RADS Distinguished Seminar

Speaker: **Dr. Huei Peng,** Roger L. McCarthy Professor of Mechanical Engineering,
University of Michigan
When: Tuesday, September 10th, 3:20 PM
Where: 209 Norris Hall

Physics Enhanced AI – Lane Detection Example

Perception, path planning and control are three important tasks in developing automated vehicles. For level-2 automated vehicle functions such as super-cruise (GM's trademark) or Autopilot (Tesla's trademark), the fundamental functions include lane/curvature detection, obstacle detection, path planning, and steering/speed control.   Existing methods in the literature can be largely divided into two categories: end-to-end, and step-by-step. End-to-end approaches compute control actions directly, while in the step-by-step approaches, the tasks are separately conceived, designed, and validated.   The step-by-step approach dominates the automotive field for many decades, until the new kid on the block, the artificial intelligence (AI), emerges, promising to totally revolutionize all aspects of the modern society, including design autonomous vehicles. AI concepts were promoted by "tech" companies such as Nvidia, Comma.ai, AutoX, and Argo.ai. Many of the end-to-end promoters believe it is not necessary to use vehicle dynamics/physics based knowledge and models—the final control decision can be figured out by the "intelligence" itself. A fundamental question this seminar aims to answer: is it true that dynamics/physics are yesterday's knowledge and is becoming obsolete by the AI approach? Or, they still have some value in the design of autonomous vehicle control systems? If so, how do we use these two approaches in a complementary way? Is there a systematic way to identify tasks more suitable for AI vs. those more suitable to physics/dynamics? Our work is early but preliminary results will be shown.

Brief Biography

Huei Peng received his Ph.D. in Mechanical Engineering from the University of California, Berkeley in 1992. He is now a Professor at the Department of Mechanical Engineering at the University of Michigan. He currently serves as the **Director** of Mcity, which studies connected and autonomous vehicle technologies and promotes their deployment. In the last 10 years, he was involved in the design of several military and civilian concept vehicles, including FTTS, FMTV, Eaton/Fedex, and Super-HUMMWV—for both electric and hydraulic hybrid concepts. He served as the US Director of the DOE sponsored Clean Energy Research Center—Clean Vehicle Consortium, which supports more than 30 research projects related to the development of clean vehicles in the US and in China.
Host: Dr. Lei Zuo

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