Aravind Narayanan

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Education

International Institute of Information Technology, Hyderabad **Aug. 2019 – May 2023***

B.Tech. in Electronics and Communication Engineering(Honors); CGPA: 9.17/10.0 *Hyderabad, India*

DPS Modern Indian School, Doha, Qatar **2015 – 2019**

High School Diploma; 95.8% in AISSCE; 3rd Rank in the graduating class *Hyderabad, India*

Experience

Robotics & Manufacturing Automation Laboratory **May 2022 – Present**

Visiting Research Student *McMaster University, Canada*

- Visiting Researcher in the Robotics and Automation Laboratory under Dr. Gary Bone on Collaborative Robot Arm Software Development project.
- Worked on the gesture recognition and obstacle avoidance for a manipulator to be able to pick up an object and give it to the human's hand using PCL libraries

Robotics Research Center, IIIT-Hyderabad **May 2021 – Present**

Undergraduate Student Researcher *Hyderabad, India*

- Worked on service robots for manipulation and localisation to perform day-to-day tasks under guidance of Dr.Nagamanikandan.
- Working on developing packages for a mobile manipulator to carry out tasks based on whole body manipulation
- Developing a E2E pipeline to be able to open variety of doors with using a Reinforcement Learning under guidance of Dr. Madhav Krishna and Dr.Nagamanikandan.

Precog, IIIT-D & Georgia Tech **September 2022 – Present**

Independent Study *Hyderabad, India*

- Recognizing dark behaviour of applications on Play store
- Working on developing ML fingerprinting techniques for classifying application behaviours as potentially fraudulent

Precog, IIIT-D & University of Michigan **May 2022 – Present**

Independent Study *Hyderabad, India*

- Analysing the Punjab Elections 2022 from a social media perspective to identify trends and correlation
- Involved in data collection, cleaning, analysis and visualisation using variety of Python libraries

Teaching

Teaching Assistant **May 2021 – March 2022**

- Planned assignments and took tutorials for the following courses: 'Intro. to Processor Architecture', 'Systems Thinking', and 'Probability and Random Processes'

Robotics Summer School Instructor **May 2022 – June 2022**

- Gave lectures on kinematics, transformations and ROS programming to a class of 30 juniors

Projects

Retinal Blood Vessels Segmentation **November 2021**

- Detection of retinal vasculature by using a morphological hessian-based approach and region-based Otsu thresholding.

Face Recognition using Eigenfaces **November 2021**

- Implement the method of Eigenfaces for face recognition by projecting the face images on the feature space which best represents the variations among distinct faces and did a comparative analysis with Fischer faces

Planning Algorithms **April 2022**

- Motion planning using RRT and Model Predictive Control with Collision Cone constraints.
- Time-scaling based collision avoidance maneuvers for non-holonomic robots.
- Fit Bernstein polynomials to model the trajectory of a non-holonomic robots.

Computer Vision Algorithms **November 2021**

- Perspective-n-Points and Iterative Closest Points for pose estimation and odometry
- Bundle Adjustment for 'Structure from Motion' with noisy pose.
- Camera calibration using Direct Linear Transform and Zhang's method.

Mini-SLAM **November 2021**

- Pose-graph optimisation for 2D-SLAM using non-linear least squares, with odometry and loop-closure constraint

5-Staged Pipe-lined Processor based on Y86-ISA **February 2021**

- A Y86-64 processor implemented in Verilog capable of running small programs.
- Based on Y86-64 ISA with emphasis on modularity in design. Sequential and 5 stage pipe-lined designs.
- RTL design in Verilog for analyzing RTL characteristics, SPICE netlist for transistor level simulations and analysis and Magic layouts for post layout simulations to analyze the effect of parasitics.

Technical Skills

Topics of Interest: Robotics, Perception, ML & AI, Mechatronics, Control Systems
Operating System: Linux, Windows
Robotics and Vision: ROS, Gazebo, PyBullet, Open3D, PCL
Programming Languages: C/C++, Python, R, MATLAB, Verilog, Ngspice, JavaScript
Frameworks: Pytorch, Sklearn, OpenCV, Pandas, Numpy, Scikit-learn
Miscellaneous: SQL, MongoDB, Markdown, Git, Bash, Multism, MAGIC

Relevant Coursework

- Mobile Robotics
- Robotics Dynamics & Control
- Statistical Methods in AI
- Digital Image Processing
- Robotics: Planning & Navigation
- ICTs for Development
- Data Structures & Algorithms
- Digital Systems & Micro-controllers
- Communication & Controls in IoT
- Systems Thinking
- Multivariate Statistical Modelling
- Neural and Cognitive Modeling
- Processor Architecture
- Robotics: Planning and Navigation
- VLSI Design
- Prob. and Random Processes
- Linear Algebra
- Analog Electronic Circuits

Achievements and Activities

Public Relations Head **Jan 2020 – June 2022**

Entrepreneurship Cell, IIIT Hyderabad

- Worked in organising one of India's largest student-run hackathon - Megathon.
- Headed the marketing team to organise 'Startup Aid' - a new initiative called Startup Aid to increase and promote the startup culture on campus.

Club Coordinator **June 2020 – Sept 2021**

Pentaprism, Photography Club & Electronics and Robotics Club, IIIT Hyderabad

- Organised different club activities and sessions for the college community

Globalink Research Award Recipient **Dec 2021**

MITACs Canada

- Awarded the competitive MITACs Canada Globalink Research Internship to pursue fully-funded 12-week research internship
- Awarded the Globalink Graduate Fellowship, 15,000 CAD in financial support to return to Canada for full master's or PhD programs, or Postdoctoral fellowships at any Mitacs partner institution.

Dean's and Merit List **Oct 2022**

IIIT-Hyderabad

- Awarded for Academic Excellence in 5 out 6 completed semesters

Top 3% ile in JEE Mains **April 2019**

National Testing Agency, India

- Obtained 97.3 percentile in Joint Entrance Examination.