PRAKYATH KANTHARAJU

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SUMMARY

Ph.D. in Robotics with over 5 years of experience in machine learning, robotics, and computer vision, seeking to leverage expertise in developing large-scale ML systems. Proficient in C/C++ and Python; experienced in ML libraries. Developed and tested novel algorithms for large systems.

SKILLS AND INTEREST

- **Languages:** Python, C/C+, R, SQL
- **ML:** Pytorch, Tensorflow, JAX, FLAX.
- **LLM:** GPT, Llama-2, mistral, RAG, Seg-Any
- **Simulation:** Gazebo, Carla, Mujoco, Drake, pybullet
- **Cloud:** AWS, GCP
- **Databases:** PostgreSQL, MySQL, sqlite, Neo4j
- **Systems:** Sensors, Data Acquisition, Controls, Signal Processing

EDUCATION

Doctor of Philosophy, University of Illinois at Chicago — 2019 - 2023
Thesis: Personalization of Wearable Robots Using Physiological Feedback and Machine Learning — *GPA: 3.96*
Specialization: Robotics

Master of Science, University of Illinois at Chicago — 2019
Major: Mechanical Engineering, — *GPA: 4.0*
Specialization: Robotics

Bachelor of Technology, Visvesvarya Technological University — 2017
Major: Mechanical Engineering, — *GPA: 3.56*
Specialization: Robotics

INTERNSHIP EXPERIENCE

Data Science R&D Intern (Natural Language Processing and Computer vision)
CCC Intelligent Solutions, *Chicago, IL* — Jan 2023 - May 2023

- Worked on state-of-the-art computer vision models for auto-insurance estimation.
- Finetuned a 13B GPT model for enterprise chat and document retrieval using RAG and AWS.
- Developed a multi-modal GPT for end-to-end auto insurance cost prediction based on CLIP.

RESEARCH & DEVELOPMENT EXPERIENCE

Research Scientist (Robotics, Assistive devices)
Rehabilitation Robotics Lab, UIC, *Chicago, IL* — Aug 2019 - Dec 2023

- Created phase-plane estimation, a novel data-driven presentation of human physiology response.
- Developed an optimization framework for Human-in-the-Loop using Bayesian optimization techniques, resulting in a 26% faster optimization.
- Implemented real-time meta-learning algorithm that uses human feedback in reinforcement learning for wearable robots.
- Developed real-time robot assistance method using CNN and LSTM with a single sensor, achieving 96% accuracy.
- Optimized wearable robots using machine learning, resulting in a 20% improvement in walking and squatting efficiency.
- Designed and developed asynchronous data acquisition and database pipelines to capture data from high-frequency sensors at a data rate of 5,000 samples per second.

- Devised statistical A/B tests and experiments to test the validity of machine learning algorithms.
- Led a cross-functional team in integrating Human-in-the-loop software and wearable robots, ensuring robust performance in real-world applications.
- Designed and implemented metrics for assessing user experience and ergonomic design in wearable technology.

Research scientist (Robotics, Mechatronics)
Mechatronics research lab, UIC *Chicago, IL* Dec 2017 - Jun 2019

- Developed vision system and Model predictive controller for the 1:8 scaled car using ROS.
- Programmed Model Predictive Controller for lane merger and Hardware-in-the-loop testing for autonomous vehicles.

PROJECTS

- Fine-tune anything - Developed a quantization and fine-tuning library with auto-loading quantize model and fine-tuning for personal data.(Try it here)
- Lead the way - Created a distributed knowledge-sharing system for mobile autonomous robot navigation using graph-neural networks and ROS. (Try it here)
- Language robot - Developed real-time control of drones and robots using multimodal-based models such as CLIP and GPT.
- Resume assistant - Multi-functional LLM agent to evaluate, edit, and write resumes and cover letters for job applications using langchain, RAG and Gradio. (Try it here)
- Meta-learning personalization - Implemented a meta-learning algorithm for adaptable and personalized wearable device settings based on user perception and comfort.
- Time-series estimation - Created a state-of-the-art time series algorithm using machine learning to estimate metabolic energy in real-time using gaussian mixture models.
- Real-time activity control - Devised a deep learning model to recognize human activities, improving user interaction with wearable devices.
- Exoskeleton design - Designed the mechatronics components and controls for an ankle-foot exoskeleton and prosthesis using Ether-cat and Can-bus.
- Quadruped control - Developed and controlled a custom-made 9 DOF quadruped for walking and navigation tasks using computer vision and reinforcement learning.
- HIL toolkit - Devised a real-time data acquisition and control framework for collecting physiological signals to optimize exoskeleton assistance by 20%, emphasizing human multi-sensory feedback.

SELECTED PUBLICATION

- Human-in-the-loop optimization of ankle exoskeleton for walking with meta-learning algorithm. IEEE IROS
- Reducing squat physical effort using personalized assistance from an ankle exoskeleton. IEEE TNSRE. link
- Single accelerometer to recognize human activities using neural networks. ASME Journal of Biomechanics. link
- Foot contact forces can be used to personalize a wearable robot during human walking. Nature Scientific reports. link
- Phase-plane-based model-free estimation of steady-state metabolic cost. IEEE Access. link
- Soft wearable, flexible bioelectronics integrated with an ankle-foot exoskeleton to estimate metabolic costs and physical effort. npj Flexible Electronics. link
- Framework for personalizing wearable devices using real-time physiological measures. IEEE Access. link