

# SriSai Naga Jyotish P

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## Education

### B. Tech. (Honors) and MS by Research in Electronics and Communications

Hyderabad, IN

IIIT Hyderabad

Expected graduation: 2020

CGPA: 7.92/10

### Master's Thesis: Motion planning under non parametric uncertainty

Robotics Research Center (RRC), IIIT Hyderabad

Advisor: Dr. K. Madhava Krishna

My thesis aims to understand various ways to plan trajectories for different robots under uncertainty. As a part of it, the collision avoidance and navigation problem is posed as a chance constraint optimization problem. Different methods to solve chance constraints are explored and studied. My thesis work was applied to a sponsored project from Collins Aerospace which demanded a motion planning algorithm that incorporates state and perception uncertainty of the robot with positive feedback from the sponsors.

## Research Interests

Reinforcement Learning • Optimal control • Motion planning • Computer Vision • Uncertainty Estimation

## Publications

P. S. Naga Jyotish\*, Bharath Gopalakrishnan\*, A. V. S. Sai Bhargav Kumar, Arun Kumar Singh, K. Madhava Krishna and Dinesh Manocha. *Reactive Navigation under Uncertainty through Hilbert Space Embedding of Probabilistic Velocity Obstacles*. IEEE Robotics and Automation Letters + IEEE International Conference on Robotics and Automation (RA-L + ICRA) 2020 (Accepted).

P. S. Naga Jyotish\*, Yash Goel\*, A. V. S. Sai Bhargav Kumar and K. Madhava Krishna. *PIVO: Probabilistic Inverse Velocity Obstacle for Navigation under Uncertainty*. IEEE International Conference on Robot and Human Interactive Communication (Ro-MAN) 2019.

P. S. Naga Jyotish\*, Yash Goel\*, A. V. S. Sai Bhargav Kumar and K. Madhava Krishna. *IVO: Inverse Velocity Obstacles for Real Time Navigation*. Advances in Robotics (AIR) 2019.

## Work Experience

### Site Reliability Engineer - Alcrowd

Nov 2019–Present

Technologies: Kubernetes, Docker, Redis, Python

- Responsible for building, deploying and maintaining the pipelines for evaluating challenges at Alcrowd.
- These challenges can range from simple input-output based problems to complex reinforced learning problems.

### Undergraduate Research Assistant - RRC, IIIT Hyderabad

May 2017–Present

Technologies: Optimization methods, Statistical inference, PyTorch, ROS, C++, Python

- Worked on developing different motion planning algorithms under uncertainty.
- Developed different end-to-end navigation frameworks for holonomic agents.
- As a part of research collaboration with Collins Aerospace, developed a navigation framework for fixed wing UAVs in urban environments.

### Software Development Engineering Intern - Swiggy

May 2019–July 2019

Technologies: Apache NiFi, Geomesa, Kubernetes, Docker, Kafka, Redis, Scala, Java, Python

- Built Redis NiFi plugin and ScyllaDB adaptor for existing GeoMesa NiFi plugins.
- Built and deployed a geo-data analysis platform using Apache NiFi cluster for data ingestion and Geoserver, Kepler.gl for visualizations.
- Built a python bot as a part of driving engineering excellence initiative.

### Student Systems Administrator - IIIT Hyderabad

May 2017–August 2019

Technologies: OpenVZ, Libvirt, LDAP, Proxy, Load balancer, Networks, Email Suites, DNS, Radius, Nagios

- Responsible for on-call, maintenance and deployment of institute-wide infrastructure and services serving ~3000 users.
- Custom auto-discovery and load balancing for domain wide web services that reverse proxies over 150 domains.

- o Aided in building and deploying a transparent proxy using an SSL interception service that preserves the destination address as a domain name (so that the domain name based ACLs on parent proxy are still valid) using SNI. This setup doesn't need a root CA.
- o Setup hybrid mail routing between GSuite, Office 365 and on-prem mail servers. Built and deployed various web portals for managing network access for guests, course feedback system, mailing list archives, etc.
- o Mentored the next generation of student sysadmins.

### Systems Administrator - RRC, IIIT Hyderabad

Mar 2018–Present

*Technologies: OpenVZ, Docker, Kubernetes, LDAP, High Performance Computing, Python, Go*

- o Setup a highly available directory server using FreeIPA and Pacemaker.
- o Aided the design of the centre's HPC cluster setup and deployed it. Also setup monitoring for the cluster using Prometheus and Grafana.

## Projects

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### Notable Projects.....

#### Multi-objective de-novo molecular generation using Deep Reinforcement Learning [PDF]

Developed a system to generate a set of candidate drug molecules given a set of desired molecular properties like melting point, SA score, solubility, number of benzene rings. An RNN is used to generate valid SMILE sequences describing molecules while RL based optimization is used to bias the RNN to generate molecules with desired molecular properties.

#### Poisson Image Editor [GitHub]

Image editing tasks posed as optimization problem using differential equations and gradient fields.

#### Neural Captioning [GitHub]

Implemented the image captioning models from "Show and Tell" and "Show, Attend and Tell" both containing a CNN and LSTM. The latter model also implements attention before sending the input image features to the RNN.

#### Unrolling the Shutter [GitHub]

Implemented a Row-Column kernel based CNN for correcting the distortion caused due to rolling shutter of the camera from a single image. Tried to improve the results using appearance flow.

#### Exploring Power Signatures for Location Forensics of Media Recordings

Developed a system for geographical location identification from electric network frequency signatures of power distribution networks in the media recordings using SVM.

### Other Selected Projects.....

- o **Pegasos-SVM** SVM classifier using PEGASOS algorithm. [GitHub]
- o **Chord DHT** Distributed hash table using chord protocol written in Go. [GitHub]
- o **IRC Server-Client** written in C++ with multiple chatrooms. [GitHub]
- o **Transparent Proxy**, written in Go, that serves ~3000 users.
- o **HTTP Proxy Server** written in Python with multi-threading.
- o **Peer to Peer File Sync** A P2P file sharing and syncing client-server written in Python.
- o **Autonomous Navigation of Quadrotors** using ROS.
- o **Reactive obstacle avoidance with Quadrotors** using ROS.

## Selected Coursework

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|--------------------------|----------------------------|--------------------------------------|
| o Advances in Robotics   | o Digital Image Processing | o OS and Algorithms                  |
| o Communication Networks | o Distributed Systems      | o Principles of Information Security |
| o Computer Vision        | o Mobile Robotics          | o Statistical Methods in AI          |

## MISC

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|---|-----------|
| o Invited to Dean's Dinner 2017-18 (for academic excellence), 2018-2019 (for research excellence) |           |
| o Club Coordinator, Photography Club, IIIT Hyderabad  | 2017-2018 |
| o Systems Administrator, Felicity 2018  | 2018      |
| o Photographer, Media Team, IIIT Hyderabad  | 2016-2017 |

## Skills

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**Advanced:** Python • Shell • Linux Systems Administration

**Intermediate:** C/C++ • Go • JS • PHP • MATLAB • Docker • Kubernetes • Computer Vision • Machine Learning • Optimization and Optimal control • Statistical Inference • ROS • Gazebo • PyTorch