

# Sarthak Ahuja

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CONTACT INFORMATION	Working remotely from Vancouver, BC	<a href="http://sarthakahuja.org">sarthakahuja.org</a> <a href="mailto:sarthakahuja[at]outlook[dot]com">sarthakahuja[at]outlook[dot]com</a>
EDUCATION	<b>The Robotics Institute, Carnegie Mellon University</b> , Pittsburgh Master of Science, Robotics, <i>GPA 4.24/4.33</i> <b>Courses:</b> Computer Vision, Machine Learning, Human-Robot Interaction, Planning for Robotics, Deep Reinforcement Learning	Aug. 2018 - Aug. 2020
	<b>Indraprastha Institute of Information Technology (IIIT)</b> , Delhi Bachelor of Technology (Honors), Computer Science, <i>GPA 9.1/10.0</i>	Aug. 2012 - May 2016
EXPERIENCE	<b>Machine Learning Engineer II, Amazon Alexa AI</b> Member of the dynamic routing science team in the <a href="http://NaturalUnderstanding.org">Natural Understanding</a> org building scalable end-to-end self-learning ML systems that predict and dynamically route user intents to appropriate Alexa actions.	Aug. 2020 onwards
	<b>Graduate Research Assistant, The Robotics Institute</b> Advised by <a href="#">Prof. Henny Admoni</a> and <a href="#">Prof. Aaron Steinfeld</a> . Worked on improving a robot's self-assessment capabilities using vision-based physics intuition models that guide robots to conduct safe manipulation decisions; Researched the effects of anticipatory robot motion during human-robot interactions.	Oct. 2019 to Aug. 2020
	<b>Research Software Engineer, IBM Research India</b> Member of the <a href="#">Collaborative AI</a> team and lead developer for <a href="#">IBM Watson Recruitment</a> . Research lied in domains of natural language processing (dynamic taxonomy generation and semantic similarity computation) and multi-agent systems (human behavior modeling in repeated social dilemmas).	July 2016 to July 2018
	<b>Research Associate, PreCog Research Group, IIIT-Delhi</b> Advised by <a href="#">Prof. Ponnurangam Kumaraguru</a> . 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.	May 2016 to July 2016
	<b>Research Intern, Infosys Center for AI, IIIT-Delhi</b> Advised by <a href="#">Dr. Saket Anand</a> . Core member of IIIT-Delhis Autonomous Car Team - <a href="#">Swarath</a> working on the perception system architecture and testing framework; Research focused on SLAM algorithms for visual positioning and navigation using wearable and vehicle dashboard monocular cameras.	May 2015 to July 2015
SELECTED PEER-REVIEWED PUBLICATIONS	<ul style="list-style-type: none"><li>- <b>Ahuja, S.</b>, Kachuee, M.; Sheikholeslami, F.; Liu, W., Do, J.; Scalable and Safe Remediation of Defective Actions in Self-Learning Conversational Systems, <a href="#">Association for Computational Linguistics (ACL) 2023</a></li><li>- Kachuee, M.; Nam, J.; <b>Ahuja, S.</b>; Won, J.; Lee, S.; Scalable and Robust Self-Learning for Skill Routing in Large-Scale Conversational AI Systems, <a href="#">North American Chapter of the Association for Computational Linguistics (NAACL) 2022</a></li><li>- Newman, B*; Biswas, A*, <b>Ahuja, S.</b>, Girdhar, S.; Kitani, K.; Admoni, H.; Examining the Effects of Anticipatory Robot Assistance on Human Decision Making, <a href="#">International Conference on Social Robotics (ICSR) 2020</a></li><li>- <b>Ahuja, S.</b>, Admoni, H., Steinfeld, A.; Learning Vision-Based Physics Intuition Models for Non-Disruptive Object Extraction from Clutter, <a href="#">International Conference on Intelligent Robots and Systems (IROS) 2020</a> [<b>Nominated for Best Student Paper</b>]</li><li>- Vallam, R., <b>Ahuja, S.</b>, Chaudhuri, R., Sajja, S., Pimplikar, R., Mukherjee, K., Parija, G.; Interactive POMDPs for Social Decision Making with Dynamic Focus on Agents, <a href="#">International Conference on Autonomous Agents and Multi-Agent Systems (AAMAS) 2019</a> (pp. 674-682)</li><li>- Mondal, J., <b>Ahuja, S.</b>, Singh, S., Mukherjee, K., Parija, G.; Benchmarking of a Novel POS Tagging Based Semantic Similarity Approach for Job Description Similarity Computation, <a href="#">European Semantic Web Conference (ESWC) 2018</a> (pp. 430-444). Springer</li><li>- <b>Ahuja, S.</b>, Mondal, J., Singh, S., George, D.; Similarity Computation Exploiting the Semantic and Syntactic Inherent Structure among Job Titles, <a href="#">International Conference on Service-Oriented Computing (ICSOC) 2017</a> (pp. 3-18). Springer</li><li>- Goel, S., <b>Ahuja, S.</b>, Subramanyam, A., Kumaraguru, P.; #VisualHashtags: Visual Summarization of Social Media Events Using Mid-Level Visual Elements, <a href="#">ACM International Conference on Multimedia (ACMMM) 2017</a>, (pp. 1434-1442)</li><li>- Singh, S., Chaudhuri, R., Kuchhal, M., <b>Ahuja, S.</b>, Parija, G.; Multi level clustering technique leveraging expert insight, <a href="#">Joint Statistical Meetings (JSM) 2017</a></li></ul>	

SELECTED  
PATENTS AND  
APPLICATIONS

- 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 No. 11410130](#) (**Granted 2022**)
- **Ahuja, S.**, Mukherjee, K., Mondal, J., Singh, S.; App-lause - Automatic Audience Generation and Simulation for Immersive Rehearsals [U.S. Patent No. 10970898](#) (**Granted 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)

SELECTED  
COURSE  
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-Sensor Data Fusion for Ego-Centric Human Activity Recognition**

- Created a real-time system to perform ensemble based sensor fusion between two signals for human activity detection, accelerometers and egocentric cameras, to improve the overall performance of the system.

**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.

ACADEMIC  
SERVICE

- Reviewer, Conference on Information and Knowledge Management (CIKM) 2019
- Reviewer, International Conference on Robotics and Automation (ICRA) 2021
- Reviewer, International Conference on Intelligent Robots and Systems (IROS) 2021
- Reviewer, IEEE Robotics and Automation Letters (RAL) 2021
- Reviewer, International Conference on Robotics and Automation (ICRA) 2023
- Reviewer, Conference on Empirical Methods in Natural Language Processing (EMNLP) 2023

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.
- Awarded the IBM Manager's Choice Award 2016.
- Awarded the [All Round Performance Medal](#) for outstanding overall performance in curricular and extra-curricular activities in the B.Tech. (CSE) program 2016.
- Awarded First Prize in the Technical Paper Presentation event at Cogensis 2016, Delhi Technological University for "Multi-Sensor Data Fusion for Human Activity Recognition".
- Awarded Best Demo Award in the Elevator Pitch Event at IIIT-Delhi Research Showcase 2015 for "Distress Detection".