Uttaran Bhattacharya

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Education

University of Maryland 2018 – Present
Ph.D. Computer Science *Advisor: Dinesh Manocha* *GPA: 4.0/4.0* *College Park, MD, USA*

Indian Institute of Science 2015 – 2017
M.E. System Science and Automation *Advisor: Venu Madhav Govindu* *GPA: 6.8/8.0 (≡ 3.8/4.0)* *Bengaluru, India*

West Bengal University of Technology 2011 – 2015
B.Tech. Computer Science and Engineering *GPA: 9.31/10.00 (≡ 3.9/4.0)* *Kolkata, India*

Professional Experience

Google Research May 2022 – August 2022
Research Intern *Mountain View, CA, USA*

- Working facial expression synthesis.

Adobe Research, San Jose, CA, USA May 2020 – March 2021, May 2021 – August 2021
Research Intern (Remote Internship) *College Park, MD, USA*

- Working with the Digital Experience team to enhance video editing solutions.

University of Maryland January 2019 – Present
Research Assistant *College Park, MD, USA*

- Currently working on developing automated techniques to generate 3D animations of human body expressions, such as gaits and gestures, corresponding to different emotions in a variety of social contexts.
- Developed tracking and trajectory prediction algorithms for dense crowds as well as dense and heterogeneous traffic scenarios.

University of Maryland August 2018 – December 2018
Teaching Assistant *College Park, MD, USA*

- Delivered tutorials, graded assignments and exams for a senior undergraduate-level course on *Data Structures*.

Indian Institute of Science July 2017 – May 2018
Research Associate *Bengaluru, India*

- Developed algorithms for performing efficient and robust large-scale 3D reconstruction from sets of RGBD images.

Indian Institute of Science August 2016 – December 2016
Teaching Assistant *Bengaluru, India*

- Delivered tutorials, set and graded assignments and exams for a graduate-level course on *Digital Image Processing*.

Tata Consultancy Services Innovations Lab June 2014 – July 2014
Software Engineer Intern *Kolkata, India*

- Developed and deployed a secure VPN for on-the-go IoT devices to communicate with each other.

Services

Conference Senior Program Committee Member

- AAAI Conference on Artificial Intelligence (AAAI) *2023*

Journal Reviewer

- ACM Special Interest Group on Computer Graphics and Interactive Techniques (SIGGRAPH) *2022*
- ACM SIGGRAPH Asia *2022*
- Artificial Intelligence Review (AI Review) *2021*
- Computer Vision and Image Understanding (CVIU) *2020*
- IEEE Robotics and Automation Letters (RA-L) *2021*

Conference Reviewer

- AAAI Conference on Artificial Intelligence (AAAI) *2022, 2021*
- Asian Conference on Computer Vision (ACCV) *2020*
- Conference on Neural Information Processing Systems (NeurIPS) *2022, 2021, 2020*
- European Conference on Computer Vision (ECCV) *2022*
- IEEE/CVF Computer Vision and Pattern Recognition (CVPR) *2022, 2021, 2020*
- IEEE/CVF International Conference on Computer Vision (ICCV) *2021*
- IEEE/CVF Winter Conference on Applications of Computer Vision (WACV) *2022, 2021*
- IEEE/RSJ International Conference on Intelligent Robots and Systems (IROS) *2020*
- IEEE/RSJ International Conference on Robotics and Automation (ICRA) *2021*
- International Conference on Learning Representations (ICLR) *2022*
- International Conference on Machine Learning (ICML) *2022*

Journal/Conference External Reviewer

- ACM Special Interest Group on Computer Graphics and Interactive Techniques (SIGGRAPH) *2020*
- IEEE Conference on Virtual Reality and 3D User Interfaces (IEEE VR) *2020*
- IEEE/RSJ International Conference on Robotics and Automation (ICRA) *2020*
- IEEE/RSJ International Conference on Intelligent Robots and Systems (IROS) *2019*

Conference Volunteer

- AAAI Conference on Artificial Intelligence *2020*
- IEEE/CVF Computer Vision and Pattern Recognition *2019*
- IEEE International Conference on Signal Processing for Communications and Networking *2016*

Campus Placements Coordinator

- **Indian Institute of Science 2016-17.** Helped schedule industry visits, organize pre-placement talks, and organize and monitor student placement interviews on campus.
- **Institute of Engineering and Management (under the West Bengal University of Technology) 2014-15.** Helped organize and monitor student placement interviews on campus.

Awards and Nominations

- **UMD Invention of the Year Award 2022 Nominee.** Trisha Mittal, Aniket Bera, Uttaran Bhattacharya, Rohan Chandra, and Dinesh Manocha. "Deepfake Detection Tool".
- **UMD Invention of the Year Award 2021 Nominee.** Trisha Mittal, Aniket Bera, Uttaran Bhattacharya, Rohan Chandra, and Dinesh Manocha. "M3ER: Multiplicative Multimodal Emotion Recognition".
- **ACM Multimedia 2021 Best Paper Award Nominee.** Uttaran Bhattacharya, Elizabeth Childs, Nicholas Rewkowski, and Dinesh Manocha. "Speech2AffectiveGestures: Synthesizing Co-Speech Gestures with Generative Adversarial Affective Expression Learning".

- **IEEE VR 2021 Best Paper Award.** Uttaran Bhattacharya, Nicholas Rewkowski, Abhishek Banerjee, Pooja Guhan, Aniket Bera, and Dinesh Manocha. "Text2Gestures: A Transformer-Based Network for Generating Emotive Body Gestures for Virtual Agents".
- **Adobe Research Fellowship 2021.** Adobe Inc.
- **ACM SAP 2019 Best Poster Award.** Tanmay Randhavane, Uttaran Bhattacharya, Aniket Bera, Kyra Kapsaskis, Kurt Gray, and Dinesh Manocha. "Identifying Emotions from Walking using Affective and Deep Features".
- **Dean's Fellowship 2018.** University of Maryland.
- **Outstanding Student Award 2013.** Institute of Engineering and Management (under the West Bengal University of Technology).

Software and Programming Skills

ML and Vision	Python (PyTorch, Tensorflow), MATLAB
Web Design	HTML5, Markdown, CSS, JavaScript
Graphics	OpenGL, WebGL, Unity + C#, Unreal Engine + C++, Blender + Python
Documentation	LaTeX

Projects

Face- and Gesture-based Affective Computing

- Generating sequences of 3D human facial and pose expressions corresponding to gestures given text sentences, speech, and dimensional emotions.

Gait-based Affective Computing

- Generating sequences of 3D human poses corresponding to gaits given trajectory information and emotion (happy, sad, angry etc.), behavior (dominant, submissive etc.) and personality (friendly, shy etc.) information.
- Integrating gaits as a modilty to multimodal emotion perception algorithms.
- Predicting perceived emotion, behavior and personality given human gait videos.

Tracking and Trajectory Prediction in Dense and Heterogeneous Traffic

- Predicting aggressive road-agent maneuvers (overspeeding, overtaking, tailgating, weaving etc.) given full trajectory history.
- Predicting trajectories of heterogeneous road-agents for 5 seconds in dense traffic, given 3 seconds of trajectory history.
- Tracking heterogeneous road-agents (cars, buses, two- and three-wheelers etc.) in dense ($>$ 1,000 agents per Kilometer) traffic videos.
- Tracking individual pedestrians in dense ($>$ 2 per square meter) crowd videos.

Efficient and Robust Large-Scale 3D Reconstruction

- Utilizing the Lie Group formulation of 3D Euclidean motions to speed up 3D reconstruction of large-scale scenes, given RGBD images.
- Exploiting plane-matching to drastically speed up 3D reconstruction of indoor scenes consisting of planar regions, given RGBD images.

Bibliography

Refereed Publications

[21] **Uttaran Bhattacharya**, Gang Wu, Stefano Petrangeli, Viswanathan Swaminathan, and Dinesh Manocha. "Show Me What I Like: Detecting User-Specific Video Highlights Using Content-Based Multi-Head Attention". ACM International Conference on Multimedia (ACMMM), 2022. *[Poster]*

[20] Abhishek Banerjee, **Uttaran Bhattacharya**, and Aniket Bera. "Learning Unseen Emotions from Gestures via Semantically-Conditioned Zero-Shot Perception with Adversarial Autoencoders". Association for the Advancement of Artificial Intelligence (AAAI), 2022. *[Oral]*

[19] **Uttaran Bhattacharya**, Gang Wu, Stefano Petrangeli, Viswanathan Swaminathan, and Dinesh Manocha. "HighlightMe: Detecting Highlights from Human-Centric Videos". IEEE/CVF International Conference on Computer Vision (ICCV), 2021. *[Poster]*

[18] **Uttaran Bhattacharya**, Elizabeth Childs, Nicholas Rewkowski, and Dinesh Manocha. "Speech2AffectiveGestures: Synthesizing Co-Speech Gestures with Generative Adversarial Affective Expression Learning". ACM International Conference on Multimedia (ACMMM), 2021. *[Oral][Best Paper Nominee]*

[17] **Uttaran Bhattacharya**, Nicholas Rewkowski, Abhishek Banerjee, Pooja Guhan, Aniket Bera, and Dinesh Manocha. "Text2Gestures: A Transformer-Based Network for Generating Emotive Body Gestures for Virtual Agents". IEEE Conference on Virtual Reality and 3D User Interfaces (IEEE VR), 2021. *[Oral][Best Paper]*

[16] **Uttaran Bhattacharya**, Nicholas Rewkowski, Pooja Guhan, Niall L. Williams, Trisha Mittal, Aniket Bera, and Dinesh Manocha. "Generating Emotive Gaits for Virtual Agents Using Affect-Based Autoregression". International Symposium on Mixed and Augmented Reality (ISMAR), 2020. *[Oral]*

[15] Trisha Mittal, **Uttaran Bhattacharya**, Rohan Chandra, Aniket Bera, and Dinesh Manocha. "Emotions Don't Lie: A Deepfake Detection Method using Audio-Visual Affective Cues". ACM International Conference on Multimedia (ACMMM), 2020. *[Poster]*

[14] **Uttaran Bhattacharya**, Christian Roncal, Trisha Mittal, Rohan Chandra, Kyra Kapsaskis, Kurt Gray, Aniket Bera, and Dinesh Manocha. "Take an Emotion Walk: Perceiving Emotions from Gaits Using Hierarchical Attention Pooling and Affective Mapping". European Conference on Computer Vision (ECCV), 2020. *[Poster]*

[13] Rohan Chandra, **Uttaran Bhattacharya**, Trisha Mittal, Aniket Bera, and Dinesh Manocha. "CMetric: A Driving Behavior Measure Using Centrality Functions". IEEE/RSJ International Conference on Intelligence Robots and Systems (IROS), 2020. *[Oral]*

[12] Rohan Chandra, Tianrui Guan, Srujan Panuganti, Trisha Mittal, Uttaran Bhattacharya, Aniket Bera, and Dinesh Manocha. "Forecasting Trajectory and Behavior of Road-Agents Using Spectral Clustering in Graph-LSTMs". Robotics and Automation Letters (RA-L), 2020, IEEE/RSJ International Conference on Intelligence Robots and Systems (IROS), 2020. *[Oral]*

[11] Trisha Mittal, Pooja Guhan, **Uttaran Bhattacharya**, Rohan Chandra, Aniket Bera, and Dinesh Manocha. "EmotiCon: Context-Aware Multimodal Emotion Recognition using Frege's Principle". IEEE/CVF Computer Vision and Pattern Recognition (CVPR), 2020. *[Poster]*

[10] Rohan Chandra, **Uttaran Bhattacharya**, Trisha Mittal, Aniket Bera, and Dinesh Manocha. "GraphRQI: Classifying Driver Behaviors Using Graph Spectrums". International Conference on Robotics and Automation (ICRA), 2020. *[Poster]*

[9] Rohan Chandra, **Uttaran Bhattacharya**, Tanmay Randhavane, Aniket Bera, and Dinesh Manocha. "RoadTrack: Realtime Tracking of Road Agents in Dense and Heterogeneous Environments". International Conference on Robotics and Automation (ICRA), 2020. *[Poster]*

[8] **Uttaran Bhattacharya**, Trisha Mittal, Rohan Chandra, Tanmay Randhavane, Aniket Bera, and Dinesh Manocha. "STEP: Spatial Temporal Graph Convolutional Networks for Emotion Perception from Gaits". Association for the Advancement of Artificial Intelligence (AAAI), 2020. *[Spotlight]*

[7] Trisha Mittal, **Uttaran Bhattacharya**, Rohan Chandra, Aniket Bera, and Dinesh Manocha. "M3ER: Multiplicative Multimodal Emotion Recognition Using Facial, Textual, and Speech Cues". Association for the Advancement of Artificial Intelligence (AAAI), 2020. *[Oral]*

[6] **Uttaran Bhattacharya**, and Venu Madhav Govindu. "Efficient and Robust Registration on The 3D Special Euclidean Group". IEEE/CVF International Conference on Computer Vision (ICCV), 2019. *[Poster]*

[5] Rohan Chandra, **Uttaran Bhattacharya**, Christian Roncal, Aniket Bera, and Dinesh Manocha. "RobustTP: End-to-End Trajectory Prediction for Heterogeneous Road-Agents in Dense Traffic with Noisy Sensor Inputs". ACM Computer Science in Cars Symposium (CSCS), 2019. *[Oral]*

[4] Rohan Chandra, **Uttaran Bhattacharya**, Aniket Bera, and Dinesh Manocha. "DensePeds: Pedestrian Tracking in Dense Crowds Using Front-RVO and Sparse Features". IEEE/RSJ International Conference on Intelligence Robots and Systems (IROS), 2019. *[Oral]*

[3] Rohan Chandra, **Uttaran Bhattacharya**, Aniket Bera, and Dinesh Manocha. "TraPHic: Trajectory Prediction in Dense and Heterogeneous Traffic Using Weighted Interactions". IEEE/CVF Computer Vision and Pattern Recognition (CVPR), 2019. *[Poster]*

[2] **Uttaran Bhattacharya**, Sumit Veerawal, and Venu Madhav Govindu. "Fast Multiview Registration of 3D Scans using Planar Structures". International Conference on 3D Vision (3DV), 2017. *[Spotlight]*

[1] **Uttaran Bhattacharya**, and Dipannita Dey. "Comparative Analysis of Scheduling Algorithms in Computational Grid Environment". International Journal of Computer Applications 107.4, 2014.

Preprints

[1] Tanmay Randhavane, **Uttaran Bhattacharya**, Kyra Kapsaskis, Kurt Gray, Aniket Bera, and Dinesh Manocha. "Identifying Emotions from Walking using Affective and Deep Features". arXiv preprint arxiv:1906.11884 (2019).

Patents

[2] Trisha Mittal, Aniket Bera, Uttaran Bhattacharya, Rohan Chandra, and Dinesh Manocha. "Human Emotion Recognition in Images or Video". Patent US20210390288A1. 2021.

[1] Trisha Mittal, Aniket Bera, Uttaran Bhattacharya, Rohan Chandra, and Dinesh Manocha. "System and Method for Multimodal Emotion Recognition". Patent US20210342656A1. 2021.

Public Datasets

EmotionGait **Link: https://go.umd.edu/emotion-gait**

- Consists of ~2K 21-joint MoCap data of people walking.
- Annotations: probabilistic emotion labels over four categories, happy, sad, angry and neutral, collected from 10 annotators.

EmotionWalk **Link: https://go.umd.edu/ewalk**

- Consists of ~350 16-joint 3D MoCap data of people walking.
- Annotations: one-hot emotion labels over four categories, happy, sad, angry and neutral, collected from 10 annotators.

TRAF **Link: https://gamma.umd.edu/researchdirections/autonomousdriving/trafdataset**

- Consists of dense and heterogeneous traffic videos collected in various Asian cities.
- Road-agents types in the dataset: cars, busses, trucks, rickshaws, pedestrians, scooters, motorcycles, carts, and animals.
- Annotations: road-agent types, bounding boxes, ground truth trajectories, road-agent maneuvers (overspeeding, overtaking, tailgating, weaving etc.).

Media Coverage

Graduate Student Bhattacharya Receives Adobe Research Fellowship April 05, 2021

- Link: https://www.umiacs.umd.edu/about-us/news/graduate-student-bhattacharya-receives-adobe-research-fellowship

Identifying perceived emotions from people's walking style Jul 12, 2019

- Link: https://techxplore.com/news/2019-07-emotions-people-style.html

UMD professor builds simulator to train self-driving cars April 4, 2019

- Link: https://dbknews.com/2019/04/04/umd-self-driving-cars-simulation-machine-learning/