

Sujitha C. Martin

Contact Information

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Education

Ph.D., Electrical and Computer Engineering Fall 2016

University of California, San Diego, CA

Thesis: *Vision-based, Multi-Cue Driver Models for Intelligent Vehicles*

Advisor: Professor Mohan M. Trivedi

M.S., Electrical and Computer Engineering Fall 2012

University of California, San Diego, CA

B.S., Electrical Engineering June 2010

California Institute of Technology, Pasadena, CA

One term study abroad at the University of Cambridge, UK

High School Diploma June 2006

Cerritos High School, Cerritos, CA

Valedictorian (ranked 1st in the graduating class)

Academic Appointments

Postdoctoral Researcher Nov. 2016 - Present

Department of Electrical and Computer Engineering

University of California, San Diego, CA

Mentor: Professor Mohan M. Trivedi

Research Interests

1. Semantic perception, modeling and cognitive/decision logic design for intelligent systems with emphasis on holistic visual information acquisition in applications such as intelligent vehicles (from driver assistive to full autonomy), human-computer interaction, biometrics, security and surveillance, autonomous robotics, and smart meeting rooms.
2. Studying long and short term effects and benefits of automation using simulator studies and naturalistic driving studies for feedback design in intelligent vehicles.

Relevant disciplines: machine learning, computer vision, human-machine interface and robotics

Research Experience

Graduate Student Researcher

2010 - 2016

Institute: Department of Electrical and Computer Engineering, UCSD*Advisor:* Professor Mohan M. Trivedi

- **[Looking-In]** Developed a machine vision based framework for modeling driver's gaze behavior by representing temporal scanpaths using glance durations and transition frequencies; the framework encompasses state-of-the-art, continuous gaze zone estimator.
- **[Looking-In]** Formulated and designed a multi-view, multimodal vision based analysis framework for recognizing in-vehicle activities (e.g. interaction with instrument cluster) and anticipating maneuvers at intersections by studying the complex coordination of head, eyes and hands from naturalistic driving data.
- **[Looking-In, Looking-Out]** Designed and evaluated an attention estimation framework by simultaneous analysis of viewer and view using driver's first person camera view and a camera observing the driver.
- **[Naturalistic Driving Studies]** Defined and implemented quantitative measures of vocabularies often used by data reductionists when labeling videos of looking at the driver, leading to automatic critical event extraction and semantic drive reports.
- **[Naturalistic Driving Studies]** Designed, implemented and evaluated de-identification filters which protected the identity of driver but preserved information for driver's gaze estimation, in order to enable publicly sharing de-identified naturalistic driving videos.
- **[Naturalistic Driving Studies]** Designed the Vision for Intelligent Vehicles & Applications (VIVA): Faces Dataset and Challenge. VIVA is a platform designed to share naturalistic driving data with the community in order to: present issues and challenges in vision from real-world driving conditions, benchmark existing vision approaches using proper metrics and progress the development of future vision algorithms.

Summer Intern

Summer 2011

Institute: Synaptics*Advisor:* Dr. Patrick Worfolk

- Explored the performance of few 3D gesture sensor technologies, created user interaction scenarios, prototyped a consumer electronics device that integrates these technologies and conducted a usability study on the cost and benefits of performing 3D gestures for scrolling through documents.

Summer Intern

Summer 2010

Institute: Jet Propulsion Laboratory, Caltech*Advisor:* Dr. David Bell

- (Confidential work) In general, worked on interference mitigation methods for the communication systems in a currently deployed MARS Orbiter.

Summer Undergraduate Researcher

Summer 2009

Institute: Department of Electrical Engineering, Indian Institute of Technology Madras*Advisor:* Professor David Koilpillai

Interference Cancellation for Cell-edge with Space Time Transmit Diversity Coding.

- Compared two methods for mitigating interference: linear and widely-linear processing.
- Evaluated the performance curve of each method using MATLAB simulations to confirm that widely-linear processing outperforms linear processing when signal to noise ratio outweighs signal to interference ratio.

Summer Undergraduate Intern

Summer 2008

Institute: Jet Propulsion Laboratory, Caltech*Advisor:* Dr. Alberto Behar

- Designed an online tracking system that collects satellite data and plots it conveniently on Google earth applet for multiple GPS trackers. The developed software was for in-situ instruments for extreme environments.

Summer Undergraduate Researcher

Summer 2007

Institute: Department of Electrical Engineering, Caltech*Advisor:* Professor Axel Scherer and Dr. Sourabh Vyawahare

Electronic control system for Micro-fluidic chips for pneumatic valves and electric valves:

- 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.

Honors & Awards

- **IAPR travel award**, ICPR, Cancun, Mexico
Awarded for presenting research papers at ICPR main conference in Winter 2016.
- **Rising Stars**, CMU, Pittsburgh, PA
One of sixty women electrical and computer engineers and computer scientists selected for their interest and promise in careers in academia. It brought together top female graduates for two days of scientific interactions and career-oriented discussions.
- **Ph.D. Networking**, GE Global Research, Niskayuna, NY
One of two graduate female students nominated from the science and engineering field at UCSD to attend the network event at GE global research in Fall 2015; selection was based on demonstrating strong leadership and technical expertise in the field, and expressing interest in potentially pursuing an industrial career path in a research environment.
- **NSF travel award**, CVPR, Boston, MA
Awarded for presenting work at the IEEE CVPR Workshop on The Future of Datasets in Vision in Summer 2015.
- **Finalist - Best Industry Related Paper Award (BIRPA)**, ICPR, Stockholm, Sweden
One of four finalists for BIRPA for an accepted paper at ICPR main conference in Fall 2014.

Journal Articles

- J6. S. Martin, S. Vora, K. Yuen and M. M. Trivedi, "Vision-based Gaze-dynamics Modeling and Behavior Prediction in the age of Highly Automated Driving," *IEEE Transactions on Intelligent Vehicles (T-IV)*, in preparation.
- J5. E. Ohn-Bar, A. Tawari, S. Martin and M. M. Trivedi, "On Surveillance for Safety Critical Events: In-Vehicle Video Networks for Predictive Driver Assistance Systems," *Computer Vision and Image Understanding (CVIU)*, 2015.
- J4. S. Martin, A. Tawari and M. M. Trivedi, "Towards Privacy Protecting Safety Systems for Naturalistic Driving Videos," *IEEE Transactions on Intelligent Transportation Systems (T-ITS)*, 2014.
- J3. A. Tawari, S. Martin and M. M. Trivedi, "Continuous Head Movement Estimator (CoHMEt) for Driver Assistance: Issues, Algorithms and On-Road Evaluations," *IEEE Transactions on Intelligent Transportation Systems (T-ITS)*, 2014.
- J2. E. Ohn-Bar, S. Martin and M. M. Trivedi, "Driver Hand Activity Analysis in Naturalistic Driving Studies: Issues, Algorithms and Experimental Studies," *Journal of Electronic Imaging: Special Section on Video Surveillance and Transportation Imaging Applications (JEI)*, 2013.
- J1. S. Vyawahare, S. Sitaula, S. Martin, D. Adalian and A. Scherer, "Electronic Control of Elastomeric Microfluidic Circuits with Shape Memory Actuators," *Lab on a Chip*, 2008.

Conference Proceedings

- C15. S. Martin, A. Rangesh, E. Ohn-Bar and M. M. Trivedi, "Preparatory Coordination of Head, Eyes and Hands at Stop Controlled Intersections," *IAPR International Conference on Pattern Recognition (ICPR)*, Cancun, Mexico, 2016.
- C14. K. Yuen, S. Martin and M. M. Trivedi, "On Looking at Faces in an Automobile: Issues, Algorithms and Evaluation on Naturalistic Driving Dataset," *IAPR International Conference on Pattern Recognition (ICPR)*, Cancun, Mexico, 2016.
- C13. B. Vasli, S. Martin and M. M. Trivedi, "On Driver Gaze Estimation: Explorations and Fusion of Geometric and Data Driven Approaches," *IEEE Conference on Intelligent Transportation Systems (ITSC)*, Rio de Janeiro, Brazil, 2016.
- C12. K. Yuen, S. Martin and M. M. Trivedi, "On Looking at Faces in a Vehicle with Deep Networks," *IEEE Conference on Intelligent Transportation Systems (ITSC)*, Rio de Janeiro, Brazil, 2016.
- C11. S. Martin, K. Yuen and M. M. Trivedi, "Vision for Intelligent Vehicles and Applications (VIVA): Face Detection and Head Pose Challenge," *IEEE Intelligent Vehicles (IV) Symposium*, Gothenburg, Sweden, 2016.

Conference Proceedings (continued)

- C10. S. Martin, A. Rangesh, E. Ohn-Bar and M. M. Trivedi, "The Rhythms of Head, Eyes and Hands at Intersections," *IEEE Intelligent Vehicles (IV) Symposium*, Gothenburg, Sweden, 2016.
- C9. S. Martin, E. Ohn-Bar and M. M. Trivedi, "Automatic Critical Event Extraction and Semantic Interpretation by Looking-Inside," *IEEE International Conference on Intelligent Transportation Systems (ITSC)*, Canary Islands, Spain, 2015.
- C8. A. Tawari, A. Moegelmose, S. Martin, T. Moeslund and M. M. Trivedi, "Attention Estimation by Simultaneous Analysis of Viewer and View," *IEEE International Conference on Intelligent Transportation Systems (ITSC)*, Qingdao, China, 2014.
- C7. S. Martin, A. Tawari and M. M. Trivedi, "Balancing Privacy and Safety: Protecting Driver Identity in Naturalistic Driving Video Data," *ACM SIGCHI International Conference on Automotive User Interfaces and Interactive Vehicular Applications (AUTO-UI)*, Seattle, WA, 2014.
- C6. E. Ohn-Bar, S. Martin, A. Tawari and M. M. Trivedi, "Head, Eye and Hand Patterns for Driver Activity Recognition," *IAPR International Conference on Pattern Recognition (ICPR)*, Stockholm, Sweden, 2014.
- C5. S. Martin, E. Ohn-Bar, A. Tawari and M. M. Trivedi, "Understanding Head and Hand Activities and Coordination in Naturalistic Driving Videos," *IEEE Intelligent Vehicles (IV) Symposium*, Dearborn, MI, 2014.
- C4. S. Martin, A. Tawari and M. M. Trivedi, "Monitoring Head Dynamics for Driver Assistance: A Multiple Perspective Approach," *IEEE International Conference on Intelligent Transportation Systems (ITSC)*, The Hague, Netherlands, 2013.
- C3. S. Martin, C. Tran and M. M. Trivedi, "Optical Flow based Head Movement and Gesture Analyzer (OHMeGA)," *IAPR International Conference on Pattern Recognition (ICPR)*, Tsukuba, Japan, 2012.
- C2. S. Martin, A. Tawari, E. Murphy-Chutorian, S. Y. Cheng, and M. M. Trivedi, "On the Design and Evaluation of Robust Head Pose for Visual User Interfaces: Algorithms, Databases, and Comparisons," *ACM SIGCHI International Conference on Automotive User Interfaces and Interactive Vehicular Applications (AUTO-UI)*, Portsmouth, NH, 2012.
- C1. S. Martin, C. Tran, A. Tawari, J. Kwan and M. M. Trivedi, "Optical Flow based Head Movement and Gesture Analysis in Automotive Environment," *IEEE International Conference on Intelligent Transportation Systems (ITSC)*, Anchorage, AK, 2012.

Workshop Papers and Abstracts

- W5. S. Martin and M. M. Trivedi, "Machine Vision Based Vehicular Cabin Activity Analysis," Workshop on Women in Computer Vision at *IEEE Computer Vision and Pattern Recognition (CVPR)*, Las Vegas, NV, USA, June 2016.
- W4. S. Martin, E. Ohn-Bar, A. Moegelmose, K. Yuen and M. M. Trivedi, "Vision Challenges in Naturalistic Driving Videos," Workshop on The Future of Datasets in Vision at *IEEE Computer Vision and Pattern Recognition (CVPR)*, Boston, MA, USA, June 2015.
- W3. S. Martin and M. M. Trivedi, "Vision for Intelligent Vehicles & Applications Face-Off Challenge: Dataset Creation and Balancing Privacy," Workshop on Women in Computer Vision at *IEEE Computer Vision and Pattern Recognition (CVPR)*, Boston, MA, USA, June 2015.
- W2. E. Ohn-Bar, A. Tawari, S. Martin and M. M. Trivedi, "Vision on Wheels: Looking at Driver, Vehicle and Surround for On-Road Maneuver Analysis," Workshop on Mobile Vision at *IEEE Computer Vision and Pattern Recognition (CVPR)*, Columbus, OH, USA, June 2014.
- W1. S. Martin, A. Tawari and M. M. Trivedi, "Privacy Protection for Large Scale Naturalistic Driving Videos," Workshop on Big Vision at *IEEE Computer Vision and Pattern Recognition (CVPR)*, Columbus, OH, USA, June 2014.

Seminars and Talks

1. "Vision for Intelligent Vehicles & Applications (VIVA): Face Challenge," Workshop on Vision of Intelligent Vehicles & Applications, **IEEE Intelligent Vehicles (IV)** Symposium, Gothenburg, Sweden, June 2016.
2. "VIVA-Face off: Challenges of in-vehicle study of faces, competition and dataset details," Workshop on Vision of Intelligent Vehicles & Applications, **IEEE Intelligent Vehicles (IV)** Symposium, Seoul, Korea, June 2015.
3. "Modeling Driver's Alertness and Inter-Activity Patterns in an Automobile Cabin for Active Safety," Ph.D Networking event, **GE Global Research**, Niskayuna, NY, October 2015.

Professional Activities

Reviewer:

- **Journals:** IEEE Transactions on Intelligent Transportation Systems, IEEE Transportation Systems Magazine
- **Conferences:** IEEE Intelligent Vehicles Symposium, IEEE International Conference on Intelligent Transportation Systems, IAPR International Conference on Pattern Recognition, ACM SIGCHI International Conference on Automotive User Interfaces and Interactive Vehicular Applications

Program Committee:

- **Workshops in:** IEEE Computer Vision and Pattern Recognition, IEEE Intelligent Vehicles Symposium

Co-Organizer:

- **Workshops in:** IEEE Intelligent Vehicles Symposium ('15, '16)

Career-building activities (by application/nomination only):

- **Rising Stars** Workshop for women in electrical and computer engineers and computer scientists interested in career in academia hosted by Carnegie Mellon University, Pittsburgh, PA, November 2016.
- **Ph.D. Networking** event for pursuing an industrial career path in a research environment sponsored and hosted by GE Global Research, Niskayuna, NY, October 2015.

Society Membership:

IEEE, Student Member	2007 - Present
Society of Women Engineers	2006 - 2008

References

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