

# Varshith Sreeramdas

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## Experience & Education

### Frontier Robotics, Honda Innovative Research Excellence (R&D)

Tokyo, Japan

RESEARCH ENGINEER

2019 - Present

- Working on Classical Control and Deep Reinforcement Learning for Dexterous Manipulation.

### Indian Institute of Technology Bombay (IITB)

Mumbai, India

B.TECH. IN COMPUTER SCIENCE AND ENGINEERING (WITH HONORS, THESIS) | GPA: 8.72

2015 - 2019

- Advanced Machine Learning, Foundations of Intelligent and Learning Agents, Organization of Web Information, Neuromorphic Engineering, Computer Graphics, and other core CS courses.
- Thesis advised by **Prof. Sunita Sarawagi**.

### Honda Research Institute Japan (HRIJP)

Tokyo, Japan

SUMMER INTERNSHIP

2018

- Worked on synthesizing motion gestures for Japanese Sign Language from language tokens.

## Research Interests

Reinforcement Learning, Latent Models, Bayesian Reasoning for Robotics, Geometric Perception, NLP.

## Key Research

### Dexterous In-Hand Manipulation using Data driven Deep Reinforcement Learning

Honda R&D

AKINOBU HAYASHI, TADAOKI HASEGAWA

Apr '20 - Aug '21

- Evaluated baseline, existing demo-based and offline Deep RL methods in simulation on dexterous In-Hand Manipulation tasks involving **transitions among tripod, precision and power grasps** of cylindrical, cuboidal objects.
- Collected expert demonstrations using manually designed controllers, and exploration data with noisy behaviour-cloned policies, on **real in-house prototype Robot Hand** with motion capture for object pose tracking.
- Deployed RL on real setup to achieve tolerance to init. noise of ranges 4cm and 30° in two tasks resp. **[PR] [Video]**

### Hierarchical RL of Motor Primitive based Robotic Manipulation Control

Honda R&D

PROF. TAKAYUKI OSA, AKINOBU HAYASHI

Apr '20 - Sept '21

- Deep RL framework for gating policies that operate Dynamic Motion Primitives with **inferable goal, duration**.
- Investigated variants involving primitive interruption heuristics, duration inference mechanisms, optimization of inference costs, local planning, utilization of sub primitive trajectory information for frequent network updates.
- Evaluated exploration efficiency, **trajectory smoothness** with Maze Navigation, Box Pushing, InHand Manipulation.

### Out-of-Distribution metrics for Active Learning | Adaptation of Prediction Services

IITB

PROF. SUNITA SARAWAGI, PROF. SOUMEN CHAKRABARTI | UNDERGRADUATE THESIS

July '18 - May '19

- Evaluated out-of-distribution (OOD) detection methods involving image classifiers: likelihood temperature scaling (TS), Variational Information Bottlenecks, multi-label and calibrated NNs, perturbation based detectors (ODIN).
- Investigated applicability of OOD-ness as a **proxy for informativeness** of data samples in Deep Active Learning.
- Extended TS, ODIN to sequence inputs for Active Domain Adaptation in Named Entity Recognition (NER). **[Report]**
- Adaptation of cloud NER services with sub-optimal performance on client domains with obscure tokens.
- Built **contextual token substitution** model based on ELMO language model architecture to adapt input sentences.
- Employed RL with sentence, token level rewards based on discrepancy b/w true labels and predictions from service.
- Surveyed use of sentiment aware embeddings for improving exploration for sentiment classification. **[Report]**

### Augmenting Scene Graph Generation with Knowledge from Corpora

IITB, IBM Bangalore

PROF. SOUMEN CHAKRABARTI, AMRITA SAHA | INDEPENDENT STUDY UNDER FACULTY

Jan '19 - April '19

- Studied various sources of side information to improve Scene Graph Completion in a gold data-scarce scenario.
- Built pipeline to parse text corpus, infer relevant entities and relations, and construct usable priors using OpenIE.
- Implemented and evaluated **LK distillation**, a method of prior incorporation, to improve Neural-Motifs.
- Investigated methods to deal with relation label space discrepancy among text and visual sources. **[Report] [Code]**

## Social Engagement

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### Synergy From Diversity

FRONTIER ROBOTICS (DIVISION)

Honda R&D

Apr '21 - Present

- Co-established a working group to promote cultural sensitivity among different nationalities, and communication in the context of remote work during COVID-19. Organizing language exchange sessions and sensitivity workshops.

### Academic Mentor

CSE DEPARTMENT ACADEMIC MENTORSHIP PROGRAM

IITB

May '18 - May '19

- Mentored 7 sophomore students, helped coordinate solutions to common academic problems with CSE Dept.
- Advised a back-logged student under the [Academic Rehabilitation Program](#).

### Teaching Assistant

SOFTWARE SYSTEMS LAB, AUTUMN 2018

IITB

July '18 - Nov '18

- Delivered guest lectures on Build Tools and Introduction to Android Development.
- Awarded 'Certificate of Excellence' for the Month of Oct '18 in the CSE Dept.

## Scholastic Achievements

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- 2015 **AP Grade**, Exceptional Performance in Engineering Graphics (awarded to less than top 1%).
- 2015 **All India Rank 204**, Joint Entrance Examination (JEE) Advanced, among 150,000 candidates.
- 2014 **All India Rank 710**, Awarded the KVPY Scholarship from the Government of India.
- 2014 **Top 1%**, State of Andhra Pradesh, India, National Standard Exam Physics, IAPT.

## Other Projects

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### Sign Language Synthesis with Adversarial Styling

BROCK, HEIKE | SUMMER INTERNSHIP

HRIJP

May '18 - July '18

- Developed seq-to-seq models to synthesize motion gestures of an animated character from annotated sentences.
- Studied incorporation of natural human-like variability into gestures using adversarially learnt style features.
- Investigated various representations of orientations for efficient learning in a data scarce scenario. [\[Report\]](#)[\[Code\]](#)

### Hand Gesture Recognition

INSTITUTE TECHNICAL SUMMER PROJECT | SELF PROJECT

IITB

June '16

- Built a gesture recognition glove using accelerometer, gyroscope, flex sensors & Bluetooth module.
- Interfaced sensors with microprocessors that relayed data to an Android mobile device.
- Matched gesture data with prerecorded static and dynamic gestures using Dynamic Time Warping.
- Performed preliminary investigations into recognition algorithms using sequence classification models using weka.

## Frameworks, Minor Projects

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<b>Deep RL</b>	AWAC (rlkit), DAPG (mjrl), SAC, TD3, baselines (OpenAI).
<b>Simulators, Control</b>	PyByllet, ROS, MoveIt, Pinocchio (basic).
<b>NN Models</b>	VAEs for Representation Learning; LSTMs for Music Synthesis; Deep Kalman Filters for Time Series Forecasting; RL of Spiking Neural Networks for Inverse Pendulum.
<b>ML Libraries</b>	PyTorch, TensorFlow (1, 2), CUDA (basic).
<b>Others</b>	Git, pybind11, OpenGL, <del>TeX</del> .

## Miscellaneous

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Assisted in <b>recruitment activities</b> of Honda R&D from premier engineering universities in India.	2021
<a href="#">N4 level proficiency</a> in Japanese Language - On track for N3 in Dec '21.	2021
Participated in the Performance Arts Festival, IIT Bombay as a part of the winning dance team.	2015