Pujith R. Kachana

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EDUCATION

Georgia Institute of Technology, Atlanta, GA — Aug 2020 - May 2023
- Candidate for Bachelor of Science in Computer Science, **Advisor**: Danfei Xu — **GPA**: 4.0
- **Coursework**: Robotics and Perception, Machine Learning, Deep Learning, Systems and Networking

Carnegie Mellon University, Pittsburgh, PA — Aug 2023 - May 2025 (expected)
- Candidate for Master of Science in Robotics, **Advisors**: Ji Zhang, Wenshan Wang — **GPA**: 4.0
- **Coursework**: Computer Vision, Robotic Math Fundamentals

Research Interests: Generalizable Robot Learning, Multimodal Learning

SKILLS

Software: C/C++, Python, Java, PyTorch, Tensorflow, Linux, ROS, Git, Cloud Computing

Concepts: Machine Learning, Computer Vision, Probabilistic Modeling, Optimization, Embedded Systems

PUBLICATIONS

Neural Field Dynamics Model for Granular Object Piles Manipulation — **CoRL 2023**

Deep Field Dynamics Model for Pile Manipulation — **Workshop, ICRA 2023**
- Best Paper Finalist at ICRA2023 Representing and Manipulating Deformable Objects Workshop

Persistent Pick: Enhanced Grasping with Tactile Feedback — **Workshop, AMLC 2023**
- Oral presentation at Robot Learning Workshop for Amazon Machine Learning Conference 2023

Turbo the Snail: Secure Non-linear and Iterative Localization — **Demo, ACM/IEEE SEC 2023**

RESEARCH EXPERIENCE

Language-Conditioned SLAM — Sept 2023 - Present
- Exploring visual-language navigation and LLM grounding for interactive autonomous navigation

Deep Field Dynamics Model for Pile Manipulation — Jan 2023 - June 2023
- Explored field-based models for granular manipulation with Prof. Danfei Xu and mentor Shangjie Xue
- Conducted real-world experiments on Franka Emika Panda robot, implementing baselines for evaluation

Multi-Modal Object Grasping — May 2023 - Aug 2023
- Proposed novel classical and learning-based approaches for enhanced grasping with tactile feedback

Trajectory Generalization with Neural Descriptor Fields — March 2023 - May 2023
- Extended Pose Descriptor Fields to Trajectory Descriptor Fields to characterize a trajectory
- Designing framework to learn viable trajectories from few demonstrations in a pick and place task

NeRF-SLAM with 3D Object Priors — Jan 2023 - May 2023
- Examined the use of class-level 3D object priors for increased computation efficiency in NeRF-SLAM
- Evaluated convergence speed and geometric accuracy of a scene with and without object prior NeRFs

Robotic Snail Localization and PBVS — Nov 2021 - May 2023
- Implemented position-based visual servoing for differential drive robot with encrypted server localization
- Analyzed convergence speed of Levenberg–Marquardt optimization under variable SVD parameters
- Awarded PURA research award for Spring 2023, paper submitted to *PETS'24*

Map Exploration and Object Instance Search — April 2022 - Aug 2022
- Designed an efficient Delauney triangulation-based exploration algorithm with advisor Jacob Abernethy
- Benchmarked road-mapping, RL, and traditional map exploration methods with Habitat-Sim simulator

LiDAR-SLAM Algorithm for Mini-Cheetah Quadruped Robot — Dec 2021 - May 2022
- Architected SLAM system with LiDAR, camera, IMU, and factor graph for legged robots with LIDAR Lab

- Engineered IMU-PID gimbal to extract sinusoid patterns from quadruped gait to reduce camera motion blur
- Introduced novel gimbal motor driver solution to reduce overall motor driver costs by 95%

Benchmarking Modified DQN Algorithm with Stability Guarantees Feb 2022 - May 2022

- Studied DQN variation proposed by graduate mentor Zaiwei Chen under advisor Dr. Siva Theja Maguluri
- Implemented various forms of DQN on CartPole problem to validate stability guarantees of modified DQN
- Experimented with replay buffer, target network, and truncation of DQN to study stability and efficiency

INDUSTRY EXPERIENCE

Amazon Robotics Applied Scientist Intern May 2023 - Aug 2023

- Researched uses of tactile sensing for grasp quality, closed-loop manipulation, and object data collection

Amazon Robotics R&D Software Development Co-op July 2022 - Dec 2022

- Orchestrated workflow for next generation of warehouse workcells in fast-paced R&D environment
- Leveraged robot control framework to interface with vision and perception systems, AWS cloud, and robots
- Created logic system for federated task planning of robot arms and drive units for package picking/storing
- Integrated motion-planning, manipulation, object tracking, and upstream cloud services for warehousing

TeamDynamix Software Engineering Intern, Columbus, OH May 2021 - Aug 2020

- Resolved 400+ web accessibility issues in web product with creative solutions to comply with WCAG 2.0
- Diversified analysis services by implementing 5+ new tabling features with C# and MVC, learned .NET, Azure DevOps, industry programming standards, and programming best practices

VYIT Innovation Intern, Team Lead, Ventech Solutions, Columbus, OH June 2018 - Aug 2020

- Coordinated research on disruptive technologies with 40 motivated high schoolers, gained exposure to business analysis, start-up lifecycle, collaboration, and dedicated team management

LEADERSHIP EXPERIENCE

Carnegie Mellon Organizations

- AI Graduate Mentor Fall 2023 - Present
- Track and Field (Long Jump and Triple Jump) Fall 2023 - Present

Georgia Tech Organization

- Research Assistant for Dr. Ada Gavrilovska Spring 2022 - Spring 2023
- Teaching Assistant for Intro to Artificial Intelligence Spring 2022
  - College of Computing teaching assistant for 500+ students under Professor James Rehg
- Ground Software Team Lead for Yellow Jacket Space Program
  - Directed a team of 6 software developers to create data acquisition unit and engine controller for rocket
  - Designed vibration sensor software library for 15kHz sensors and PCB adapter for accelerometer IC
- Undergraduate Researcher for Augmented Reality Lab Spring 2021 - Summer 2022
  - Researched collaborative virtual learning spaces under Dr. Blair MacIntyre through VIP program
- Officer for Android Dev Club and Electronics Makery club, Member of AI club and Programming Team

BHT Camp Counseling Logistics Manager Jan 2019 - July 2019

- Supervised logistics and supplies for weeklong camp program at BHT Temple for over 120 children

ADDITIONAL INFORMATION

Awards: President's Undergraduate Research Award (2022), National Merit Winner, All-State jumper (2020)

- Competed at HackGT Hackathon (2020, 2021), Code for Good (2022), and ICPC National Qualifier (2021)

Hobbies: Prototyping projects, pick-up sports, music/art production