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Control Seminar

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AI Guarding the Human: Toyota's Guardian Approach to Automated Driving

RYAN EUSTICE

Professor, University of Michigan Senior Vice President
of Automated Driving, Toyota Research Institute
University of Michigan, Department of Naval Architecture
and Marine Engineering

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3:30 – 4:30 pm 1500 EECS

ABSTRACT: At this year's CES in Las Vegas, Toyota demonstrated significant progress in its Guardian approach to vehicle automation. I lead this project at the Toyota Research Institute (TRI) as senior vice president of automated driving in a dual-appointment with the University of Michigan, where I am a professor. Guardian is a whole new way of approaching vehicle automation, flipping the conventional mindset from having the human guard the AI (as in SAE Level 2 systems) to instead using AI to guard the human driver. I will share how I came to lead the development of this project, provide my insights into the current state of vehicle automation, and deliver a technical deep dive into how Guardian works and our vision for building an uncrashable car. I will talk about the systems being used for perception, prediction, and planning plus the integration of blended envelope control that combines the best of human and machine to improve driving performance. I will conclude with a glimpse at how this technology might be developed and evolve in the future.

BIO: Dr. Ryan Eustice is a Professor at the University of Michigan and the Senior Vice President of Automated Driving at the Toyota Research Institute (TRI). Dr. Eustice received a PhD from the Massachusetts Institute of Technology / Woods Hole Oceanographic Institution Joint Program in Ocean Engineering in 2005, and was a Postdoctoral Research Scholar at Johns Hopkins University. He joined the faculty at the University of Michigan in 2006 in the Department of Naval Architecture and Marine Engineering where he additionally holds joint appointments in the Department of Electrical Engineering and Computer Science, and the Department of Mechanical Engineering. He remains the Director of the Perceptual Robotics Laboratory (PeRL) at U-M. Dr. Eustice is perhaps best known for his work in advancing large-scale simultaneous localization and mapping, including visual mapping of the RMS Titanic. He has published over 150 technical papers, is the recipient of a NSF CAREER award and ONR Young Investigator Award, and has been an Associate Editor for *IEEE Transactions on Robotics, IEEE Robotics and Automation Letters* and *IEEE Journal of Oceanic Engineering*, and is widely cited in the mobile robotics literature. He was a core member of Team IVS in the 2007 DARPA Urban Challenge (one of 11 finalist teams) and worked collaboratively with Ford Motor Company for over a decade in self-driving vehicle research as a PI at the University of Michigan before joining TRI.

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Questions? Contact: Judi Jones asap@umich.edu