Puneet Jain

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Education

Brigham Young University (BYU)
Doctor of Philosophy - Computer Science [Fall 2019-Present]

Brigham Young University (BYU)
Masters (Thesis) - Electrical and Computer Engineering [Funded by the ECEn Dept. @ BYU] [2017-19]

Indraprastha Institute of Information Technology, Delhi (IIIT-Delhi)
Bachelors of Technology (with Honors) - Electronics and Communication [**Department Rank**: 1] [2013-17]

Journal papers

- [Pre-print] **Puneet Jain**, O. P. Singh, Sachit Butail, "*Dynamics of mosquito swarms over a moving marker*", arXiv preprint arXiv:2007.04254. (under-review in Bioinspiration and Biomimetics)
- Ambuj Mehrish, Prerna Singh, **Puneet Jain**, A.V Subramanyam, Mohan Kankanhalli, "*Egocentric Analysis of Dash-cam Videos For Vehicle Forensics*", accepted in IEEE Transactions on Circuits and Systems for Video Technology.

Conference papers

- **Puneet Jain**, Cammy Peterson, "*Encirclement of Moving Targets using Relative Range and Bearing Measurements*", presented as a contributed paper in the Proceedings of the 2019 International Conference on Unmanned Aircraft Systems (ICUAS'19)
- Rishav Jain, Rohan Tiwari, **Puneet Jain**, Sujit PB, **"***Distributed Fault Tolerant and Balanced Multi-Robot Area Partitioning for Coverage Applications",* accepted as a contributed paper in the Proceedings of the 2018 International Conference on Unmanned Aircraft Systems (ICUAS'18)
- Rohan Tiwari*, **Puneet Jain***, Sachit Butail, Sujit Baliyarasimhuni and Michael Goodrich, "*Effect of Leader Placement on Robotic Swarm Control*", accepted as a full paper in the Proceedings of the 16th International Conference on Autonomous Agents and Multiagent Systems (AAMAS2017) [*Acceptance Rate 26%*] (*equal contribution)
  [Received AICTE-INAE Travel Grant, presented the paper in AAMAS2017 in Sao Paolo, Brazil]

Short paper/Poster presentations

- **Puneet Jain**, Sachit Butail, "*Frequency Response Analysis of Mosquito Swarming over a Marker*", accepted as a poster presentation at SIAM Conference on Applications of Dynamical Systems (DS19) to be held in May 2019.
- Nipun Batra, Manoj Gulati, **Puneet Jain**, Kamin Whitehouse, and Amarjeet Singh, *"Bits and Watts: Improving energy disaggregation performance using power line communication modems"*, presented as short (poster) paper at the 1st ACM International Conference on Embedded Systems For Energy-Efficient Buildings (BuildSys' 2014).
  [Also accepted for presentation in Microsoft Techvista'15]

Experience

Research Assistant, HCMI Lab, BYU [Present] **Advisor:** Dr. Mike Goodrich
Use of graph-theoretic methods for distributed optimization.

Research Assistant, Magicc Lab, BYU [2017-2019] **Advisor:** Dr. Cammy Peterson
Decentralized estimation and non-linear tracking control algorithms for UAVs/AUVs, achieving communication and self-organization using only relative information from the target.

Research & Development Intern, Zenatix [Summer 2016] **Advisor:** Dr. Amarjeet Singh (CTO)
Worked on hardware and firmware design of nRF (radio) based low power temperature sensing device and deployment of WiFi based temperature sensors, for communicating with the base smart meter for energy monitoring for office buildings.

Research Intern, Emergent and Autonomous Systems Lab, IIIT Delhi [Summer 2015] **Advisor:** Dr. Sachit Butail
Worked on analyzing the collective behavior in pill bugs by processing data for varying density of Pill bugs moving in an annular region.

Research Intern, Energy Lab, IIIT Delhi [Summer 2014]
Studied approaches for Non Intrusive Load Monitoring, including Electromagnetic Interference from SMPS devices and data rate of PLC Modems.

Projects

Masters Thesis: Controller Design for Coordinated Encirclement of Moving Targets [pdf]
Developed controllers for unmanned vehicles using Lyapunov theory and feedback linearization for encircling targets moving with constant acceleration. Proposed estimation framework and vehicle arrangement for constant velocity targets. **Advisor:** Dr. Cammy Peterson

Undergraduate Thesis: Frequency Response Analysis of Mosquito Swarming Behaviour [pdf]
Built a laboratory microcosm at the National Institute of Malaria Research for studying mosquito swarming behavior. Developed experimental setup for system identification of insect swarming over a marker. Performed frequency domain analysis of marker following behavior using control-theoretic methods. **Advisors:** Dr. Sachit Butail, Dr. P.B. Sujit
[Second prize at IIIT-Delhi Research Showcase Demo Presentation] *[Nominated for best Bachelors Thesis]*

Low power device for Snow Petrel's nest in Antarctica
Hardware and firmware design for a device used to detect the foraging patterns and the temperature in the nests of Snow Petrels, using Arduino Pro Mini, temperature and light sensors, SD Card and a 3D printed enclosure. Worked with Wildlife institute of India to deploy the device in Antarctica.

Audio localization using ENF signatures
Worked on using the ENF signatures embedded within audio recordings for forensic purpose, as part of Signal Processing Cup 2016. [Report]

Awards

- All Round Performance Medal in ECE (2013-17), IIIT-Delhi (Best out of the 2013-17 batch of 175 students)
- Best Academic Performance in ECE (2013-17), IIIT-Delhi (Best out of 35 students, Top 5 in batch of 175 students)
- IIIT-Delhi's Dean's list for Academic Excellence in the term 2015-16
- In Top 3 teams: Hackathon at Summer School for IoT by Microsoft Research, Bangalore and IISc Bangalore
- Summer School for IoT organized by Microsoft Research, Bangalore and IISc Bangalore: Hackathon 3rd position
- IIIT-Delhi Research Showcase 2015: Hardware Hackathon Winner

Skills

Languages & Tools: MATLAB, Python, C, C++, ROS, EagleCAD
Hardware: Arduino, RaspberryPi, Intel Galileo, ESP WIFi boards, nRF (Nordic) radio, Emlid RTK GPS, 3DR Radio

Positions Held

- Teaching Assistant
  - *Design of Control Systems* for Fall 2017 (BYU)
  - *Embedded Logic Design* for Fall 2015 (IIIT-Delhi)
  - *Digital VLSI Design* for Fall 2016 (IIIT-Delhi)
  - *Introduction to Robotics* for Winter 2017 (IIIT-Delhi)
- Mentor for a group of 10 undergraduate first year students during my senior year at IIIT-Delhi

Community Work

I taught Math, Science and Music to orphan girls aged 8 - 15 and Math and English to high school children, associating with the NGO - Udayan Care for 2 months during the summer of 2015, for about 15 hours a week.

Extra-Curricular Activities

I am fond of mentoring. I've taught Math and Science to school kids, and have helped my cousins, friends, and orphan children understand applicability of what they study. I have also organized and spoken at robotics workshops at my

college IIIT-Delhi, teaching freshmen from various colleges about building simple robots and different control algorithms to control them.

I play basketball, and have represented my school and college in Delhi in various tournaments (won twice!). I also love playing table-tennis few times a week. I play the keyboard and have represented my college (IIIT-Delhi) and high school, in New Delhi for the same. I have also performed at the International Arts Week, held by Kiran Nadar Museum of Arts, Delhi in 2013. I love music and currently trying to learn to play a Ukulele. I also like organizing events, and have been in the organizing committee and event teams for the annual technical and cultural festivals during my bachelors.