Sujitha Catherine Martin

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Technical Skills

- *Core competencies:* Machine learning, computer vision, signal and image processing, multimodal fusion
- *Programming:* Python, C++
- *Software Packages:* OpenCV, Pytorch, Tensorflow, Keras
- *Learning/inference:* AdaBoost, random forest, SVM, PCA, kNN, audo-encoders, multilayer perceptron, convolutional neural networks, recurrent neural networks, graph neural networks, inverse reinforcement learning, generative adversarial networks

Education

- **Doctor of Philosophy, Electrical and Computer Engineering** 2016
  University of California, San Diego (UCSD), La Jolla, CA
  Thesis: *Vision-based, Multi-cue Driver Models for Intelligent Vehicles*
  Advisor: Mohan M. Trivedi
- **Bachelors of Science, Electrical Engineering** 2010
  California Institute of Technology (Caltech), Pasadena, CA
  One term study abroad at the University of Cambridge, UK
- **High School Diploma** 2006
  Cerritos High School, Cerritos, CA
  Valedictorian (ranked 1st in the graduating class)

Professional Experience

- **Scientist**, Honda Research Institute USA, San Jose   2017-Present
  Conducted fundamental research in intelligent mobility as principal investigator in the following projects:
  - Explainable AI: Enabling the explainability of an autonomous system at the design stage by incorporating domain knowledge. From expert demonstrations, inferring the interactive latent space of agents in an environment using GNNs in an auto-encoder fashion and structured rewards to specify the functional space of the latent interactions in an inverse reinforcement learning fashion, where all modules are trained using an adversarial scheme.
  - Situational Awareness: Modeling human-like perception of an environment that leads to (un)safe behaviors, for use in driver assistance technologies and trust inducing autonomous systems. Tackled the definition and measurement of awareness using various annotation schemes and user studies, the estimation of awareness with various hand-crafted functions and machine learning models.
- **Graduate Student Researcher**, University of California, San Diego   2010-2016
  Investigated multi-cue driver models by modeling gaze dynamics for behavior prediction, head and hand coordination for activity recognition, and viewer and view simultaneously for attention estimation. Developed fundamental building blocks such as face detection under varying lighting conditions and occlusions, continuous head pose estimation with spatially distributed camera sensors, and gaze classification into semantic regions of interest. Involved in instrumenting testbeds for real-world data collection, conducting user studies and showcasing demonstrable systems.
- **Summer Intern**, Synaptics   2011
  Explored 3-D sensing technologies, developed depth-based hand gesture recognition software, mapped gesture recognition system to user interaction scenarios and conducted usability study on the cost and benefits of performing hand gestures for scrolling through documents.
- **Summer Intern**, Jet Propulsion Laboratory (JPL), Caltech   2010
  Compared interference mitigation methods for communication systems in a MARS Orbiter.
- **Summer Undergraduate Researcher**, Indian Institute of Technology, Madras, India   2009
  Compared interference mitigation methods for cell-edge under varying signal to noise ratios
- **Summer Undergraduate Researcher**, Jet Propulsion Laboratory, Caltech   2008
  Developed online remote tracking of multiple GPS trackers on-board of in-situ instruments

- **Summer Undergraduate Researcher**, Caltech   2007
  Designed pressure sensors on printed circuit board (PCB) and a miniaturized control system using high speed ARM processor to control flow into micro-fluidic chips.

Select Publications

- C. Tang, N. Srishankar, **S. Martin**, M. Tomizuka, "Grounded Relational Inference: Domain Knowledge Driven Explainable Autonomous Driving," *in submission at IEEE Transactions on Robotics*.
- H. Kim, **S. Martin**, A. Tawari, T. Misu, J. L. Gabbard, "Toward Real-Time Estimation of Driver Situation Awareness: An Eye Tracking Approach based on Moving Objects of Interest," IEEE Intelligent Vehicles Symposium, 2020.
- Z. Zhang, A. Tawari, **S. Martin**, D. Crandall, "Interaction Graphs for Object Importance Estimation in On-road Driving Video," IEEE International Conference on Robotics and Automation, 2020.
- A. Rahimpour, **S. Martin**, A. Tawari, H. Qi, "Context Aware Road-user Importance Estimation," IEEE Intelligent Vehicles Symposium, 2019.
- A. Tawari, P. Mallela, **S. Martin**, "Learning to Attend to Salient Targets in Driving Videos using Fully Convolutional RNN," IEEE International Conferences on Intelligent Transportation Systems, 2018. *(US Patent 10,902,279)*
- **S. Martin**, "Object of Fixation Estimation by Joint Analysis of Gaze and Object Dynamics," IEEE Intelligent Vehicles Symposium, 2018. *(US Patent 10,809,799)*
- **S. Martin**, S. Vora, K. Yuen, M. M. Trivedi, "Dynamics of Driver's Gaze: Explorations in Behavior Modeling & Maneuver Prediction," IEEE Transactions on Intelligent Vehicles, 2018.
- A. Tawari, **S. Martin**, M. M. Trivedi, "Continuous Head Movement Estimator (CoHMEt) for Driver Assistance: Issues, Algorithms and On-road Evaluations," IEEE Transactions on Intelligent Transportation Systems, 2014.
- **S. Martin**, A. Tawari, M. M. Trivedi, "Towards Privacy Protecting Safety Systems for Naturalistic Driving Videos," IEEE Transactions on Intelligent Transportation Systems, 2014.

Awards and Honors

- Two US Patents granted (10,809,799 and 10,902,279) and four US Patents under review, since 2017.
- Rising Stars, Carnegie Mellon University, Pittsburgh, PA, 2016.
- Finalist in Best Industry Related Paper Award (BIRPA), ICPR, Stockholm, Sweden, 2014.
- ECE Graduate School Department Fellowship, UC San Diego, La Jolla, CA, 2010-11.
- NASA Tech Brief Award for new technology report, JPL, Pasadena, CA, 2009.
- Summer Undergraduate Research Fellowship, JPL, Pasadena, CA, 2008.
- Summer Undergraduate Research Fellowship, Caltech, Pasadena, CA, 2007.
- Robert C. Byrd Honors Scholarship, Cerritos High School, Cerritos, CA, 2006.

Professional Activities

- **Publication Committee**, Honda Research Institute, since 2020.
- **Associate Editor**, IEEE Intelligent Vehicles Symposium (IVS), 2017-2021.
- **Co-Organizer**, Women in Intelligent Transportation Systems at IVS in 2017, 2020.
- **Rising Stars** workshop acknowledging women electrical and computer engineers and computer scientists for pursuing a career path in academia hosted by Carnegie Mellon University, PA, 2016.
- **Ph.D. Networking** event for pursuing an industrial career path in a research environment, sponsored and hosted by GE Global Research, NY, 2015.
- **Program Committee**, Workshop on Automatic Traffic Surveillance, CVPR, Las Vegas, 2016.
- **Co-Organizer**, Vision for Intelligent Vehicles & Applications: Workshop and Challenges in IVS 2015, 2016.

Referees

- Professor Mohan M. Trivedi, Distinguished Professor, UC San Diego   mtrivedi@ucsd.edu