# Shyam Sundar **Kannan**

Roboticist

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## Research Interests

Motion Planning, Autonomous Navigation, Computational Geometry, Deep Learning.

## Education

### Purdue University — *West Lafayette, IN*

Ph.D. in Robotics — *June 2019 - Present*

- Research: Control of Multi-UAV system
- Advisor: Byung-Cheol Min
- Relevant Coursework: Deep learning for machine vision, Machine learning for robotics, Electro-mechanical robotic systems

### Purdue University — *West Lafayette, IN*

M.S. in Robotics — *Aug 2017 - April 2019*

- Thesis: Multi-UAV Coverage Path Planning for Reconstruction of 3D Structures.
- Advisor: Byung-Cheol Min
- Relevant Coursework: Robot programming using ROS, Computational motion planning, Probabilistic robotics, Computer vision, Software design for robots

### Anna University — *Chennai, India*

B.E. in Computer Science and Engineering — *Aug 2012 - April 2016*

- Senior Project: 3D Point cloud segmentation using Normal Ray Intersection

## Experience

### SMART Lab — *Purdue University*

Graduate Researcher — *Jan 2018 - Present*

- Working on developing multi-UAV object transportation system by hauling.
- Designed a multi-human multi-robot adaptive control system.
- Developed **multi-agent path planner** for structural inspection using UAVs.
- Worked on **programming by demonstration** to teach cooking tasks to bi-manual robots.
- Developed a **material classifying robot** to explore various materials in an environment and localize them using LiDAR.
- Built a **F1/10 autonomous racing car** with drift capabilities.

### Nokia Bell Lab — *Murry Hill, NJ*

Summer Research Intern — *June 2018 - Aug 2018*

- Developed a **centralized task allocation system** for a heterogeneous team of robots.
- Designed an **end to end architecture** for controlling robots using high level human commands.
- Developed an unified path planner for unmanned aerial and ground vehicles based on ROS Navigation stack.

### Advanced Geometric Computing Lab — *IIT-Madras, Chennai, India*

Project Associate — *Sept 2016 - July 2017*

- Designed a non-parametric algorithm for the volumetric **segmentation** of a CAD mesh model.
- Developed algorithms to **extract the geometric features** in CAD mesh model and to classify them.
- Researched on the **reconstruction** of a 2D point set and a 3D point cloud.

### Pasumai Solutions — *Chennai, India*

Android Developer Intern — *June 2014 - Aug 2014*

- Improved the accuracy of Tesseract OCR from 60% to 92% in mobile devices through image processing.

## Key Skills

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|---|---|
| **Programming** | Python, C/C++, Java, MATLAB, Unix Scripting, SQL, Android/Mobile, VB.NET |
| **Libraries** | ROS, PCL, OpenCV, OpenGL, CGAL, TensorFlow |
| **Robotics** | Path Planning, SLAM, Localization, Autonomous navigation, LIDAR |
| **Prototyping** | Autodesk Inventor, Autodesk Fusion |

## Patent

**Shyam Sundar Kannan**, Volumetric feature extraction in mesh representation of a CAD model using random cutting planes and graph traversals, Application No: 201841008900, Indian Patent (2018)

## Publications

JH Bae, S Luo, **SS Kannan**, Y Singh, B Lee, RM Voyles, M Malaga, EG Zenteno, LP Aguilar, BC Min (2019). Development of an Unmanned Surface Vehicle for Remote Sediment Sampling with a Van Veen Grab Sampler. MTS/IEEE OCEANS.

M Penmetcha, **SS Kannan** and BC Min (2019). Smart Cloud: Scalable Cloud Robotic Architecture for Web-powered Multi-Robot Applications. arXiv preprint arXiv:1912.02927.

LP Muraleedharan, **SS Kannan** and R Muthuganapathy (2019). Autoencoder-based part clustering for part-in-whole retrieval of CAD models. Computers & Graphics 81, 41-51.

**SS Kannan**, W Jo, R Parasuraman and BC Min (2018). Mobile Robot-Assisted Mapping of Materials in Unknown Environments. arXiv preprint arXiv:1812.05489.

LP Muraleedharan, **SS Kannan**, A Karve and R Muthuganapathy. Random cutting plane approach for identifying volumetric features in a CAD mesh model (2018). Computers & Graphics 70, 51-61.

S Methirumangalath, A Dev Parakkat, **SS Kannan** and R Muthuganapathy (2017). Reconstruction using a simple triangle removal approach. SIGGRAPH Asia Technical Briefs, 1-4.

S Methirumangalath, **SS Kannan**, AD Parakkat and R Muthuganapathy. Hole detection in a planar point set: An empty disk approach (2017). Computers & Graphics 66, 124-134.

## Teaching Experience

### Graduate Teaching Assistant

*Purdue University*

Visual Programming - CNIT175

*Aug 2017 - Present*

- Primary lab instructor for introductory programming course in VB.NET.

## Community Activities

### Treasurer and Mentor

*Purdue University*

League of Robotic Engineers

*Aug 2019 - Present*

- Mentor undergraduate students to build robotics projects of their interest.