Rohan Chandra

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Rohan Chandra is currently a postdoctoral research fellow in Texas Robotics, advised by Dr. Joydeep Biswas and Dr. Peter Stone, at the University of Texas, at Austin. His research focuses on algorithms and systems for enabling robots to navigate safely and efficiently among humans. Rohan obtained his M.S. and Ph.D. in 2018 and 2022 from the University of Maryland advised by Dr. Dinesh Manocha, and completed his B.Tech from the Delhi Technological University, New Delhi in 2016. His doctoral thesis focused on autonomous driving in dense, heterogeneous, and unstructured traffic environments.

Education

Ph.D. in Computer Science — **University of Maryland, College Park**
Advisor: Dr. Dinesh Manocha — *August 2018 - May 2022*
Thesis: *Towards Autonomous Driving in Dense, Heterogeneous, and Unstructured Traffic*
Thesis Committee: Dinesh Manocha, Yiannis Aloimonos, Pratap Tokekar, Mac Schwager, Derek Paley

M.S. in Computer Science — **University of Maryland, College Park**
Advisor: Dr. Tom Goldstein — *August 2016 - May 2018*

B.Tech. in ECE — **Delhi Technological University, New Delhi**
August 2012 - May 2016

Employment

UT Austin (current) — **Austin, TX**
Postdoctoral Research Fellow — *June 2022 - Present*
My current research interests include robot planning, decision-making, and navigation in unstructured human environments, multi-agent RL, and autonomous driving.

NVIDIA — **Santa Clara, CA**
Applied Research Intern, Autonomous Driving (Prediction) — *Summer'21 (Remote)*
Improved ego-vehicle trajectory and behavior prediction via ego-goal conditioning by upto 50%. Improved navigation in particularly hard cases like U-turns and left turns–cases that the model struggled with.

Scholarships, Awards, and Honors

2023

Best Paper/Presentation Award
For the work, iPLAN: Intent-Aware Planning in Heterogeneous Traffic via Distributed Multi-Agent Reinforcement Learning, at the IROS 2023 Workshop on Advances in Multi-Agent Learning - Coordination, Perception, and Control.

SNU Ph.D. Talk Award
This award will be given to one of the two PhD research talks selected by the program committee of the IROS 2023 Workshop on Integrated Perception, Planning, and Control for Physically and Contextually-Aware Robot Autonomy as a recognition of excellent robotics research on autonomous navigation. The award amount is $\$1,000$ which is generously sponsored by Seoul National University (SNU) Research Center for Advanced Unmanned Vehicles.

Charles A. Caramello Distinguished Dissertation Award Finalist
A University level award that recognizes original work that makes an unusually significant contribution to the discipline. Four Awards are given each year in Mathematics, Physical Sciences, and Engineering, Social Sciences, Humanities and Fine Arts, Biological and Life Sciences. Recipients of the Charles A. Caramello Distinguished Dissertation Award receive an honorarium of $\$1,000$ and may be selected for nomination to the CGS/ProQuest Distinguished Dissertation Award competition.

Microsoft Future Leaders in Robotics and AI
This series is part of the University of Maryland and Microsoft Robotics and Diversity Initiative, sponsored by Microsoft DC Metro Engineering Site. This is a nationwide online seminar series for PhD students, postdoctoral researchers, or early-career professionals, especially underrepresented minorities and women. The seminar series will highlight the latest research and innovation in the field of robotics and AI.

Rising Star in AI (declined)
Hosted by the AI initiative at KAUST, this event is geared towards young researchers who have recently published significant works at leading AI venues.

2022

Invention of the Year Award Finalist for "Emotions Don't Lie"
To celebrate innovative campus research, the University of Maryland has been recognizing winners of the Inventions of the Year since 1987.

RSS Pioneer

RSS Pioneers is a workshop for senior Ph.D. students and postdocs, held in conjunction with the main Robotics: Science and Systems (RSS) Conference. The goal of RSS Pioneers is to bring together a cohort of the world's top early career researchers to foster creativity and collaborations surrounding challenges in all areas of robotics, as well as to help young researchers navigate their next career stages.

2021

Future Faculty Fellow

Selective program to prepare doctoral students to achieve career-long success in the academic world as educators and researchers and place selected students in leading institutions where they can have the greatest impact.

Invention of the Year Award Finalist for "M3ER"

To celebrate innovative campus research, the University of Maryland has been recognizing winners of the Inventions of the Year since 1987.

2020

- Awarded the **Summer Research Fellowship** by The Graduate School, UMD.

Publications

2023

1. Xiyang Wu, Rohan Chandra, Tianrui Guan, Amrit Singh Bedi, Dinesh Manocha. "iPLAN: Intent-Aware Planning in Heterogeneous Traffic via Distributed Multi-Agent Reinforcement Learning." *CoRL*, 2023 (oral).
2. Rohan Chandra, Rahul Maligi, Arya Anantula, Joydeep Biswas. "SOCIALMAPF: Optimal and Efficient Multi-Agent Path Finding with Strategic Agents for Social Navigation." *R-AL/IROS*, 2023.
3. Rohan Chandra, Xijun Wang, Mridul Mahajan, Rahul Kala, Rishitha Palugulla, Chandrababu Naidu, Alok Jain, Dinesh Manocha. "METEOR: A Massive Dense & Heterogeneous Behavior Dataset for Autonomous Driving." *ICRA*, 2023.

2022

1. Nilesh Suriyarachchi, Rohan Chandra, John S Baras, Dinesh Manocha. "GAMEOPT: Optimal Real-time Multi-Agent Planning and Control at Dynamic Intersections." *ITSC*, 2022.
2. Tianrui Guan, Jun Wang, Shiyi Lan, Rohan Chandra, Zuxuan Wu, Larry Davis, Dinesh Manocha. "M3DeTR: Multi-representation, Multi-scale, Mutual-relation 3D Object Detection with Transformers." *WACV*, 2022.
3. Tianrui Guan, Divya Kothandaraman, Rohan Chandra, Dinesh Manocha. "GANav: Group-wise Attention Network for Classifying Navigable Regions in Unstructured Outdoor Environments." *R-AL/IROS*, 2022.
4. Rohan Chandra, Dinesh Manocha. "GamePlan: Game-Theoretic Multi-Agent Planning with Human Drivers at Intersections, Roundabouts, and Merging." *ICRA/RAL*, 2022.
5. Rohan Chandra, Mingyu Wang, Mac Schwager, Dinesh Manocha. "Game-Theoretic Planning for Risk-Aware Human Drivers." *ICRA*, 2022.
6. Angelos Mavrogiannis, Rohan Chandra, Dinesh Manocha. "B-GAP: Behavior-Guided Action Prediction for Autonomous Navigation." *RAL*, 2022.

2021

1. Rohan Chandra, Aniket Bera, Dinesh Manocha. "Using Graph-Theoretic Machine Learning to Predict Human Driver Behavior." *IEEE Transactions on ITS*, 2021.
2. Divya Kothandaraman, Rohan Chandra, Dinesh Manocha. "BoMuDA: Boundless Multi-Source Domain Adaptive Segmentation in Unconstrained Environments." *ICCV*, 2021.
3. Divya Kothandaraman, Rohan Chandra, Dinesh Manocha. "SS-SFDA: Self-Supervised Source-Free Domain Adaptation for Road Segmentation in Hazardous Environments." *ICCV*, 2021.

2020

1. Trisha Mittal, Pooja Guhan, Uttaran Bhattacharya, Rohan Chandra, Aniket Bera, Dinesh Manocha. "EmotiCon: Context-Aware Multimodal Emotion Recognition using Frege's Principle." *CVPR*, 2020.
2. Uttaran Bhattacharya, Trisha Mittal, Rohan Chandra, Tanmay Randhavane, Aniket Bera, Dinesh Manocha. "STEP: Spatial Temporal Graph Convolutional Networks for Emotion Perception from Gaits." *AAAI*, 2020.
3. Trisha Mittal, Uttaran Bhattacharya, Rohan Chandra, Aniket Bera, Dinesh Manocha. "M3ER: Multiplicative Multimodal Emotion Recognition Using Facial, Textual, and Speech Cues." *AAAI* (oral), 2020.
4. Uttaran Bhattacharya, Christian Roncal, Trisha Mittal, Rohan Chandra, Aniket Bera, Dinesh Manocha. "Take an Emotion Walk: Perceiving Emotions from Gaits Using Hierarchical Attention Pooling and Affective Mapping." *ECCV*, 2020.
5. Trisha Mittal, Uttaran Bhattacharya, Rohan Chandra, Aniket Bera, Dinesh Manocha. "Emotions Don't Lie: An Audio-Visual Deepfake Detection Method Using Affective Cues." *ACM'MM*, 2020.
6. AJ Sathyamoorthy, Jing Liang, Utsav Patel, Tianrui Guan, Rohan Chandra, Dinesh Manocha. "Densecavoid: Real-time navigation in dense crowds using anticipatory behaviors." *RAL/ICRA*, 2020.
7. Rohan Chandra, Uttaran Bhattacharya, Trisha Mittal, Xiaoyu Li, Aniket Bera, Dinesh Manocha. "GraphRQI: Classifying

Driver Behaviors Using Graph Spectrums." *ICRA*, 2020.
8. Rohan Chandra, Uttaran Bhattacharya, Trisha Mittal, Aniket Bera, Dinesh Manocha. "RoadTrack: Tracking Road Agents in Dense and Heterogeneous Environments." *ICRA*, 2020.
9. Rohan Chandra, Tianrui Guan, Srujan Panuganti, Trisha Mittal, Uttaran Bhattacharya, Aniket Bera, Dinesh Manocha. "Forecasting Trajectory and Behavior of Road-Agents using Spectral Clustering in Graph-LSTMs." *IROS/RAL*, 2020.
10. Rohan Chandra, Uttaran Bhattacharya, Trisha Mittal, Aniket Bera, Dinesh Manocha. "CMetric: A Driving Behavior Measure Using Centrality Functions." *IROS*, 2020.

2019

1. Rohan Chandra, Uttaran Bhattacharya, Aniket Bera, Dinesh Manocha. "TraPHic: Predicting Trajectories of Road-Agents in Dense and Heterogeneous Traffic." *CVPR*, 2019.
2. Rohan Chandra, Uttaran Bhattacharya, Aniket Bera, Dinesh Manocha. "DensePeds: Pedestrian Tracking in Dense Crowds Using Front-RVO and Sparse Features." *IROS*, 2019.
3. Rohan Chandra, Uttaran Bhattacharya, Christian Roncal, Aniket Bera, Dinesh Manocha. "RobustTP: End-to-End Trajectory Prediction for Heterogeneous Road-Agents in Dense Traffic with Noisy Sensor Inputs." *CSCS*, 2019.

Professional Activities

- **Appointments:**
  - Associate Editor, RA-L (2023 - Present)
- **Workshop Chair/Co-Chair**:
  - RSS'23: Workshop on Multi-Agent Planning and Navigation in Challenging Environments.
  - IROS'23: The 2nd Workshop on Social Robot Navigation: Advances and Evaluation.
  - IROS'22: Behavior-driven Autonomous Driving in Unstructured Environments.
- **Program Committee**:
  - **Publicity and Social Media Chair** for the International Symposium on **Multi-Robot & Multi-Agent Systems 2023**.
  - ICCV'21 Workshop on Multi-Agent Interaction and Relational Reasoning.
  - Chaired the **Computer Vision for Autonomous Driving** session at **AAAI'23**.
  - Co-chaired the **Intelligent Transportation** session at **ICRA'22**.
- **Reviewer**:
  - CVIU'18 -'20, IJCAI'19, CoRL'19, CVPR'20 -'21, AAAI'20 -'21, ICRA'20 -'21, IROS'19 -'20, RAL'20 -'21, NeurIPS'20, ICLR'21, ICML'21, ICCV'21, RSS'22.
- **Graduate Admissions Committee**:
  - 2022-2023: UT Austin CS.
  - 2017-2018: UMD CS

Invited Talks

- IROS'23: Workshop on Integrated Perception, Planning, and Control for Physically and Contextually-Aware Robot Autonomy.
- IIIT-Hyderabad, IIIT-Delhi, IIT-Delhi
- Georgia Tech
- UPenn
- WACV'22: Hazard Perception in Intelligent Vehicles (HPIV) Workshop.
- RSS'21: Perception and Control for Autonomous Navigation in Crowded, Dynamic Environments Workshop.
- Maryland Robotics Center Student Seminar.

Students Supervised

- Divya Kothandaraman (Ph.D. at UMD, currently Ph.D. at UMD, supervised by Dr. Dinesh Manocha)
- Tianrui Guan (M.S. at UMD, currently Ph.D. at UMD, supervised by Dr. Dinesh Manocha)
- Zayne Sprague (M.S. at UT Austin, currently Ph.D. at UT Austin, supervised by Dr. Greg Durrett)
- Xiyang Wu (Ph.D. at UMD, currently Ph.D., UMD, supervised by Dr. Dinesh Manocha)

Grants/Proposals

TAS Hub (UKRI) **£18,149.50**

TAME Pain: Trustworthy AssessMEnt of Pain - Listening Between the Lines *Researcher Role*

The UKRI Trustworthy Autonomous Systems Program is the UK's flagship multi-disciplinary research program that looks to address the challenge of developing best practices for the design, operation, and governance of trusted and trustworthy autonomous systems for the benefit of society.

Teaching Assistant Experience

- **CMSC 250: Discrete Mathematics** — **University of Maryland, College Park**
  Taught by Jason Filippou — *Fall'17 and Spring'18*
- **CMSC 131: Introduction to Programming** — **University of Maryland, College Park**
  Taught by Fawzi Emad — *Spring'17*
- **CMSC 417: Computer Networks** — **University of Maryland, College Park**
  Taught by Ashok Agrawala — *Fall'16*

Outreach and Community Service

- Participated in the **Robotics Summer Camp 2023** at UT Austin where I demonstrated Texas Robotics autonomous mobile robot navigation to 20 high school and middle school students.
- **Judged** the special awards category for AAAI at the **International Science and Engineering Fair 2023**. High school students from around the world competed for nearly $9M$ in awards, scholarships at Regeneron ISEF 2023.
- Volunteered for **STEM Girl Day** on the UT Austin Campus: UT Austin's national award-winning STEM Girl Day gives K-8th graders a chance to explore STEM through grade-appropriate, hands-on activities hosted by scientists, engineers, astronomers, and mathematicians.
- Participated in the Future Leaders in Robotics and AI: Celebrating Diversity and Innovation Seminar Series as part of the University of Maryland and Microsoft Robotics and Diversity Initiative. This is a nationwide online seminar series for Ph.D. students and postdoctoral researchers, especially underrepresented minorities and women. The seminar series will highlight the latest research and innovation in the field of robotics and AI. The series is intended to provide exposure and mentorship opportunities to the speakers, build a network of innovators across the country, and support the speakers' career planning.
- **AI4ALL 2021:** Led a 2 week project for 5-6 high school students. Introduced them to various aspects of machine learning and artificial intelligence.
- **NYU AI School 2021:** Teaching basic machine learning and programming and discussing a career in machine learning research with students from underrepresented minorities.
- **AI4ALL 2020:** Teaching basic machine learning and programming and discussing a career in machine learning research with students from underrepresented minorities.

Patents

- Title: System and Method for Detecting Fabricated Videos U.S. Application No.: 17/515846 Filing Date: November 01, 2021
- Title: System and Method for Multimodal Emotion Recognition U.S. Application No.: 17/173018 Publication Date: February 10, 2021
- Title: Human Emotion Recognition in Images or Video U.S. Application No.: 17/349732 Publication Date: June 16, 2021