Sudharshan Suresh

Personal Information

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Education

Robotics Institute, Carnegie Mellon University 2017 - ongoing
M.S. in Robotics
GPA: 4.08, *Advisor*: Prof. Michael Kaess

National Institute of Technology, Tiruchirappalli, India 2013 - 2017
B.Tech (Hons) in Instrumentation and Control Engineering
GPA: 9.45/10

Publications

S. Suresh, E. Westman and M. Kaess, **Through-water Stereo SLAM with Refraction Correction for AUV Localization**, *under review* in IEEE Robotics and Automation Letters, ICRA/RA-L, 2019. [Pre-print, Video]

J. Hsiung, A. Tallaksen, L. Papincak, S. Suresh, H. Jones, W. Whittaker and M. Kaess, **Localized Imaging and Mapping for Underwater Fuel Storage Basins**, Proceedings of the Symposium on Waste Management, Phoenix, Arizona, Mar 2018. [PDF, Slides, Video]

R. K. Sarvadevabhatla, S. Suresh and R. Venkatesh Babu, **Object Category Understanding via Eye Fixations on Freehand Sketches**, in IEEE Transactions on Image Processing, vol. 26, no. 5, pp. 2508-2518, May 2017. [PDF, Project]

E. Fang, S. Suresh and W. Whittaker, **Camera-Only Kinematics for Small Lunar Rovers**, Annual Meeting of the Lunar Exploration Analysis Group, Vol. 1960, Nov 2016. [PDF, Poster]

S. Suresh, E. Fang and W. Whittaker, **Optical Kinematic State Estimation of Planetary Rovers using Downward-Facing Monocular Fisheye Camera**, RISS Working Paper Journal, Nov 2016. [PDF, Video, Poster]

Research Experience

Robotics Institute, Carnegie Mellon University Aug 2017 - ongoing
Advisor: Prof. Michael Kaess *M.S. Student*

Ongoing Master's thesis research in the Robot Perception Lab. Research focuses on visual SLAM and navigation for autonomous underwater vehicles (AUVs). Worked on a novel through-water SLAM framework for AUV localization in inspection tasks. Also developed an inspection prototype for underwater 3D reconstruction. Currently working on saliency-aware active SLAM for exploration.

Robotics Institute, Carnegie Mellon University June - Sep 2016
Advisor: Prof. William L. "Red" Whittaker *RI Summer Scholar*

Developed a novel visual state-estimation algorithm for planetary rovers via self-perception. Method uses a single downward-facing fisheye camera to robustly estimate 10-DoF kinematic state on rugged terrain. Demonstrated in lunar analogous field tests to agree well with proprioceptive sensors.

Video Analytics Lab, Indian Institute of Science May - Aug 2015
Advisors: Prof. R. Venkatesh Babu, R. K. Sarvadevabhatla *Research Intern*

Research in object category understanding for freehand sketches. Created *SketchFix-160*, as open-source dataset of free-viewing user tests collected with a monocular eye-tracker. Analyzed fixation data to reveal multi-level consistency and built a computational model for sketch category prediction.

Dept. of Instrumentation and Control, NIT Trichy Jan - May 2017
Advisor: Prof. M. Umapathy *Bachelor's Thesis*

Worked on the design and implementation of sliding mode control for electromechanical domains. Analyzed hyperplane design techniques for a cantilever beam system with input disturbance.

Independent Projects

DeepGeo: Photo Localization with Deep Neural Network `(10-701 project)` [arXiv] 2018
A deep network that beats humans at GeoGuessr—trained on our *50States10K* dataset.

Task and Motion Planning for Robotic Food Preparation `(16-782 project)` [Report] 2018
Hierarchical task and motion planning for a 6-DOF robot arm—to prepare yogurt parfaits.

Thin Structure Reconstruction via 3D Lines and Points `(16-822 project)` [Poster] 2018
We combine edge data and sparse features in the SfM pipeline to recover thin objects in a scene.

Awards and Honors

RECAL Alumni Award, 2017 (*gold-medalist in undergraduate major*)
Sri. Avinash Memorial Award, 2017 (*best outgoing male student in undergraduate major*)
OPJEMS Scholar, 2017 (*100 undergraduates across India*)
S. N. Bose and Robotics Institute Summer Scholar, 2016
Cargill Global Scholar, 2015 - 2017 (*10 undergraduate sophomores across India*)

Activities

Admissions committee, CMU RI Summer Scholars program (2018)
Mentor, Jiteshraj Scholarship, NIT Trichy (2018)

Technical Skills

Programming: C/C++, Python, MATLAB, LaTeX
Tools and Libraries: ROS, OpenCV, TensorFlow

Relevant Coursework

Graduate: Geometry-based Methods in Vision (16-822), Planning and Decision-making in Robotics (16-782), Robot Localization and Mapping (16-833), Introduction to Machine Learning (10-701), Computer Vision (16-720B), Mathematical Fundamentals for Robotics (16-811)

Undergraduate: Data Structures and Algorithms, Computer Networks, Neural Networks and Fuzzy Logic, Image Processing, Basics of Programming, Control Systems, Logic and Distributed Control, Robotics, Signals and Systems, Circuit Theory, Digital Electronics, Embedded Systems, Linear Integrated Circuits, Sensors and Transducers, Material Science, Numerical Methods