KartikPatath

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Field(s) of Interest

Perception, Localization and Mapping, Deep Learning, Robotic systems engineering

Education

Worcester Polytechnic Institute (WPI) MA, USA

Masters of Science in Robotics Engineering CGPA - 4/4 August 2019 - May 2021

Skills

Programming	Python, C++
Cloud Platforms	Google Cloud Platform (GCP), Amazon Web Services (AWS)
ML/AI Frameworks	TensorFlow, PyTorch
Robotics & Vision	ROS, OpenCV, OGRE, GTSAM
Development Tools	Docker, GIT, CUDA, MATLAB

Experience

Woven by Toyota, U.S, Inc. Palo Alto, CA

Localization and Mapping Engineer June. 2022 - present

- **Change Detection:** Designed a localization framework for change detection, which identifies changes in road signs and features. This framework uses GTSAM for factorgraph optimization with GPS and SFM-based odometry.
- **TSS Ingest Component:** Designed and deployed a data ingestion module to process thousands of data files in parallel. This module generates Medium Definition Maps (MD Maps) for autonomous driving applications.

Velodyne Lidar San Jose, CA

Computer Vision Engineer Aug. 2021 - March 2022

- **3D Lidar Perception:** Developed a 3D-object tracking and prediction module with occupancy estimation for the Vella Development Kit (VDK), which is used in ADAS and autonomous driving applications.

Honda Research Institute, USA San Jose, CA

Robotics Research Intern Feb. 2021 - May 2021

- **Curiosity Based SLAM:** Worked on curiosity based mapping and navigation in unknown environment, targeting indoor spaces. Benchmarked on custom developed A-star variant.

NASA JPL, Team COSTAR Pasadena, CA

JVSRP Intern Aug. 2020 - Jan. 2021

- **Perception of Sub-Terranean Robots:** Developed an artifact localization method using camera and lidar fusion to accurately report artifact locations. This was used in the final stage of the DARPA SubT competition in 2021.

Worcester Polytechnic Institute Worcester, MA

Research Assistant Sep. 2019 - Aug. 2020

- **Semantic SLAM:** Integrated a system for semantic-level SLAM, which includes semantic object detection, data association, and loop detection based on semantic objects.

Carnegie Mellon University Pittsburgh, PA

Summer Intern May 2017 - Aug. 2017

- **Dynamic Texture Mapping for Stiffness Visualization:** Developed an Rviz plugin for dynamic texturing. This plugin augments textures to 3D models in real-time and uses texture mapping and projective geometry for the backend.
- **Vision System for Modular 6-Legged Robot:** Developed a vision system with an Intel RealSense and Hokuyo lidar for a 6-legged robot. Implemented RGBD and Monocular SLAM with person tracking and 3D mapping using Large Scale Direct SLAM.

Projects

Motion Forecasting for Autonomous Vehicles using Argoverse Dataset Jan 2020 - April 2020

- Trajectory prediction of an AGV using LSTM Encoder-Decoder and Social ways GAN on the Argo AI motion forecasting dataset

Curiosity-Driven Exploration Oct 2019 - Dec 2019

- Implemented Intrensic Curiocity Module and Random Network Distillation for MineRL Navigation Challenge, NeurIPS 2019

Multi-focal image fusion using deep Convolutional Neural Networks Sept. 2017 - May 2018

- CNN based image fusion approach using Siamese network architecture to compute the fusion mask for a pair of multi-focal images

Publications

- Qian Zhentian, **Kartik Patath**, Fu, Jie and Xiao Jing, "Semantic SLAM with Autonomous Object-Level Data Association", research paper in IEEE International Conference on Robotics and Automation, ICRA 2021.(accepted)
- **Kartik Patath**, R. Arun Srivatsan, Nicolas Zevallos and Howie Choset, "Dynamic Texture Mapping of 3D models for Stiffness Map Visualization", poster presentation in the workshop on Medical Imaging at the IEEE/RSJ International Conference on Intelligent Robots and Systems, IROS 2017.
- **Kartik Patath**, Hadi Salman and Howie Choset, "Visual system for a Modular 6-Legged robot", research paper and poster in vol.5, pages 138-141, Robotics Institute Summer Scholars Journal 2017.
- Nicolas Zevallos, R Arun Srivatsan, Hadi Salman, Lu Li, Jianing Qian, Saumya Saxena, Mengyun Xu,**Kartik Patath** and Howie Choset, "A surgical system for automatic registration, stiffness mapping and dynamic image overlay", The International Symposium on Medical Robotics, ISMR 2018.
- N. Zevallos, R. A. Srivatsan, H. Salman, L. Li, J. Qian, S. Saxena, M. Xu, **K. Patath** and H. Choset, "A Real-time Augmented Reality Surgical System for Overlaying Stiffness Information",in proceedings of Robotics: Science and Systems, RSS 2018.

Patents

31 Jan, 2024	**Systems and Methods for Estimating a Gap Between Positioning and Odometry Signals**, Application Number 18/428,329	USA
05 May, 2017	**Humanoid Robot**, Application Number 201721015920	India
22 Dec, 2016	**Robotic Cleaning System**, Application Number 201621043891	India

Achievements & Awards

2017	**Summer Scholar**, Robotics Institute Summer Scholars Program	Pittsburgh, PA
2017	**Scholarship**, Federation of Indian Chambers of Commerce and Industry (FICCI)	Pittsburgh, PA

Extracurricular Activity

- Teaching Assistant for ECE 2312 - Discrete-time Signals and Systems.
- Teaching Assistant for ECE 3311 - Principles of Communication Engineering.
- Teaching Assistant for ECE 2019 - Sensors, Circuits and Systems.
- Peer reviewer for RISS 2017 journal.
- Creative head of the departmental council, in the Electronics and Communication department.
- Vice-Chairman of my institute's Robotics Lab, IvLabs, from 2016-2017.
- Mentored a team of four sophomores, the team was among the quaterfinalists of Texas Instruments Innovation Challenge 2016.
- Conducted workshops in my institute on topics such as Image processing, Microcontroller programming and Circuit designing.