Sarthak Ahuja

Contact Information

Working remotely from
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Education

Robotics Institute, Carnegie Mellon University, Pittsburgh
Master of Science, Robotics, *GPA 4.24/4.33* — Aug. 2018 - Aug. 2020
Courses: Computer Vision, Machine Learning, Visual Learning and Representation, Planning for Robotics, Deep Reinforcement Learning

Indraprastha Institute of Information Technology, Delhi
Bachelor of Technology (Honors), Computer Science, *GPA 9.1/10.0* — Aug. 2012 - May 2016

Experience

Machine Learning Engineer II, Amazon Alexa AI — Aug. 2020 onwards
Member of the Intelligent Decisions group and Dynamic Routing Science team building automated and scalable self-learning ML systems that predict and dynamically route user intents to appropriate Alexa actions.

Graduate Research Assistant, Robotics Institute — Oct. 2019 to Aug. 2020
Master's thesis research advised by Prof. Henny Admoni and Prof. Aaron Steinfeld. Worked on improving a robot's self-assessment capabilities - particularly reasoning about the effects of a robot's actions on the operating environment; learning vision-based physics intuition models that guide robots to conduct safe manipulation decisions.

Research Software Engineer, IBM Research India — July 2016 to July 2018
Member of the Collaborative AI team. Lead developer and researcher for IBM Watson Recruitment, a real-time data analytics platform that shortlists the most qualified candidates for a given job. Research focused in the domains of natural language processing (dynamic taxonomy generation and semantic similarity computation) and multi-agent systems (human behavior modeling in repeated social dilemmas).

Research Associate, PreCog Research Group, IIIT-Delhi — May 2016 to July 2016
Advised by Prof. Ponnurangam Kumaraguru. Developer on Project-O, Precog's social media analytics platform. Research focused in the domain of social systems and computer vision - particularly on patch-based visual summarization of social media events using discriminative learning.

Research Intern, Infosys Center for AI, IIIT-Delhi — May 2015 to July 2015
Core member of IIIT-Delhi's Autonomous Car Team - Swarath. Led a team of two, to design and develop the car's perception system; explored and deployed multiple SLAM algorithms for visual positioning and navigation using wearable and vehicle dashboard monocular cameras.

Selected Peer-Reviewed Publications

- Newman, B*; Biswas, A*, **Ahuja, S.**, Admoni, H.; Examining the Effects of Anticipatory Robot Assistance on Human Decision Making, International Conference on Social Robotics (ICSR) 2020
- **Ahuja, S.**, Admoni, H., Steinfeld, A.; Learning Vision-Based Physics Intuition Models for Non-Disruptive Object Extraction from Clutter, International Conference on Intelligent Robots and Systems (IROS) 2020
- Vallam, R., **Ahuja, S.**, Chaudhuri, R., Sajja, S., Pimplikar, R., Mukherjee, K., Parija, G.; Interactive POMDPs for Social Decision Making with Dynamic Focus on Agents, Proceedings of the International Conference on Autonomous Agents and Multi-Agent Systems (AAMAS) 2019 (pp. 674-682)
- Goel, S., **Ahuja, S.**, Subramanyam, A., Kumaraguru, P.; #VisualHashtags: Visual Summarization of Social Media Events Using Mid-Level Visual Elements, Proceedings of the ACM International Conference on Multimedia (ACMMM) 2017, (pp. 1434-1442)

Patent Applications

- **Ahuja, S.**, Mukherjee, K., Mondal, J., Singh, S.; App-lause - Automatic Audience Generation and Simulation for Immersive Rehearsals U.S. Patent No. 10970898 (2021)
- **Ahuja, S.**, Singh, S., Parija, G., Chaudhuri, R., Kuchhal, M., Kataria, M.; SIdeal: System and Method for Attribute Weight Induction in a Multiple Recruiter Setting Exploiting Public Goods Games Framework, U.S. Patent Application No. 15/842,066 *(pending)*
- George, D., Mondal, J., Singh, S., **Ahuja, S.**, Medicke, J., Klabzuba, A.; System and Method to Produce Generalized Representation of Job Description Documents and Calculate Similarity Using the Representation in Recruitment Domain, U.S. Patent Application No. 15/854,837 *(pending)*

Poster Presentations

- **Ahuja, S.**, Admoni, H., Steinfeld, A.; Learning Physics Intuition Models for Non-Disruptive Object Extraction from Clutter, Northeast Robotics Colloquium 2019, University of Pennsylvania

Selected Projects

Informed Multi-Representation Multi-Heuristic A*
- Implemented an informed version of MRMHA* that uses past plans to control future state expansions; Used Conditional-VAEs to learn a sampling distribution (Ichter et al. ICRA 2018) over state expansions on subsets of the state-space to better schedule expansions from their corresponding queues.

Assistive Sketching and Animation Using Shape-Aware Moving Least Squares Deformations
- Developed an end-to-end sketching platform which assists an artist to draw complex non-convex 2D characters and dynamically animate them using a Kinect; Implemented drawing tools using bezier curves, distance-transform based skeletonization, and shape-aware deformations (Sharma et al. SA 2015).

Semi-Supervised Stance Detection in Tweets
- Implemented a heuristic-based semi-supervised learning approach, LDA2Vec (Moody CoNLL 2016) for stance detection that learns a coherent and informed embedding comparable to Para2Vec, concurrently bolstering interpretability of topics by creating representations similar to those in Latent Dirichlet Allocation.

Deep Learning Based Dynamic Taxonomy Generation
- Developed a semi-supervised learning approach for dynamically generating a large taxonomy over a large dataset of keywords; Proposed a novel LSTM based architecture that learns over random branches of a small seed taxonomy and uses the trained model to place unseen words under an appropriate parent word.

Speech-Based Distress Detection
- Created an android application that uses a two-stage contextual supervised learning algorithm (Sharma et al. TASLP 2015) to robustly detect speech based distress activity in urban spaces; Developed a web dashboard to monitor the generated alarms and mine for large-scale occurrence patterns in real-time data.

Multi-Agent Path Planning (MAPP) for Warehouse Butlers
- Hacked an implementation of Pacman to create a simulator with multiple robots trying to reach their resp. goals simultaneously. Implemented a Multi-Agent Path Planning Algorithm (Wang et al. ECAI 2010) and analyzed characteristic warehouse designs and how they affect the quality of the generated plans.

CoDrive: Crowd Sourced Memory Sharing
- Built a crowd-sourcing based android application to allow temporary sharing of phone memory space among peers easily and securely.

Academic Service

- Reviewer, Conference on Information and Knowledge Management 2019
- Reviewer, International Conference on Robotics and Automation 2021
- Reviewer, International Conference on Intelligent Robots and Systems 2021
- Reviewer, IEEE Robotics and Automation Letters 2021

Workshops Attended

International Institute of Information Technology, Hyderabad — July 2016
Summer School, Deep Learning in Computer Vision

Selected Honors and Awards

- Nominated for Best Student Paper at IROS 2020 for the paper "Learning Vision-Based Physics Intuition Models for Non-Disruptive Object Extraction from Clutter".
- Awarded the Graduate Student Conference Funding by the Graduate Student Assembly and the Provosts Office to present research at AAMAS 2019.
- J.N. Tata Scholar - Awarded the J.N. Tata Scholarship 2019 for pursuing graduate studies at CMU.
- Runners-Up, Space Innovation Challenge 2018, CMU Tepper School of Business.
- Winning Team, Consensys Award at HackInOut 2017, for the developing "VoteChain - Blockchains for Decentralized Elections".
- Awarded the IBM Manager's Choice Award 2016.
- Awarded the All Round Performance Medal for the overall performance in curricular and extra-curricular activities in the B.Tech. (CSE) program 2016.
- First Prize in the Technical Paper Presentation event at Cogenesis 2016, Delhi Technological University for "Multi-Sensor Data Fusion for Human Activity Recognition".
- Best Demo Award in the Elevator Pitch Event at IIIT-Delhi Research Showcase 2015 for "Distress Detection".

Teaching Experience

Teaching Assistant
- 46-891: Mining Unstructured Data, CMU — Fall 2018
- CSE344/544: Computer Vision, IIIT-Delhi — Winter 2016
- CSE201: Advanced Programming, IIIT-Delhi — Monsoon 2015
- CSE102: Data Structures and Algorithms, IIIT-Delhi — Winter 2015
- CSE101: Introduction to Programming, IIIT-Delhi — Monsoon 2014