, engineering teams, profession, models, and communication skills.
- Taught over 1400 students Human-Computer Interaction (CSE 463) under Dr. Robert Atkinson, from Spring 2019, Fall 2019, and Spring 2020. Assisted in course design, examinations, and grading.
- Lab Instructor for CSE 110: Principles of Programming with Java (Summer 2019, 2020, and 2022). Taught Java basics to a class of 60 students and provided one-on-one mentorship to foster interest in coding.

Graduate Services Assistant - Grader/Lab Instructor | *SCAI, Arizona State University* **August 2017 – July 2022**

- Assisted in designing course structure, assignments, examinations, and grading for Introduction to Software Engineering (CSE 360).
- Taught basic computer fundamentals to 150 students in CSE 180: Computer Literacy, covering Microsoft Excel, Word, HTML, SQL, Networking, and Security.
- Assisted in designing course structure, examinations, and grading for Introduction to Human-Computer Interaction (CSE 463).
- Assisted in grading assignments and examinations for CSE 110: Principles of Programming with Java.

Capstone Team Mentor | *Center for Cognitive Ubiquitous Computing (CUbiC) Lab* **August 2021 – May 2022**

- Mentored four undergraduate students and one undergraduate volunteer in developing and testing wearable technology using off-the-shelf components and mobile deep learning applications.

Capstone Team Mentor | *Innovative Learner and User eXperience (iLUX) Lab* **January 2019 – December 2020**

- Mentored three teams comprising 2 graduate students and 18 undergraduate students to develop and test new application features, including driver tracking, new payment options, and localization layouts for Yum! Brands' Pizza Hut.

AI Instructor | *AI4ALL* **June 2020**

- Created and taught AI curriculum for 24 high school students, covering topics like Clustering, Classification, Naive Bayes, Regression, Neural Networks, Data, and Bias, with hands-on project development.

Capstone Team Mentor | *Innovative Learner and User eXperience (iLUX) Lab* **January 2019 – December 2019**

- Mentored four students in building a web-based and standalone application to clean and process data collected from various sources like Brain-Computer Interfaces, Galvanic Skin Response, and Eye Tracking.

Capstone Team Mentor | *Advanced Next Generation Learning Environments (ANGLE) Lab* **January 2019 – December 2019**

- Mentored two teams comprising 1 graduate and 12 undergraduate students in improving packing methods for shipping companies, including developing applications for efficient pallet building and shipping container filling for FedEx.

Capstone Team Mentor | *Innovative Learner and User eXperience (iLUX) Lab* **Sep 2017 – Nov 2017**

- Mentored a team to develop an automated mobile app using Android and the WEKA library to benchmark machine learning algorithms on datasets, analyzing their performance and execution time.

Administrative Experience

Administrative Researcher | *Center for Cognitive Ubiquitous Computing (CUbiC) Lab* **January 2019 – July 2020**

- Secured a **$20,000 WearTech grant** as Co-PI through the Cognitive Ubiquitous Computing (CUbiC) Lab to research medication adherence in elderly individuals living alone, developing innovative video-detection algorithms using a wrist-worn camera device.
- Secured a **$20,000 Global Sport Institute grant** as Co-PI to develop tools for tracking physical activities, improving remote training experiences, and reducing reliance on personal trainers, particularly for sports enthusiasts and elderly individuals.
- Guided multiple thesis students, capstone projects, and student volunteers in the space of computer vision and HCI, fostering their development and advancing research initiatives.

Administrative Researcher | *Innovative Learner and User eXperience (iLUX) Lab* **January 2019 – July 2020**

- Orchestrated daily operations, mentoring to foster professional growth and supporting a dynamic research team.
- Led research initiatives in Affective Computing and eye-tracking, guiding collaborative efforts and securing grants through proposal crafting.
- Worked with Edgenuity to improve their education platform and partnered with Adidas and Pizza Hut to enhance sales and user experience through A/B testing.
- Mentored several capstone projects and student volunteers in Affective Computing and eye-tracking, supporting their growth and propelling research initiatives forward.

Administrative Researcher | *Advanced Next Generation Learning Environments (ANGLE) Lab* **January 2019 – July 2020**

- Led research initiatives in Augmented Reality, nurturing the development of graduate and undergraduate talents.
- Spearheaded efforts in guiding collaborative research and secured funding through well-crafted proposals.
- Collaborated with FedEx to develop an efficient Augmented Reality Unit Load Device (ULD) using Microsoft HoloLens, optimizing ULD filling capacity and streamlining operations.
- Guided multiple capstone projects and student volunteers in the space of Augmented Reality and Virtual Reality, facilitating their growth and driving forward research initiatives.

Hackathon Projects

WizardEyes | *Python, OpenVino, DepthAI, AWS* **September 2021**

- Engineered a versatile Smart Cities and Infrastructure Module with Luxonis Oak-D-IoT-40, featuring an easy-to-use API for insights on Occupancy, Queue, Mask Detection, Social Distance, and Crowd Counting.

Open-Source Contributions

Mayhem Heroes | *Rust, Docker, Cargo, DevOps, DevSecOps* **April 2022 – June 2022**

- Recognized as **top 2nd Mayhem Hero** for deploying Mayhem, an autonomous A.I. fuzzy testing tool, discovering exploitable bugs in **48 Open-Source Software (OSS) projects**, and revolutionizing vulnerability identification and mitigation.

Technical Skills

Languages: Python, SQL, Java, HTML/CSS
Developer Tools: VS Code, Jupyter, HPC, Eclipse, Docker, Git
Technologies/Frameworks: TensorFlow, PyTorch, scikit-learn, pandas, Hadoop, Spark, AWS, Google Cloud Platform (GCP), Tableau, Elasticsearch, DevOps, MLOps, Weights & Biases