



Steering UX Education: Designing an Automotive UX Course

A workshop for educators, designers, and researchers who have an interest in teaching about what should be designed within in-car interfaces

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ABSTRACT

In-car interfaces are the primary medium for communication between the occupants and the increasingly agentic vehicle systems. Although many universities teach automotive user experience and design courses, there is no consensus on what topics to cover. Some schools may choose to focus on the interior design of the cabin, including, but not limited to, physical controls and ergonomics, while other schools may just focus on the usability of what is shown to the driver and passengers. Participants in our workshop will discuss various topics for teaching Automotive UX and UI at both undergraduate and graduate levels, participating in interactive activities such as panels, breakout discussions, and syllabus design. Participants will then combine and form their findings into a course outline based on themes (ex., UI, Human Factors, etc.). This workshop is expected to achieve general consensus on a Automotive UX curriculum drawing from diverse stakeholders, including academia, industry, and government.

CCS CONCEPTS

• **Human-centered computing** → Human computer interaction (HCI); • **Social and professional topics** → Professional topics; Computing education; Model curricula.

KEYWORDS

automated vehicles, curriculum, user experience, interaction design, human-centered computing

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1 OVERVIEW

User Experience (UX) Design within the automotive space has started to appear as stand-alone specialty classes offered at multiple education institutions; all taking unique stances as to the direction and topics of the classes. Some focus on graphics and modeling, while others focus on designing key interface features while considering human factors guidelines. In addition, key topics such as accessibility, information architecture, and psychology can also play a huge role in interface designs because users' primary objective is to drive, interaction with the in-vehicle interface being a secondary task. With highly automated vehicles, the roles of the vehicle occupants change, to supervisor or passenger [1]. Therefore, although general UX design methodologies are applied, automotive UX design also aims to improve driver performance and safety, in addition to user satisfaction [2].

Educators should always be able to put their spin on any particular course, but it would help if guardrails (pun intended) were put in place to help paint an idea as to what the fundamentals are and how they could be taught to both undergraduate and graduate students. Building on top of common UI and UX principles is required by the nature of the vehicle context, where design of the vehicle interior must take into account the fact that the whole thing is moving, the attentional focus of the driver may need to be maintained on the road environment and away from the interface, and there are material safety concerns to be considered.

This proposed workshop aims to develop a sample syllabus based on the curriculum plan discussed and generated by the workshop activities. The developed curriculum plan is anticipated to make the following contributions: First, the curriculum plan will consider automotive UX design to be different from the generic UX design by identifying the unique needs of in-car interface designs, including physical, visual, auditory, and cognitive needs for drivers

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to guide automotive UX design [3]. Second, our curriculum plan will integrate perspectives from academic research and industrial development settings [4]. Automotive UX design under these two settings shares common goals with general UX courses, but also has special goals specific to the automotive context. Thus, integrating industrial and academic perspectives will provide students with a holistic view of related topics and benefit their future career, whatever that may be.

2 TOPICS

The workshop will be four hours long with a 30-minute break in the middle. The session will be divided into two modules. Each module will be structured slightly differently. Refer to the table for a detailed breakdown.

Module 1 - The first step is to identify the audience and goals of an introductory course on automotive UX. This module will define the learning objectives, target audiences, and their needs. This section will start with a panel discussion led by current educators and automotive UX practitioners followed by a brainstorming session. The output would be a list of target audiences, learning objectives, and themes that could fall under the umbrella of Automotive UX (e.g., UI, Human Factors, Graphics, etc.).

Module 2 - The second step is to gain consensus on evaluating students learning and on the topics to be covered in a course. Participants will be assigned to small discussion groups based on themes that were identified in Module 1. While in these groups, participants will be asked to brainstorm topics on one stack of Post-it notes and a separate stack of Post-It notes. Participants will be asked to write an assignment or evaluation activity that students would complete in class or as a project assignment and create an affinity diagram on the wall. The output from the affinity diagram would be a list of topics paired with evaluation methods that are put in order. Ultimately, this order of student learning objectives, topics and evaluation methods would create a number of different class ideas.

3 PARTICIPANTS

This workshop will be most useful for anyone teaching or planning to teach an automotive user experience design course. This can include, but not be limited to, human factors, graphics, and design studio classes. Given the interest, we anticipate 25 participants. If we end up with more or fewer participants, we can easily modify the number of participants in each module 2 discussion group. We will recruit participants through email (e.g., SIGCHI listserv, Dagstuhl listserv on automotive, HRI listserv, etc.) and we will collect demographic and curriculum information from participants.

4 DOCUMENTATION & OUTPUT

The output will be developed into a curriculum plan that will include an example syllabus and will be shared publicly through our workshop website. We will write an additional paper based on the output of this workshop for the following year.

5 SCHEDULE

The half-day workshop will contain a variety of activities across four hours (refer to Table 1 for full schedule).

Panel Discussion - There will be three panelists in Module 1. Each will be asked to give a five-minute introduction about themselves and what they think is important to teach based on their background.

Small Group Discussions - In the 2nd Module, attendees will be randomly split into groups of 4-5 people. Each Moderator will lead a small group. This will allow attendees to meet new people and engage in a task. This will also help give more time for people to share their insights. An organizer will be in charge of each small group, in order to help lead the discussion.

Affinity Diagram Development - As team members we will be asked to post their notes on a board so that every attendee can identify groups of similarity and match both assessment tools and topics that would be covered in the classroom.

6 PANELISTS

Irene Lopatovska is a Professor at the Pratt Institute. Their highest degree is a PhD in Information Science from Rutgers University.

Niklas Martelaro is an Assistant Professor at Carnegie Mellon. Their highest degree is a PhD in Mechanical Engineering from Stanford University.

David Sirkin is a Research Engineer and Lecturer at Stanford University. Their highest degree is a PhD in Mechanical Engineering from Stanford University.

James Rampton is a Lecturer at the University of Michigan. Their highest degree is a Master in Human Computer Interaction and a Master in Health Behavior and Health Education from the University of Michigan.

7 ROOM & TECHNOLOGY NEEDS

No specific hardware or software is requested for this workshop. We plan to use Zoom to hold the panel discussion. For other workshop activities, we need packets of Post-it notes, markers, easel pads, a table for panelists facing the room, and a projector with a screen.

8 AUTHORS/MODERATORS

James Rampton is a Lecturer at the University of Michigan School of Information (UMSI). For the past year, he has taught automotive user experience design courses at both the undergraduate and graduate levels. The Student Life office selected him as an “Honored Instructor” in his first year. Before joining UMSI in the fall of 2024 he worked at General Motors as a Lead Product Designer for five and a half years. At GM, he redesigned the entire messaging framework and vehicle information app. His work can be seen in vehicles like the Cadillac Lyriq and the Chevrolet Blazer EV, which both won the *Wards 10 Best Interior and User Experience* Design award. He also worked on the next-generation framework for Model Year 2027 and beyond.

Lionel P. Robert Jr. is a Professor of Information and Robotics at the University of Michigan. He is an ACM Distinguished Member, an AIS Distinguished Member “Cum Laude”, and an IEEE and INFORMS Senior Member. He is the director of the Michigan Autonomous Vehicle Research Intergroup Collaboration (MAVRIC) and an affiliate of the National Center for Institutional Diversity. His research has been sponsored by AAA, Automotive Research

Table 1: Workshop Schedule

START TIME	ACTIVITY	PRESENTER
MODULE 1		
01:00 PM	Introductions, Schedule, Problem Statement & Scope	James Rampton
01:15 PM	Panel Discussion	Irene Lopatovska, Nikolas Martelaro, David Sirkin, James Rampton
02:00 PM	Small Group Brainstorm on Themes & Learning Objectives	
02:45 PM	BREAK	
MODULE 2		
03:15 PM	Recap of Themes & Learning Objectives and Assignment to Group Tables	
03:30 PM	Small Group Brainstorm & Affinity Diagram Mapping	
04:30 PM	Summarize the Affinity Diagram and discuss the next steps	James Rampton

Center/U.S. Army, Army Research Laboratory (ARL), Toyota Research Institute, MCity, and the National Science Foundation. Dr. Robert has also appeared in print, radio, & television for ABC, CNN, CBS, CNBC, Michigan Radio, Inc., Fast Company, New York Times, and the Associated Press.

Myounghoon “Philart” Jeon is a Professor in the Grado Department of Industrial and Systems Engineering and the Department of Computer Science (by courtesy) at Virginia Tech. His Mind Music Machine Lab focuses on emotion and sound research in the context of automotive user experiences, assistive robotics, and arts in extended reality. He edited a book, “User Experience Design in the Era of Automated Driving”. He hosted AutoUI 2022 as a General co-chair and has been serving as a steering committee member of the AutoUI community. He has co-hosted several workshops at AutoUI including the DEI workshop series.

Manhua Wang is a PhD candidate in the Grado Department of Industrial and Systems Engineering at Virginia Tech. She received her M.S. in Information Science from the University of North Carolina at Chapel Hill. Her research aims to enhance the human-technology partnership, focusing on understanding and addressing human information needs in the context of intelligent transportation systems and future workplaces. She has served on the organizing committee of the AutoUI community since 2022.

Gayoung Ban is a PhD student at Virginia Tech in the Grado Department of Industrial and Systems Engineering. She received her M.E. in Industrial Engineering from Seoul National University. Her research primarily focuses on studying human distraction within intelligent transportation systems. It aims to improve human-machine collaboration by identifying and addressing the specific information needs of operators, enhancing safety and efficiency in future transportation environments. She holds leadership positions in the Women’s Transportation Seminar International at Virginia Tech and as a communicator for the Human Factors and Ergonomics Society’s Surface Transportation Technical Group (STTG).

Ankit R. Patel is currently associated with the University of Minho, Portugal. He served in various positions at international conferences, like paper chair for the IEEE/ASME JRC 2025; track chair for the IEEE ITEC 2023, 2024; track co-chairs for the IEEE AFRICON; associate editor for the IFAC CTS 2024; associate chair for the ACM GROUP 2025; global ambassador for the ACM CHI; diversity inclusion and accessibility chair for the ACM COMPASS 2024 and AutomotiveUI 2023; associate chair for the ACM IMX 2023, 2024; associate chair for the ACM AutomotiveUI 2024 and MuC 2024. He also serves as a lead editor for the special issue in the Journal on Multimodal User Interfaces; an associate editor for the EAI Endorsed Transactions on Smart Cities and Journal of Social Economic Research; and an editorial board member in the Journal of Sustainable Urban Mobility and Transportation Development Research. He received the best poster paper award at the 2019 IEEE/RISJ International Conference on Intelligent Robots and Systems (IROS), Macau. He also serves as a reviewer in many journals, including Transport; Journal of Transport and Health; and Transportation Research Part F: Traffic Psychology and Behaviour. He reviewed many conferences, including CHI, IMX, AutomotiveUI, MuC, ITS America, OzCHI, INTERACT, TRB, and NordiCHI, among others. His research interests lie in the fields of human factors and interactions, sustainable transportation, travel behavior and psychology, and socially inclusive transportation.

Dave B. Miller is an assistant teaching professor in the Human Factors Engineering program at Tufts University, in the department of Mechanical Engineering. His teaching is currently focused on interface design, research methods, industrial ergonomics, interaction with automated systems, and engineering ethics. He is also director of the SHOULD Lab, supervising research into trust in automation, human-technology conflict, and instructional design.

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