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.**
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.

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`

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`

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.

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.

Technical Writing

Stereo calibration using C++ and OpenCV September, 2016
15k pageviews. Average time on page: 4 min.

Talks

IROS 2018 Oral Presentation [4] | Madrid, Spain October, 2018