Akash Sharma

Email | Website | Github | Google Scholar | LinkedIn

Education

Carnegie Mellon University — Pittsburgh, PA
Master of Science in Robotics — *2019 – Present*
Advisor: Prof. Michael Kaess — *CGPA: 4.25/4.00*

Sri Jayachamarajendra College of Engineering — Mysore, India
Bachelor of Engineering in Electronics and Communication — *2013 – 2017*
Advisor: Prof. Sudharshan Patil Kulkarni — *CGPA: 9.61/10.00*

Research Interests

Simultaneous Localization and Mapping, Computer Vision, 3D Reconstruction

Publications

Compositional Scalable Object SLAM | preprint
Akash Sharma, Wei Dong, Michael Kaess
Submitted to International conference in Robotics and Automation (**ICRA**) 2021

Automated Vision Inspection for Cylindrical Metallic Components | paper
Krithika Govindaraj, Bhargavi Vaidya, **Akash Sharma**, Shreekanth T
International Conference on Computing and Communication (**IC3**) 2018

Experience

Graduate Research Assistant — Oct 2019 – Present
Carnegie Mellon University – ***The Robotics Institute*** — *Pittsburgh, PA*
Advisor: Prof. Michael Kaess
- Developing algorithms for dense metric and semantic SLAM systems.
- Working towards distributed SLAM for multi robot systems with semantic mapping.

Research Assistant — Aug 2020 – Present
Carnegie Mellon University — *Pittsburgh, PA*
Advisor: Prof. Katerina Fragkiadaki
- Research in estimating camera egomotion using deep models for outdoor forest environments
- Working on implicit map representations for 3D reconstructions to support TSDF inpainting

Student Developer — May 2020 – Aug 2020
OpenCV – ***Google Summer of Code (GSoC)*** | blog — *Virtual/Pittsburgh, PA*
- Implemented and improved RGBD fusion methods using spatial hashing and submap based local registrations to enable reconstruction of large scale environments.
- Reviewing extension of implementation to GPU in OpenCL

Software Engineer — Jul 2017 – Jul 2019
Infinera — *Bangalore, India*
- Built abstract infrastucture for *fault, configuration and performance management* of the optical line system.
- Implemented the *bypass auto-discovery* feature, and supported *input power control* for faster optical traffic turn up, and increased traffic capacity respectively.
- Was responsible for mentoring incoming graduate software developers in optical line system team.

Summer Research Fellow (Indian Academy of Sciences) — Apr 2016 – Jul 2016
PES University – ***Indvent labs*** — *Bangalore, India*
- Worked with the TI F28335 peripheral explorer kit Digital Signal Controller (DSC), and explored algorithms for sound reconstruction from visual feed of vibrating speaker system.

Research Intern — June 2015 – Aug 2015
Indian Institute of Science — *Bangalore, India*
- Worked on a hardware accelerator for RSA encryption using Verilog HDL. Implemented and simulated the results on the Zynq Z7020 FPGA.

Projects

SuperGlue | code | *python, pytorch* Aug 2020

Unofficial implementation of *CVPR 2020 paper – Superglue: Learning feature matching with Graph neural networks* training code in pytorch.

Simple SLAM | code | *python* Nov 2019

Implementation of sparse feature based simple visual odometry using `g2o` for graph optimization.

Visual SLAM for Quadrotors in Indoor environments | *C++, python, ROS, hardware* Dec 2016 – May 2017

Built hardware for a quadrotor based on an arduino platform with onboard Odroid XU4 and Kinect

Tested algorithms for indoor localization such as RTAB-mapping, and KinectFusion

Navigate a Terrain | *python, arduino* Nov 2016 – Jan 2017

Built a robot to follow a laser. A laser pointer mounted on a servo base leads the robot avoiding obstacles to reach a goal.

Qualified for pre-finals *e-Yantra Robotics Challenge (eYRC) 2016* at IIT Bombay

Mobile Inverted Pendulum robot | *hardware, arduino, C++* Jan 2016 – Apr 2017

Implemented a Kalman filter for IMU sensor fusion. Implemented a cascaded PI-PD controller for speed and angle control. Control was implemented at 200Hz using hardware interrupts to control stepper motors

Implemented simple line following (high contrast lines) via visual servoing

Hybrid Gear shifter and Vehicle Control System | *arduino* Sep 2015 – Jul 2016

Designed and conceptualized a hybrid gear actuator system based on capacitive touch panels attached to the steering wheel

Placed 4th in the Partners for the Advancement of Collaborative Engineering Education (PACE) Collaborative Innovation Challenge (CIC) held at Cincinnati, Ohio, USA.

Awards and Achievements

- Ranked **7th** in a class of $\sim$ 160 `[Undergrad]`
- Won most promising project award (cash prize) in the *Infinera India Hackathon (2018)*, **2nd** place among over 50 teams. Implemented a method to prevent system shutdown, in case of realtime process failures. `[Infinera]`
- Secured **1st** place in (state-level) C coding competition , held by *Hackerearth* and *IEEE – SJCE*. `[Undergrad]`
- Placed **2nd** in the (state-level) line following robot competition held at *SJCE*. `[Undergrad]`
- Placed **1st** in the *Algorithms for Robot autonomy* course offered by *University at Buffalo (SUNY)*, at SJCE. `[Undergrad]`
- Placed **1st** in Grade 10 with 95%, across all *ICSE* schools in Mysore. `[Secondary School]`

Teaching Experience and Service

Graduate Teaching Assistant | *16833 - Robot Localization and Mapping* | **Prof. Michael Kaess** Fall 2020

Delivered a lecture on dense SLAM methods.

Created new homework scripts in python.

Office hours, grading, and project guidance for $\sim$ 60 students.

Robotics Mentor | *IEEE - SJCE Robotics Workshop* | **Prof. S. B. Rudraswamy** 2016