

# Sudharshan Suresh

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## PERSONAL

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## EDUCATION

### Robotics Institute, Carnegie Mellon University

2019 - present

Ph.D. in Robotics

Advisor: [Prof. Michael Kaess](#)

Interests: *Tactile perception; Localization and Mapping; Manipulation*

### Robotics Institute, Carnegie Mellon University

2017 - 2019

M.S. in Robotics

GPA: 4.09, Advisor: [Prof. Michael Kaess](#)

Thesis: [Localization and Active Exploration in Indoor Underwater Environments](#)

### National Institute of Technology, Tiruchirappalli, India

2013 - 2017

B.Tech (Hons) in Instrumentation and Control Engineering

GPA: 9.45/10

## PUBLICATIONS

### PREPRINTS

- [1] [S. Suresh](#), M. Bauza, K.-T. Yu, J. Mangelson, A. Rodriguez, and M. Kaess, "Tactile SLAM: Real-time inference of shape and pose from planar pushing," In *Proc. IEEE Intl. Conf. on Robotics and Automation (ICRA)*, Xi'an, China, May 2021, submitted. ([arXiv](#) / [video](#))

### JOURNAL PUBLICATIONS

- [2] [S. Suresh](#), E. Westman, and M. Kaess, "Through-water stereo SLAM with refraction correction for AUV localization," *IEEE Robotics and Automation Letters (RA-L)*, vol. 4, no. 2, pp. 2377-3766, presented at ICRA 2019, Apr. 2019. ([pdf](#) / [poster](#) / [video](#))
- [3] R. K. Sarvadevabhatla, [S. Suresh](#), and R. Venkatesh Babu, "Object category understanding via eye fixations on freehand sketches," *IEEE Transactions on Image Processing*, vol. 26, no. 5, pp. 2508-2518, May 2017. ([pdf](#) / [project](#))

### PEER-REVIEWED PUBLICATIONS

- [4] M. Hsiao, J.G. Mangelson, [S. Suresh](#), C. Debrunner, and M. Kaess, "ARAS: ambiguity-aware robust active SLAM based on multi-hypothesis state and map estimations," In *Proc. IEEE/RSJ Intl. Conf. on Intelligent Robots and Systems (IROS)*, Oct. 2020. ([pdf](#))
- [5] [S. Suresh](#), P. Sodhi, J. G. Mangelson, D. Wettergreen, and M. Kaess, "Active SLAM using 3D submap saliency for underwater volumetric exploration," In *Proc. IEEE Intl. Conf. on Robotics and Automation (ICRA)*, Paris, France, pp. 3132-3138, May 2020. ([pdf](#) / [video](#) / [presentation](#))

### WORKSHOPS/OTHER PUBLICATIONS

- [6] [S. Suresh](#), J. G. Mangelson, and M. Kaess, "Incremental shape and pose estimation from planar pushing using contact implicit surfaces," In *ICRA 2020 workshop - ViTac 2020: Closing the Perception-Action Loop with Vision and Tactile Sensing*, May 2020. ([pdf](#) / [presentation](#))
- [7] J. Hsiung, A. Tallaksen, L. Papincak, [S. Suresh](#), H. Jones, W. Whittaker, and M. Kaess, "Localized imaging and mapping for underwater fuel storage basins," In *Proceedings of the Symposium on Waste Management*, Phoenix, Arizona, Mar. 2018. ([pdf](#) / [presentation](#))
- [8] E. Fang, [S. Suresh](#) and W. Whittaker, "Camera-only kinematics for small lunar rovers," In *Annual Meeting of the Lunar Exploration Analysis Group*, Columbia, Maryland, Vol. 1960, Nov 2016. ([poster](#))
- [9] [S. Suresh](#), E. Fang and W. Whittaker, "Optical kinematic state estimation of planetary rovers using downward-facing monocular fisheye camera," *RISS Working Papers Journal*, Nov 2016. ([pdf](#) / [video](#) / [poster](#))

EXPERIENCE	Graduate Research Assistant, Carnegie Mellon University	2017 - present
	Ph.D. research in the <a href="#">Robot Perception Lab</a> , on vision and tactile perception for robot manipulation. Currently working on mapping and localizing objects via tactile interaction. Previously developed algorithms for active exploration and stereo visual SLAM in underwater environments.	
	Undergraduate Research Scholar, Carnegie Mellon University	Summer 2016
	<a href="#">RI summer scholar</a> working with <a href="#">Red Whittaker</a> on visual state-estimation via self-perception for planetary rovers.	
	Undergraduate Research Scholar, Indian Institute of Science	Summer 2015
	Work with <a href="#">R. Venkatesh Babu</a> and <a href="#">R. K. Sarvadevabhatla</a> on freehand sketch understanding through eye-gaze fixations.	
AWARDS AND HONORS	<a href="#">Hima and Jive Fellowship in Computer Science for International Students</a> , 2020	
	RECAL Alumni Award and Sri. Avinash Memorial Award, 2017 ( <i>gold-medalist in undergraduate major</i> )	
	<a href="#">OPJEMS Scholar</a> , 2017 ( <i>100 undergraduates across India</i> )	
	<a href="#">S. N. Bose and Robotics Institute Summer Scholar</a> , 2016	
	<a href="#">Cargill Global Scholar</a> , 2015 - 2017 ( <i>10 undergraduate sophomores across India</i> )	
SERVICE	<b>Reviewer:</b> IROS 2020, RA-L 2020, ICRA 2021	
	<b>Admissions committee:</b> CMU RI Summer Scholars program (2018-2020)	
	<b>Mentorship:</b> CMU AI undergraduate mentorship program (2019), NIT Trichy <a href="#">Jiteshraj Scholarship</a> (2018)	
TEACHING	Teaching Assistant, <a href="#">16-833</a> : Robot Localization and Mapping	Fall 2019, Spring 2020
	Project mentoring, office hours, grading, presented lectures on occupancy mapping <sup>†</sup> and sparse visual SLAM techniques.	
SELECT COURSEWORK	<b>Graduate:</b> Convex optimization (10-725), kinematics, dynamics and control (16-711), 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 (16-720), mathematical fundamentals for robotics (16-811)	
	<b>Undergraduate:</b> Data structures and algorithms, computer networks, neural networks and fuzzy logic, image processing, basics of programming, control systems, robotics, signals and systems, circuit theory, embedded systems, linear integrated circuits, sensors and transducers, material science, numerical methods	
INDEPENDENT PROJECTS	DeepGeo: Photo localization with deep neural network ( <a href="#">10-701</a> )	( <a href="#">arXiv</a> / <a href="#">github</a> )
	A deep network that beats humans at <a href="#">GeoGuessr</a> —trained on our <i>50States10K</i> dataset.	
	Task and motion planning for robotic food preparation ( <a href="#">16-782</a> )	( <a href="#">report</a> )
	Hierarchical task and motion planning for a 6-DOF robot arm—to prepare yogurt parfaits!	
	Thin structure reconstruction via 3D lines and points ( <a href="#">16-822</a> )	( <a href="#">poster</a> )
	We combine edge data and sparse features in the SfM pipeline to recover thin objects in a scene.	
	Factor graph optimization for dynamic parameter estimation ( <a href="#">16-711</a> )	( <a href="#">report</a> )
	We implement a method for estimation of MAV poses and dynamic parameters during flight.	