

# Sudharshan Suresh

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## 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	<b>DeepGeo: Photo Localization with Deep Neural Network</b> (10-701 project) [ <a href="#">arXiv</a> ] 2018 A deep network that beats humans at <a href="#">GeoGuessr</a> —trained on our <i>50States10K</i> dataset.
	<b>Task and Motion Planning for Robotic Food Preparation</b> (16-782 project) [ <a href="#">Slides</a> ] 2018 Hierarchical task and motion planning for a 6-DOF robot arm—to prepare yogurt parfaits.
	<b>Thin Structure Reconstruction via 3D Lines and Points</b> (16-822 project) [ <a href="#">Poster</a> ] 2018 We combine edge data and sparse features in the SfM pipeline to recover thin objects in a scene.
AWARDS AND HONORS	<p>RECAL Alumni Award, 2017 (<i>gold-medallist in undergraduate major</i>)</p> <p>Sri. Avinash Memorial Award, 2017 (<i>best outgoing male student in undergraduate major</i>)</p> <p><a href="#">OPJEMS Scholar</a>, 2017 (<i>100 undergraduates across India</i>)</p> <p><a href="#">S. N. Bose</a> and <a href="#">Robotics Institute Summer Scholar</a>, 2016</p> <p><a href="#">Cargill Global Scholar</a>, 2015 - 2017 (<i>10 undergraduate sophomores across India</i>)</p>
ACTIVITIES	<p>Admissions committee, CMU RI Summer Scholars program (2018)</p> <p>Mentor, Jiteshraj Scholarship, NIT Trichy (2018)</p>
TECHNICAL SKILLS	<p><b>Programming:</b> C/C++, Python, MATLAB, L<sup>A</sup>T<sub>E</sub>X</p> <p><b>Tools and Libraries:</b> ROS, OpenCV, TensorFlow</p>
RELEVANT COURSEWORK	<p><b>Graduate:</b> 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)</p> <p><b>Undergraduate:</b> 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</p>