

# SOURISH GHOSH

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Languages and Tools:

C++, Python, Java, OpenCV, ROS,  
Qt, OpenGL, TensorFlow, Keras,  
PyBullet, CVXPY, Eigen

## EDUCATION

Carnegie Mellon University

August, 2019 - present

Ph.D. in Robotics

Indian Institute of Technology,  
Kharagpur

July, 2014 - April, 2019

Integrated M.Sc. (GPA: 8.50/10)

Department: Mathematics

Major: Mathematics and Computing

## PUBLICATIONS

### [4] Probabilistic Kinematic State Estimation for Motion Planning of Planetary Rovers

by Sourish Ghosh, Kyohei Otsu, and Masahiro Ono

In *Intelligent Robots and Systems, IROS, 2018 IEEE/RSJ International Conference*, (Madrid, Spain). Oct 2018. [PDF]

### [3] Fast Approximate Clearance Evaluation for Rovers with Articulated Suspension Systems

by Kyohei Otsu, Guillaume Matheron, Sourish Ghosh, Olivier Toupet, and Masahiro Ono

In *Journal of Field Robotics*. [PDF]

### [2] Joint Perception And Planning For Efficient Obstacle Avoidance Using Stereo Vision

by Sourish Ghosh and Joydeep Biswas.

In *Intelligent Robots and Systems, IROS, 2017 IEEE/RSJ International Conference*, (Vancouver, Canada). Sep 2017. [PDF]

### [1] A Fuzzy Logic System to Analyze a Student's Lifestyle

by Sourish Ghosh et al.

In *2017 9th International Conference on Advanced Computational Intelligence, ICACI*, (Doha, Qatar). Feb 2017. [PDF]

## EXPERIENCE

Princeton University | Summer Intern, IROM Lab

Adviser: [Prof. Anirudha Majumdar](#) | June - Aug, 2018

Topic: Learning Data-Driven Dynamic Models of Task-Relevant Perceptual Features for Robot Controllers

Research Areas: control theory, deep learning, variational autoencoders, model-predictive control

NASA Jet Propulsion Laboratory | Summer Intern, Group 347E

Adviser: [Dr. Masahiro Ono](#) | May - July, 2017

Topic: Probabilistic Kinematic State Estimation for Motion Planning of Planetary Rovers

Research Areas: probabilistic state estimation, risk-aware motion planning

University of Massachusetts Amherst | Summer Intern, AMRL

Adviser: [Prof. Joydeep Biswas](#) | May - Aug, 2016

Topic: Joint Perception and Planning for Efficient Obstacle Avoidance using Stereo Vision

Research Areas: obstacle avoidance, stereo vision, motion planning

Aerial Robotics Lab, Kharagpur | Software Team Member

Adviser: [Prof. Somesh Kumar](#) | Feb, 2017 - present

Topic: Building unmanned emergency aerial vehicles to drop medical supplies in less accessible regions of rural India.

Research Areas: localization and mapping, motion planning, control theory

Cognitive Robotics Summer School, Massachusetts Institute of Technology Organizer: MIT MERS Group | July, 2018

Attended a week long workshop based on the following themes: robust execution, motion planning, activity planner, perception and manipulation, and planning under uncertainty and risk.

Kharagpur RoboSoccer Students' Group (KRSSG) | Software Team Member

February, 2015 - April, 2016

Topic: Trajectory generation and tracking for multi-agent soccer playing robot systems.

Research Areas: multi-agent robot systems, robot soccer, motion planning

## AWARDS AND ACHIEVEMENTS

### IROS Travel Award

October, 2018

Received the IROS Student and Developing Countries (SDC) Travel Award for my publication at IROS 2018.

### Successful Fundraiser for IROS 2018

July, 2018

Successfully raised \$1350 on [GoFundMe](#) to support my travel and registration costs for attending IROS 2018.

### Caltech SURF Award

May - July, 2017

Awarded the prestigious Caltech SURF fellowship for doing a summer internship at NASA JPL.

### Best Term Project, Soft Computing Course

Spring, 2016

Designed a mobile application that tracks the daily lifestyle of a student [1]. Peer reviewed as the best project.

## Bronze in MiroSot, FIRA

July, 2015

Bronze winning team member of IIT Kharagpur at MiroSot: an international five-a-side robot soccer tournament.

## INSPIRE Scholarship

July, 2014 - present

A prestigious scholarship awarded by the Government of India to the top students ( $< 1\%$ ) who appeared for the JEE Advanced 2014 examination in India, and pursuing a degree in Science.

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## SELECTED PROJECTS

### Stereo Dense 3D Reconstruction Tool

This is a ROS package for real-time 3D reconstruction from stereo images using ELAS.

Repository: [https://github.com/umass-amrl/stereo\\_dense\\_reconstruction](https://github.com/umass-amrl/stereo_dense_reconstruction)

### JPP

C++/ROS implementation of [2]

Repository: <https://github.com/umass-amrl/jpp>

### RRT Simulator

An interactive GUI application for visualizing motion planning using RRTs.

Repository: <https://github.com/sourishg/rrt-simulator>

### Stereo Camera Calibration Tools

Tool for the calibration of monocular and stereo cameras using the checker-board method.

Pinhole Model: <https://github.com/sourishg/stereo-calibration>

Fisheye Model: <https://github.com/sourishg/fisheye-stereo-calibration>

### Generating Disparity Maps

Implementation of various algorithms to compute disparity maps.

Repository: <https://github.com/sourishg/disparity-map>

### Turntable Controller

Learning data-driven dynamic models (using VAEs) of task-relevant perceptual features for model-predictive control.

Repository: [https://github.com/sourishg/turntable\\_controller](https://github.com/sourishg/turntable_controller)

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## RESPONSIBILITIES

### Technology Robotix Society, IIT Kharagpur

Governor | July, 2017 - April, 2018

I led a three-tier team to successful planning and execution of all the year-long activities of the society which includes organizing the annual Robotix fest, conducting seminars and workshops for students at IIT Kharagpur and other colleges in India, and initiating new research projects in robotics.

### Kharagpur Winter of Code (KWOC) 2017, IIT Kharagpur

Mentor | December, 2017

I mentored 4 students in KWOC (organized by *Kharagpur Open Source Society*) which is a 5-week long GSoC-styled programme for students who are new to open source software development.

Project: <https://github.com/sourishg/stereo-calibration>

### IEEE Robotics Winter Workshop, IIT Kharagpur

Mentor | December, 2015

I conducted a week-long workshop for first and second year undergraduates at IIT Kharagpur. I taught basic image processing using OpenCV and C++, and micro-controller programming using an Arduino UNO board. As a final project of the workshop I helped the students build a simple object tracking differential drive robot.

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## MEDIA COVERAGE

### Princeton University News

August, 2018

My work at Princeton University was featured as part of a story about the International Summer Internship Program.

### Internshala Blog

September, 2017

My summer internship story at NASA JPL was covered by Internshala, India's largest portal for student internships.

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## TECHNICAL WRITING

### Stereo calibration using C++ and OpenCV

September, 2016

15k pageviews. Average time on page: 4 min.

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## TALKS

IROS 2018 Oral Presentation [4] | Madrid, Spain

October, 2018

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