NIKOLAS MARTELARO

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I explore the future of design. My research focuses on creating interaction systems and design tools with the goal of helping designers better understand people and create human-centered products. I blend a background in mechanical engineering, mechatronics, computing, data collection, and product design to develop new interactive systems and to understand how designers do design. My work looks at observing people using intelligent systems and design new kinds of interactive devices. My research has implications for human-robot interaction, autonomous cars, and human-centered artificial intelligence. My teaching aims to provide designers the skills to use new technologies and develop systems that focus on the needs of people.

EDUCATION

2012 - 2018 **Stanford University**, Stanford CA
Ph.D. in Mechanical Engineering
DISSERTATION: *The Needfinding Machine*
COMMITTEE: Larry Leifer, Wendy Ju, Pamela Hinds, James Landay

2012 - 2014 **Stanford University, Stanford, CA**
M.S. Mechanical Engineering

2008 - 2012 **Franklin W. Olin College of Engineering**, Needham, MA
B.S. Engineering: Design

RESEARCH EXPERIENCE

2020 - AUGMENTING DESIGNER CAPABILITIES LAB
Carnegie-Mellon Human-Computer Interaction Institute , Assistant Professor
Head of the Augmenting Designer Capabilities Lab focusing on methods, tools, and materials to help designers develop new interactive and autonomous systems.

2018 - 2019 FUTURE PRODUCT DESIGN METHODS
Accenture Technology Labs, Technology Research & Development Associate Principal
Research on future tools and opportunities for product designers. Prototyping and exploration of smart materials, including e-textiles. Research on interaction design support tools.

2016 - 2018 MACHINE LEARNING DATASET CREATION FOR DRIVER FOCUSED INTELLIGENT ASSISTANTS
Stanford University, Research Assistant — PI: Wendy Ju
Sponsor: Toyota Research Institute

Creating an open dataset for supervised machine learning around when it is appropriate for in-car speech agents to proactively talk to a driver. Developed a protocol for asking drivers "Is now a good time?" while on a 40-minute naturalistic driving route. Developed an in-car data collection system with five video channels, GPS, inertial measurement, physiological measurement, and automotive computer (CAN) data. Mentored an undergraduate researcher to help run study participants.

SUMMER 2017 PRODUCTIVITY IN THE CAR
Microsoft Research, Research Intern — PI: Shamsi Iqbal

Exploration of speech-based productivity applications for use in the car. Designed and ran a simulator based driving study looking into how task support and road context alerts could help drivers create documents using speech while also maintaining safety on the road. Conducted statistical analysis of driving performance and qualitative video interaction analysis.

2014 - 2018 NEEDFINDING MACHINES: TOOLS FOR REMOTE NEEDFINDING THROUGH PHYSICAL PRODUCTS
Stanford University, Research Assistant — PIs: Larry Leifer & Wendy Ju

Exploration of interactive devices as conversational infrastructures between designers and their users. Development of a remote control prototyping system for use in cars and homes. Collaborations with practicing designers at Renault, Spotify, and Volkswagen to explore how the system and method influences their design practice and understanding of their users in real-world contexts.

2015 - 2016 INTERACTIVE DEVICE DESIGN TOOLS
Stanford University, Research Assistant — PIs: Wendy Ju & Mark Horowitz

Evaluated numerous connected device prototyping platforms and developed a standardized toolkit for creating internet connected physical hardware. Developed and co-taught a workshop aimed at designers and conducted qualitative research on how they used the toolkit within their own projects.

2014 - 2015 ASSISTIVE ROBOTS FOR STUDENTS LEARNING ELECTRONICS
Stanford University, Research Assistant — PIs: Pamela Hinds & Wendy Ju

Designed an interactive robot to teach students electronics and explore how robot interactivity and vulnerability would influence trust, disclosure, and companionship with the robot. Co-designed a lab study and mentored a student researcher in running experiments. Mentored an undergraduate student to run experiment sessions. Participated in the National Science Foundation Expedition on Socially Assistive Robotics.

2013 - 2014 HUMAN-ROBOT INTERACTION WITH TEAMS UNDER STRESS
Stanford University, Research Assistant — PIs: Pamela Hinds & Malte Jung

Co-developed a human-robot interaction study exploring how a robot can facilitate better team cooperation during stressful situation using social repair strategies. Conducted a lab-based study and trained a confederate to perform a difficult teammate.

2012 - 2013 TUTOR ROBOTS FOR CHILDREN LEARNING ELECTRONICS
Stanford University, Research Assistant — PIs: Malte Jung & Clifford Nass

Designed and developed an interactive robot to teach students electronics. Ran a Wizard-of-Oz study to explore how interest from the robot and whether the

robot was the electronic prototyping kit itself or a separate robot would influence student learning.

2008 - 2012 DISTRIBUTED DESIGN SKETCHING
Franklin W. Olin College of Engineering, Research Assistant — PI: Ozgur Eris
Designed and developed a distributed whiteboard system to explore how two designers sketch together at a distance. Ran a user study with and used video interaction analysis to code sketching behavior during design sessions.

TEACHING EXPERIENCE

SPRING 2020 Co-teacher
RAPID PROTOTYPING OF COMPUTER SYSTEMS (CMU 18-745 / 05-540)
Co-teaching rapid product development course along with professors Dan Siewiorek and Asim Smailagic. Supporting lead professor Siewiorek and coaching teams through product development process.

2018 Workshop Instructor
NEURAL NET COMPUTER VISION ON EMBEDDED SYSTEMS LECTURE
Developing a short workshop on the basics of using off-the-shelf neural net computer vision systems on single-board computers. Delivered a lecture and hands-on workshop to Jan Borcher's Lab and Wendy Ju's Interactive Device Design course at Cornell Tech. Continuing development and integration of neural net computer vision tools into Interaction Engine platform.

2016 - 2018 Workshop Instructor
INTERACTION ENGINE, Stanford
With Wendy Ju and Michael Shiloh.
Developed an introductory workshop to teach designers how to prototype interactive and connected devices using open source hardware and software. Developed a toolkit based on Raspberry Pi, Arduino, and NodeJS introducing students to physical computing, networking, and interactive device design. Created open source learning materials and taught workshop at the TEI conference, Stanford, and California College of the Arts. Learning materials are free and open-source. The Interaction Engine serves as the base platform for Wendy Ju's Interactive Device Design Course at Cornell Tech.

SUMMER 2015 Teaching Assistant
EE 47, INTRODUCTION TO INTERACTIVE DEVICE DESIGN, Stanford Electrical Engineering
With David Sirkin.
Worked as head teaching assistant and interacted with students primarily during lab sessions. Developed and taught an introduction to programming for students with limited programming experience. Provided circuit and code debugging during labs and the final project. Coached students on the design and implementation of their final interactive device projects.

WINTER 2015 Teaching Assistant
MS&E 488, PROTOTYPING AND RAPID EXPERIMENTS, Stanford d.school
With Pamela Hinds and Julie Stanford.

Coached students on the design of prototypes and rapid experiments during industry sponsored projects. Provided organizational assistance to the course instructors. Developed and taught a lecture on physical and digital prototyping methods. Provided design critique of intermediate and final design deliverables.

SPRING 2012

Teaching Assistant
ENGR 2205, USER-ORIENTED COLLABORATIVE DESIGN, Olin College
With Ben Linder and Lawrence Neeley.

Coached student design teams on user-centered design methods including contextual inquiry, benchmarking, ideation, iterative design, and concept prototyping. Provided organizational assistance to the teaching team. Provided design critique on intermediate and final design deliverables.

INDUSTRY EXPERIENCE

2018 - 2019

Accenture Technology Labs, San Francisco, CA
Technology Research & Development Associate Principal
MENTOR: ALEX KASS, MIKE KUNIAVSKY

SUMMER 2017

Microsoft Research, Redmond, WA
Research Intern
MENTOR: SHAMSI IQBAL

SUMMER 2011 & 2012

MITRE Corp., Bedford, MA
Research Intern
MENTORS: DOUG PHAIR, TINA CROTTY, LES HOLTZBLATT

HONORS AND AWARDS

Best Demonstration, CSCW'17. Portland, OR. *With Wendy Ju.*

National Science Foundation - Graduate Research Fellowship Program (NSF GRFP). Awarded 2013.

Miller Research Fellowship, Franklin W. Olin College of Engineering. Awarded Summer 2009.

PUBLICATIONS

JOURNAL PAPERS

Ozgur Eris, **Nikolas Martelaro**, and Petra Badke-Schaub. 2014. A Comparative Analysis of Multimodal Communication During Design Sketching in Co-located and Distributed Environments. *Design Studie*s 35, 6: 559–592.

CHAPTERS

Nikolas Martelaro and Wendy Ju. 2018. The Needfinding Machine. In: Soro A., Brereton M., Roe P. (eds) *Social Internet of Things. Internet of Things (Technology, Communications and Computing)*. Springer, Cham

Nikolas Martelaro, Wendy Ju, and Mark Horowitz. 2017. The Interaction Engine. In *Design Thinking Research: Making Distinctions: Collaboration versus Cooperation*. Springer, 147–169.

David Sirkin, Sonia Baltodano, Brian Mok, Dirk Rothenbücher, Nikhil Gowda, Jamy Li, **Nikolas Martelaro**, David Miller, Srinath Sibi, and Wendy Ju. 2016. Embodied Design Improvisation for Autonomous Vehicles. In *Design Thinking Research*. Springer, 125–143.

Nikolas Martelaro, Shameek Ganguly, Martin Steinert, and Malte Jung. 2015. The Personal Trait Myth: A Comparative Analysis of the Innovation Impact of Design Thinking Tools and Personal Traits. In *Design Thinking Research*. Springer, 41–57.

Conference Papers (Refereed)

Rob Semmens, **Nikolas Martelaro**, Pushyami Kaveti, Simon Stent, and Wendy Ju. 2019. Is Now A Good Time?: An Empirical Study of Vehicle-Driver Communication Timing. In Proceedings of the 2019 CHI Conference on Human Factors in Computing Systems (CHI '19). ACM, New York, NY, USA, Paper 637, 12 pages.

Nikolas Martelaro, Jaime Teevan, and Shamsi T. Iqbal. 2019. An Exploration of Speech-Based Productivity Support in the Car. In Proceedings of the 2019 CHI Conference on Human Factors in Computing Systems (CHI '19). ACM, New York, NY, USA, Paper 264, 12 pages.

Nikolas Martelaro and Wendy Ju. 2017. WoZ Way: Enabling Real-Time Interaction Prototyping and On-road Observation. In *Proceedings of the 2017 Conference on Computer Supported Cooperative Work (CSCW'17)*. Portland, OR.

David Sirkin, **Nikolas Martelaro**, Mishel Johns, and Wendy Ju. 2017. Toward Measurement of Situation Awareness in Autonomous Vehicles. In *Proceedings of the 2017 CHI Conference on Human Factors in Computing Systems (CHI'17)*, 405–415.

Dylan Moore, Hamish Tennent, **Nikolas Martelaro**, and Wendy Ju. 2017. Making Noise Intentional: A Study of Servo Sound Perception. In *Proceedings of the 2017 ACM/IEEE International Conference on Human-Robot Interaction (HRI '17)*, 12–21.

Nikolas Martelaro, Victoria C. Nneji, Wendy Ju, and Pamela Hinds. 2016. Tell Me More: Designing HRI to Encourage More Trust, Disclosure, and Companionship. In *The Eleventh ACM/IEEE International Conference on Human Robot Interaction (HRI'16)*, 181–188.

Marco Spadafora, Victor Chahuneau, **Nikolas Martelaro**, David Sirkin, and Wendy Ju. 2016. Designing the Behavior of Interactive Objects. In *Proceedings of the TEI'16: Tenth International Conference on Tangible, Embedded, and Embodied Interaction (TEI'16)*, 70–77.

Malte F. Jung, **Nikolas Martelaro**, and Pamela J. Hinds. 2015. Using Robots to Moderate Team Conflict: The Case of Repairing Violations. In *Proceedings of the Tenth Annual ACM/IEEE International Conference on Human-Robot Interaction (HRI'15)*, 229–236.

Sonia Baltodano, Srinath Sibi, **Nikolas Martelaro**, Nikhil Gowda, and Wendy Ju. 2015. The RRADS Platform: A Real Road Autonomous Driving Simulator. In *Proceedings of the 7th International Conference on Automotive User Interfaces and Interactive Vehicular Applications (AutoUI '14)*, 281–288.

Malte F. Jung, **Nikolas Martelaro**, Halsey Hoster, and Clifford Nass. 2014. Participatory Materials: Having a Reflective Conversation with an Artifact in the Making. In *Proceedings of the 2014 Conference on Designing Interactive Systems (DIS '14)*. ACM, New York, NY, USA, 25-34.

Invited Articles

Nikolas Martelaro and Wendy Ju. 2018. Cybernetics and the design of the user experience of AI systems. Interactions 25, 6 (October 2018), 38-41.

Workshop Papers (Refereed)

Nikolas Martelaro and Wendy Ju. 2017. DJ Bot: Needfinding Machines for Improved Music Recommendations. In *2017 AAAI Spring Symposium Series*.

Nikolas Martelaro and Wendy Ju. 2017. The Needfinding Machine. In *Proceedings of the Companion of the 2017 ACM/IEEE International Conference on Human-Robot Interaction (HRI '17)*, 355–356.

Demos, Videos, and Work-in-Progress (Refereed)

Nikolas Martelaro and Wendy Ju. 2017. WoZ Way: Enabling Real-time Remote Interaction Prototyping & Observation in On-road Vehicles. In *Companion of the 2017 ACM Conference on Computer Supported Cooperative Work and Social Computing (CSCW '17 Companion)*. ACM, New York, NY, USA, 21-24. (Demo) *****Best Demonstration Award*****

Nikolas Martelaro. 2016. Wizard-of-Oz Interfaces as a Step Towards Autonomous HRI. In *2016 AAAI Spring Symposium Series*.

Nikolas Martelaro, Victoria C. Nneji, Wendy Ju, and Pamela Hinds. 2016. Tell Me More: Designing HRI to Encourage More Trust, Disclosure, and Companionship. In *The Eleventh ACM/IEEE International Conference on Human Robot Interaction (HRI '16)*. IEEE Press, Piscataway, NJ, USA, 577-577. (Video)

Nikolas Martelaro, David Sirkin, and Wendy Ju. 2015. DAZE: A Real-time Situation Awareness Measurement Tool for Driving. In *Adjunct Proceedings of the 7th International Conference on Automotive User Interfaces and Interactive Vehicular Applications (AutoUI '15)*, 158–163. (Work-in-Progress)

Organized Course & Workshops

Naomi T. Fitter, Heather Knight, **Nikolas Martelaro**, and David Sirkin. 2017. What Actors can Teach Robots. In *Proceedings of the 2017 CHI Conference Extended Abstracts on Human Factors in Computing Systems (CHI '17)*, 574–580.

David Sirkin, **Nikolas Martelaro**, and Wendy Ju. 2017. Make This! Introduction to Electronics Prototyping Using Arduino. In *Proceedings of the 2017 CHI Conference Extended Abstracts on Human Factors in Computing Systems (CHI EA '17)*. ACM, New York, NY, USA, 1224-1227.

Nikolas Martelaro, Michael Shiloh, and Wendy Ju. 2016. The Interaction Engine: Tools for Prototyping Connected Devices. In *Proceedings of the TEI'16: Tenth International Conference on Tangible, Embedded, and Embodied Interaction (TEI '16)*, 762–765.

David Sirkin, **Nikolas Martelaro**, and Wendy Ju. 2016. Make This!: Introduction to Electronics Prototyping Using Arduino. In *Proceedings of the 2016 CHI Conference Extended Abstracts on Human Factors in Computing Systems (CHI EA '16)*. ACM, New York, NY, USA, 980-983.

David Sirkin, **Nikolas Martelaro**, Hamish Tennent, Mishel Johns, Brian Mok, Wendy Ju, Guy Hoffman, Heather Knight, Bilge Mutlu, and Leila Takayama. 2016. Design Skills for HRI. In *The Eleventh ACM/IEEE International Conference on Human Robot Interaction (HRI '16)*. IEEE Press, Piscataway, NJ, USA, 581-582.

PROFESSIONAL ACTIVITY

SERVICE

ACM/IEEE CHI 2020 (Conference on Human Factors in Computing Systems) Program Committee Member

ACM/IEEE CHI 2019 (Conference on Human Factors in Computing Systems) Program Committee Member

ACM/IEEE HRI 2019 (Conference on Human-Robot Interaction) Program Committee Member

ACM/IEEE HRI 2018 (Conference on Human-Robot Interaction) Pioneers Panel Chair

ACM CHI 2016 (Conference on Human Factors in Computing Systems) Conference Chair Assistant

ACM TEI 2015 (Tangible Embodied Embedded Interactions) Student Volunteer Chair

ACM TEI 2014 (Tangible Embodied Embedded Interactions) Student Volunteer

PEER REVIEWER FOR

ACM CHI (Human-Computer Interactions)
ACM DIS (Designing Interactive Systems)
ACM HRI (Human-Robot Interactions)
ACM AutoUI (Automotive User Interfaces)
International Journal of Human-Computer Studies

ASSOCIATIONS

Association of Computer Machinery
Association for the Advancement of Artificial Intelligence

SKILLS

DESIGN

User-centered product development, Needfinding, Contextual Inquiry, Rapid Prototyping, Concept Generation, Systems Design, Cybernetics

PROGRAMMING

Python, R, Arduino, Embedded C, UNIX, NodeJS, d3.js, ffmpeg, HTML

MECHANICAL DESIGN

SolidWorks CAD, gearbox design, physical modeling and simulation, wood and metal work

Electrical Design	Mechatronics, microcontroller systems, digital circuit design, PCB layout
Multimedia	Camera and Recording Systems, Final Cut Pro, Adobe Premiere Pro, Adobe Audition, Adobe Illustrator, Adobe Photoshop