

Kushal Kedia

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Research Interests

Robotics & AI: Robot Learning, Human-Robot Interaction, Model-Based RL, Motion Planning

Academics

Ph.D. in Computer Science Cornell University	2022 - 2027 (expected)
B. Tech in Electronics (Minor: Computer Science) Indian Institute of Technology (IIT) Kharagpur	2018 - 2022 Grade: 9.53/10

Publications

- Kushal Kedia**, Atiksh Bhardwaj, Prithwish Dan, and Sanjiban Choudhury. InterACT: Transformer models for human intent prediction conditioned on robot actions. *Submitted to ICRA*, 2024
- Kushal Kedia**, Prithwish Dan, Atiksh Bhardwaj, and Sanjiban Choudhury. ManiCast: Collaborative manipulation with cost-aware human forecasting. *7th Annual Conference on Robot Learning (CoRL)*, 2023 [OpenReview]
- Kushal Kedia**, Prithwish Dan, and Sanjiban Choudhury. A game-theoretic framework for joint forecasting and planning. *2023 IEEE/RSJ International Conference on Intelligent Robots and Systems (IROS)*, 2023 [Project Page]
- Punyajoy Saha, Divyanshu Sheth, **Kushal Kedia**, Binny Mathew, and Animesh Mukherjee. Rationale-guided few-shot classification to detect abusive language. *26th European Conference on Artificial Intelligence*, 2023 [PDF]
- Troy McMahon, Aravind Sivaramakrishnan, **Kushal Kedia**, Edgar Granados, and Kostas E. Bekris. Terrain-aware learned controllers for sampling-based kinodynamic planning over physically simulated terrains. *2022 IEEE/RSJ International Conference on Intelligent Robots and Systems (IROS)*, 2022 [PDF]

Peer-Reviewed Workshop Papers

- Kushal Kedia***, R. Jenamani*, R. Kumar*, and P. Mall*. Robotic Motion Planning Using Learned Critical Sources & Local Sampling. In *MLPC Workshop*, ICRA 2020 [PDF] [Video]
- Kushal Kedia** and A. Nandy. Offensive Language Identification in Dravidian Languages. In *First Workshop on Speech and Language Technologies for Dravidian Languages*, EACL 2021 [PDF] [Poster]

Research Experiences

PoRTaL Group, Cornell University 🎓 <i>Guide: Prof. Sanjiban Choudhury</i>	<i>Jul '22 - Current</i>
<ul style="list-style-type: none">Integrated human motion forecasting for collaborative manipulationDeveloping game-theoretic frameworks for joint forecasting and planning	
PRACSYS Group, Rutgers University 🎓 <i>Guide: Prof. Kostas Bekris</i>	<i>Mar '21 - Apr '21</i>
<ul style="list-style-type: none">Improving the efficiency of kinodynamic planning for mobile robots using data-driven techniquesContributed to ML4KP: A library for integrating machine learning with kinodynamic planning	
Microsoft Research Labs India 🎓 <i>Multilingual NLP Intern</i>	<i>April '21 - July '21</i>
<ul style="list-style-type: none">Worked on predicting the performance of multilingual LLMs on low-resourced languages as part of Team LITMUS (Linguistically Informed Testing of Multilingual Systems)	

Multi-Agent Research Group, IIT Kharagpur   *Guide: Prof. Partha P. Chakrabari* Jan '21 - May '22

- Designed optimal Multi-Agent Path Finding (MAPF) algorithms for sequential task assignment and collision-free routing in manufacturing applications with inter-task precedence constraints

Hate Alert, IIT Kharagpur *Guide: Prof. Animesh Mukherjee* Dec '20 - Nov '21

- Developed explainable models for abusive language detection using rationale prediction networks

Kharagpur RoboSoccer Students Group  *3-D Simulation Humanoid Team* Feb '19 - Mar '21

- Worked on skills like passing & defense on top of C++ framework to enhance game strategy for Robocup
- Optimized parameters of walk-engine using CMA-ES; increased speed of humanoid from 5m/s to 9.5m/s

Mentorship and Outreach

Head, Technology Robotix Society, IIT Kharagpur

Leading a 3-tier team to execute the annual Robotix fest & conducting workshops; In charge of Makerspace - an open source lab for robotics enthusiasts seeking guidance & components

IEEE Mentor, Winter School of AI & Robotics, IIT Kharagpur

Mentored 100+ students in week-long workshops on Machine Learning & Image Processing

Projects

ML Reproducibility Challenge 2022   *Reinforcement Learning Term Project* Sep '21 - Nov '21

- Reproduced the paper *Average-Reward Reinforcement Learning with Trust Region Methods*, IJCAI 2021

Annotator Influence on Hate-Speech Detection  *AI & Ethics Term Project* Jan '21 - Apr '21

- Analysed the influence of demographic attributes of the annotators on hate speech detection
- Showed that neural networks infer identity of annotators, thus biasing their predictions

Exploiting Code-Switching Patterns in NLP  *Guide: Prof. Animesh Mukherjee* May '20 - Dec '20

- Formulated 24 handcrafted features based on code switches and language spans in sentences
- Concatenated features with BERT embeddings improving F1 scores by 10% in 3 classification tasks

RRT* Simulator on Turtlesim  *Personal Project* Feb '19 - Mar '19

- Developed interactive GUI to simulate growth of RRT* avoiding obstacles using **OpenCV**
- Controlled movement from start to goal using a P-controller and animated the path in **ROS Turtlesim**

Technical Skills

Programming Languages: Python | C | C++ | MATLAB

Libraries & Tools: ROS | PyTorch | Keras | Boost-Graph | OpenCV | PyBullet | NetworkX | Unix

Academic Achievements

- **Top 1% among 1400+** undergraduate students at IIT Kharagpur
- Part of **bronze-winning** contingent at the 9th Inter-IIT Tech-Meet
- Among top 10 teams in the world that qualified for **RoboCup Humanoid League, 2021**
- Felicitated by **Chief Minister** of West Bengal for outstanding academic performance in ISC 2018