Karnik Ram

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Education

International Institute of Information Technology, Hyderabad 2018 - 2021
M.S. by Research in Computer Science & Engineering
Thesis: Robust plane-based visual-inertial odometry for dynamic environments
GPA: 9.50/10

Anna University, SSN College of Engineering, Chennai 2013 - 2017
B.Eng. in Electronics & Communication Engineering
GPA: 7.20/10

Publications

RP-VIO: Robust Plane-based Visual-Inertial Odometry for Dynamic Environments
Karnik Ram, Chaitanya Kharyal, Sudarshan S. Harithas, K. Madhava Krishna
International Conference on Intelligent Robots and Systems (IROS), 2021

Learnable Spatio-Temporal Map Embeddings for Deep Inertial Localization
Dennis Melamed, **Karnik Ram**, Vivek Roy, Kris Kitani
International Conference on Intelligent Robots and Systems (IROS), 2022

CalibNet: Geometrically-Supervised LiDAR-Camera Extrinsic Calibration using 3D Spatial Transformer Networks
Ganesh Iyer, **Karnik Ram**, J. Krishna Murthy, K. Madhava Krishna
International Conference on Intelligent Robots and Systems (IROS), 2018

INFER: Intermediate Representations for Future Prediction
Shashank Srikanth, Junaid Ahmed Ansari, **Karnik Ram**, Sarthak Sharma, J. Krishna Murthy, K. Madhava Krishna
International Conference on Intelligent Robots and Systems (IROS), 2019

PathFinder: Designing a Map-less Navigation Robot for Blind People in Unfamiliar Buildings
Masaki Kuribayashi, Tatsuya Ishihara, Daisuke Sato, Jayakorn Vongkulbhisal, **Karnik Ram**, Seita Kayukawa, Hironobu Takagi, Shigeo Morishima, Chieko Asakawa
CHI Conference on Human Factors in Computing Systems, 2023 (Under review)

Work Experience

Carnegie Mellon University Oct 2022 - Present
Research Associate, Robotics Institute
Advisor: Prof. Srinivasa Narasimhan
- Working with programmable light curtains (PLC), a novel controllable depth sensor.
- Working on using PLC for generating dynamic safety envelopes and active robot perception.

Carnegie Mellon University Aug 2021 - Oct 2022
Research Associate, Robotics Institute
Advisor: Prof. Kris Kitani
- Worked on a low-drift inertial odometry algorithm using map prior information (IROS '22).
- Implemented a camera-less localization algorithm on a smartphone for indoor navigation.
- Worked on a map-less navigation robot for assisting the visually impaired.

International Institute of Information Technology, Hyderabad Aug 2018 - Aug 2021
Graduate Research Student, Robotics Research Center
Advisor: Prof. K. Madhava Krishna
- Developed a plane-based monocular visual-inertial odometry algorithm and a dataset for dynamic environments (IROS '21).
- Worked on trajectory prediction using intermediate semantic representations (IROS '19).

Google Summer of Code
Student Developer, Mobile Robot Programming Toolkit Summer 2018
- Developed a GUI app for the extrinsic calibration of depth sensors.
- Implemented calibration algorithms based on plane and line matching.

International Institute of Information Technology, Hyderabad
Research Intern, Robotics Research Center May 2017 - April 2018
Advisor: Prof. K. Madhava Krishna, J. Krishna Murthy
- Worked on a deep network with geometric supervision for target-less LiDAR-camera extrinsic calibration (IROS '18).
- Implemented a target-based LiDAR-camera extrinsic calibration algorithm.

Relevant Coursework

Graduate: Mobile Robotics, Computer Vision, Machine Learning, Topics in Applied Optimization.
Undergraduate: Robotics & Automation, Digital Image Processing, OOP & Data Structures, Computer Architecture, Probability & Random Processes, Embedded & Real Time Systems

Additional Courses

ETH Robotics Summer School, ETH Zürich July 2019
2-week summer school on autonomous ground robot navigation with talks, hands-on lectures and exercises, and a competition. 53 selected participants from 15 countries. Awarded full travel grant.
Committee: Cesar Cadena, Marco Hutter

Teaching Experience

CSE 483 Mobile Robotics Fall 2019
International Intitute of Information Technology, Hyderabad
Designed five new assignments and exams along with regular responsibilities as head teaching assistant with Prof. K. Madhava Krishna.

3D Computer Vision Workshop Feb 2020
International Institute of Information Technology, Hyderabad
Instructor for the multiple view geometry tutorial session for a large professional audience.

Selected Projects

Smartphone-based Indoor Navigation
- Implemented a real-time deep IMU and BLE based localization system on a smartphone.

Janitorial Mobile Robot
- Implemented indoor navigation on a mobile robot for pick-and-place janitorial tasks.

Automated Stock-counting Quadcopter
- Implemented on-board navigation on a custom-built drone using optical-flow based odometry.

Awards

- **Best Senior Year Project**, ECE Department, SSN-CE 2017
- **Top 2** out of 136 teams in the ARTPARK Robotics Challenge, IISc 2022
- **First place**, inter-college image processing based robotics event, Anna University 2016
- **Top 10** out of 144 teams in the "Apps for Chennai Challenge" 2015

Services

- **Lab Systems Administrator** for the compute cluster at RRC, IIIT Hyderabad 2020-21
- Served as a reviewer in the SLAM track for IROS 2021, 22
- Served as a co-chair for the VI-SLAM session at IROS 2021
- Conceived, developed, and maintained **The SSN App**, the official Android app of SSN-CE 2014-17

Technical Skills

Tools & Libraries: OpenCV, ROS, PyTorch, Ceres Solver, Eigen, Git | Familiar: iOS, Qt, Android
Programming Languages: C++, Python | Familiar: Swift, Java