Kartik Paigwar

https://kartikpaigwar.github.io

EDUCATION

Arizona State University

Master's in Robotics and Autonomous Systems (AI Concentration), GPA : 3.93/4.0

Visvesvaraya National Institute of Technology

Bachelors of Technology in Computer Science and Engineering

Experience

Verdant Robotics

Software Engineer Intern, Supervised by Dr. Gabe Sibley

- Developed an automated labeling tool in C++ and Python for generating segmentation dataset for millimeter-wide sprays in static and dynamic backgrounds.
- Implemented temporal attention-based U-Net model using PyTorch and achieved 0.8 IoU over test dataset.
- Incorporated system priors to achieve real-time spray detection and monitoring at 30 FPS on Jetson Xavier.

Robert Bosch Centre for Cyber-Physical Systems

Project Associate, Supervised by Prof. Shishir Kolathaya

- Created an open-source library synthesising light-weight locomotion gaits for low-cost quadruped robots using RL.
- Developed a novel linear-policy based locomotion controller capable of traversing slopes of 15-25°.
- Built a perception pipeline for simultaneous 3D modeling and localization of the staircase with a stereo camera.

AIRLab, Politecnico di Milano

Summer Research Intern, Supervised by Prof. Andrea Bonarini

- Built a teleoperated mobile robot platform in ROS for human demonstrations of search and exploration strategies.
- Researched on dimensionality reduction of 2D laser scans using VAEs and achieved 93% reconstruction accuracy.

Collaboration

Improbable AI Lab, MIT

Learning Visually-Guided Locomotion, Supervised by Prof. Pulkit Agrawal

- Implemented a trajectory modulating controller (PMTG) on Mini Cheetah robot for dynamic vision-aware locomotion over gaps of size 10cm-40cm.
- Used two-staged knowledge distillation for learning RNN-based locomotion policy with noisy depth map inputs.

Projects

- Human Gameplay Imitation using Deep-RL: Implemented Deep Q-learning from Demonstrations (DQfD) for data-efficient acquisition of experts' strategies in a breakout game. Proposed a new experience replay mechanism.
- Multi-Focus Image Fusion: Designed a Siamese CNN in TensorFlow to obtain a fully-focused image from multiple spatially focused images of the same scene.
- Attention-Guided Lane Detection: Reproduced an anchor-based lane detection model with ResNet-34 backbone and evaluated realtime efficiency and accuracy on TuSimple, CuLane and ASU campus street datasets.
- Lossy Image Compression with Compressive Autoencoders: Implemented CAE and studied non-differentiability in loss function for lossy image compression. Worked on smooth approximation of quantization gradients.

PUBLICATIONS

- G. Margolis, Ge Yang, K. Paigwar, T. Chen, P. Agrawal. "Rapid Locomotion via Reinforcement Learning". RSS 2022.
- G. Margolis, T. Chen, K. Paigwar, X. Fu, D. Kim, S. Kim, P. Agrawal. "Learning to Jump from Pixels", CoRL 2021.
- K. Paigwar, L. Krishna, S. Tirumula, N. Khetan, S. Kolathaya et al. "Robust Quadrupedal Locomotion on Sloped Terrains: A Linear Policy Approach", CoRL 2020.
- S. Tirumula, S. Gubbi, K. Paigwar, A. Sagi et al. "Learning Stable Manoeuvres in Quadruped Robots from Expert Demonstrations", Ro-Man 2020.

TECHNICAL SKILLS

Languages: Python, C, C++, MATLAB, HTML, CSS, SQL Developer Tools: Linux, ROS, Git, Docker, CMake, Bash, GDB, Slurm, AWS, Google Cloud Libraries: PyTorch, TensorFlow, Keras, OpenCV, OpenGL, PCL, PyBullet, Issac Gym, scikit-learn, pandas, Matplotlib

Jan. 2021 - Dec. 2022 Nagpur, India

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Aug. 2015 - May 2019

May 2022 - Aug. 2022

Bengaluru, India

Hayward, CA

Jun. 2019 - Dec. 2020

Milan, Italy

Jun. 2018 - Aug. 2018

Cambridge, MA

Feb. 2021 - Jan. 2022