Viren Khandal

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Summary

With over 3 years of relevant work experience in software development and machine learning through my full-time work and internships (Berkeley Research, Open Networking Foundation, Hirebee.ai, Employers4Change, etc), I have experience working on various computer vision, natural language processing, and machine learning projects, as well as developing multi-platform applications.

Education

- **University of Berkeley, California** — Berkeley, California
  Bachelor of Arts - Computer Science & Applied Mathematics (Double Major) — *Aug 2019 - May 2022*
  Specialization: *Machine Learning and Artificial Intelligence*
  Courses: *Deep Learning, Machine Learning, Artificial Intelligence, Efficient Algorithms, Data Structures, Modern Statistical and Predictive Analysis, Numerical, Real, and Complex Analysis, Advanced Linear Algebra, Abstract Algebra*

- **Stanford University, California** — Palo Alto, California
  Bachelor of Arts - Computer Science — *May 2018 - Sept 2018*
  Courses: *Data Mining and Analysis, Client Side Internet Technologies*

Skills Summary

- **Languages**: Python, JAVA, C, C++, JavaScript, Go, SQL, Julia
- **Frameworks**: Tensorflow, PyTorch, Keras, Flask, NLTK, SpaCy, NodeJS, ReactJS
- **Tools**: GIT, Unity, Docker, Shell, AWS, Azure, GCP, IBM Cloud, Arduino
- **Soft Skills**: Leadership, Communication, Time Management, Public Speaking, Teamwork

Experience

- **UC Berkeley College of Engineering - VeHICal** — Berkeley, CA
  Research Engineer — *May 2022 - Present*
  - **Mentors**: Professor Sanjit Seshia, Professor Bjoern Hartmann, Dr. Balasaravanan Thoravi Kumaravel
  - **Scope**: Formalizing models for safe autonomous-to-human perception handoffs in autonomous vehicles on the VeHICal project *(https://vehical.org)*
  - **Description**: Leading project to optimize human performance in human-autonomy handoffs in autonomous driving, Developing Virtual Reality (VR) tools to conduct human-in-the-loop experiments with high ecological validity
  - **Research Foci**: Human-Autonomy Interaction, Autonomous Driving, Virtual-Reality Development, and Machine Learning

- **Stanford University - Autononous Systems Lab** — Stanford, CA
  Researcher — *Sept 2022 - Present*
  - **Mentors**: Professor Marco Pavone
  - **Scope**: Investigating the effects of Out-of-Distribution events on human-autonomy interaction in autonomous driving *(https://stanfordasl.github.io/)*
  - **Description**: Leading project to develop a framework to enable safe control handoffs in autonomous driving from vehicle to human in the case of Out-of-Distribution (OOD) events.
  - **Research Foci**: Human-Autonomy Interaction, Autonomous Driving, Machine Learning, and Uncertainty Learning

- **Postbox** — Remote
  Full-Stack Software Engineer — *June 2022 - Oct 2022*
  - **Mentor**: Sherman Dickman
  - **Scope**: Personalized desktop email client, news client, and feed reader for macOS and Windows
  - **Description**: Leading effort to upscale platform for optimized performance on new macOS and Windows updates, Improve automation and maintenance of CI/CD pipeline

- **genei.io** — Remote
  Machine Learning Engineer — *June 2022 - Aug 2022*
  - **Mentors**: Thomas Foster, Jack Bowen
  - **Scope**: Optimized web application and extension for faster researching by automatically summarizing background reading and produce blogs, articles, and reports faster
  - **Description**: Lead Document Layout Analysis project to parse the underlying structure of a PDF to categorize sections into classes and extract reading order of the text, Implemented Transformer models (LayoutLMv3 and LayoutReader) to perform scalable document layout analysis

- **UC Berkeley College of Engineering - VeHICal** Berkeley, CA
  Student Researcher *May 2021 - May 2022*
  - **Mentors**: Professor Sanjit Seshia, Professor Bjoern Hartmann, Dr. Yash Vardhan Pant
  - **Scope**: Formalizing models for safe autonomous-to-human perception handoffs in autonomous vehicles on the VeHICal project *(https://vehical.org)*
  - **Description**: Improving responsibility of autonomous vehicles through verification of perception decision making by developing unique scoring metric to gauge credibility of reinforcement learning/object detection models (YOLOv3, SSD, RetinaNet)
  - **Research Foci**: Human-Autonomy Interaction, Robust Perception, Formal Methods

- **Computer Science Mentors** Berkeley, CA
  Instructor & Coordinator & Advisor *Jan 2020 - Present*
  - **Mentors**: Professor John DeNero, Professor Christopher Hunn
  - **Scope**: Lead weekly tutoring session to teach students about linear algebra, circuit analysis, and machine learning.
  - **Description**: Lead a group of 25+ mentors by hosting teaching workshops and promoting a passion for teaching.
  - **Impact**: Providing group tutoring for Electrical Engineering & Computer Science (EECS) courses at UC Berkeley to 2000+ undergraduate students.

- **Hirebee.ai** Remote
  Machine Learning Intern *Jan 2021 - June 2021*
  - **Mentors**: Dr. Vahe Tshitoyan, Mrs. Luiza Avetisyan
  - **Scope**: Streamlining the HR process by developing NLP-based algorithms for job similarity and candidate progression.
  - **Description**: Designed and deployed a multilayered CNN based on Named-Entity-Recognition (NER) to extract categorized skills from resumes and job postings with 95% precision

- **InternPursuit** Remote
  Machine Learning Intern *Jan 2021 - June 2021*
  - **Mentors**: Dr. Isabella Johnston, Mr. Irving Chin
  - **Scope**: Employer platform to manage intern from recruitment to exit. Learning Academy for Employers
  - **Description**: Developing a novel optimization and multilayered clustering algorithm to optimally match student and employer profiles

- **Cool Climate Networks** Berkeley, CA
  Lead Researcher *Jan 2020 - June 2021*
  - **Mentor**: Dr. Christopher Jones, Dr. Daniel Kammen
  - **Scope**: Research consortium at the University of California, Berkeley focused on research in developing cutting-edge carbon footprint management tools for communities in the U.S. and Internationally.
  - **Description**: Used machine learning tools in R and Python to perform qualitative/quantitative analysis and create analytical maps from US Census Tract data

- **WhatElse.io** Berkeley, CA
  Backend Development Intern *Sept 2019 - Feb 2020*
  - **Mentor**: Mr. Pooran Prasad Rajanna
  - **Scope**: A business productivity solution, which saves customer-oriented teams many hours, from searching data in various applications, by providing relevant content when necessary
  - **Description**: Utilized Flask and Jinja to create an interactive Python-based web dashboard and demoed it to 100+ VC firms and investors at official Berkeley SkyDeck Demo Day

- **Open Networking Foundation** Menlo Park, CA
  Software Engineering Intern *June 2018 - Dec 2019*
  - **Mentors**: Dr. Guru Parulkar, Mr. William Snow, Mr. Matteo Scandolo
  - **Scope**: Operator Led Consortium hosting open source mobile broadband projects driving network industry transformation
  - **Description**: Development/Unit testing work to enhance UI for key Internet Service Providers with JavaScript, jQuery, and AJAX

Publications

- **Academic Paper: Human-in-the-Loop Control Handoffs in Out-of-Distribution (OOD) Contexts**: A framework to enable safe control handoffs in autonomous driving from vehicle to human in the case of Out-of-Distribution (OOD) events. **Tech: Python, Tensorflow, TinyYolo** (In Progress) **Submitting to the International Conference on Machine Learning (ICML) 2023**
- **Academic Paper: Learning-Driven Oracle-Guided Compositional Symbiotic Design of Cyber-Physical Systems (LOGiCS)**: Developing a control system for Underwater Autonomous Vehicles (UAVs) to safely maneuver around land and drop off payload. **Tech: Python, Control Theory, Physics** (In Progress) **DARPA Funded Project**
- **Academic Paper: Using Immersive Virtual Reality to Improve the Realism of Perception Handoff Testing for Safer Autonomous Driving**: An immersive human-in-the-loop virtual reality autonomous driving simulation to increase the realism and efficacy of existing perception handoff testing. **Tech: Virtual Reality, Unity, C++, Python** (September '22) **Submitted to ACM Conference on Human Factors in Computing Systems (CHI) 2023**
- **Academic Workshop Paper: Exploring Credibility Scoring Metrics of Perception Systems for Autonomous Driving**: An empirical study on the reliability of object detectors and their points of failure based on realistic, non-adversarial perturbations. **Tech: Python, Tensorflow, TinyYolo, GCP** (December '21) **Accepted at IEEE/ACM COMSNETS Intelligent Transportation Systems 2022**
- **Academic Paper: Modeling the 15 Tile Puzzle Through the Lens of Group Theory**: Developing a mathematical backing for the 15 Tile Puzzle and solving strategies using group and ring theory. (November '21) **Self-Publish**
- **Publication: Consumption Based Greenhouse Gas Inventory of San Francisco from 1990 to 2015**: A consumption-based emissions inventory for the City/County of San Francisco, California from 1990 to 2015. **Tech: R, Python, Data Analysis** (October '20) **Presented at Commission on the Environment - San Francisco**
- **Industry Conference Paper: Determining the Causalities of Network Delay and Latency**: An approach using a correlation analysis and machine learning to determine the constituents of network latency. **Tech: Python, R, Tensorflow, Keras** (September '19) **Presented at ONF Connect 2019**
- **Industry Conference Paper: The Beginnings of a Search Engine**: An introductory model for a search engine, built on search optimization through a variety of classifiers (SVMs, Random Forests, etc). **Tech: Python, R, TensorFlow, PyTorch** (December '18) **Presented at ONF Connect 2018**

Projects

- **Virtual Reality Autonomous Driving Simulation (VRADS)**: A high-fidelity VR simulation to realistically model and influence human attentiveness in autonomous driving contexts. **Tech: Unity, C++, OpenXR** (August '22)
- **Drowsiness Detection System (Computer Vision, Machine Learning)**: AI model to detect/prevent drowsiness in autonomous vehicles. **Tech: DeepLearning4Java, OpenCV, Tensorflow, Android Studio** (August '21)
- **Wrapt - (Full-Stack, RESTful API)**: Web Application for visualizing Spotify listening activity with Spotify, Twitter, and Instagram integration. **Tech: Python, Flask, JavaScript, API Integration** (February '21)
- **MoodMatch - multimedia recommendation system (Machine Learning, NLP, Full-Stack, Web Crawlers)**: Multi-platform application for recommending trending music/movies based on user's mood using novel sentimental analysis algorithms. **Tech: Python, NodeJS, NLTK, TensorFlow, Keras, Azure** (October '20)
- **BeachBuddy - multimedia recommendation system (Machine Learning, RESTful API, Full-Stack, Web Crawlers)**: Multi-platform application for recommending beaches based on several criteria (crowd, weather, distance, etc) using novel clustering algorithm built on PyTorch. **Tech: Python, PyTorch, AWS, Flask** (July '20)

Honors & Awards

- Amazon Web Services **Cloud Practitioner** - *In Progress*
- **First Place Winner** at Global DefHacks Hackathon - July, 2020
- Awarded title of **Computer Science Scholar** at University of California, Berkeley - Sept, 2019
- **Second Place Winner** at Global Amazon Web Services Hackathon, May, 2019