The Emergence of Software Defined Automobiles: Products, Industry, Curriculum & Collaborations of Tomorrow

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This talk is a drive into the future --- to share the joys, challenges, opportunities and risks associated with software in modern-day automotive product creation. Several recent concept and production automobiles will be used to sketch this future, involving the rapid convergence of enterprise and embedded computing and of portable-mobile, fixed-mobile and fixed wireless communications. A central theme in this talk will be the art & science of balancing right-brain & left-brain thinking: An automobile has to have an emotional appeal and its design must inherently be user-centered. At the same time it must be precisely engineered and executed to meet a broad spectrum of demands, needs and wants --- from global regulatory requirements and local, societal, market needs to individual consumer wants – expressed within broad attribute groupings such as: safety & security, powertrain, fuel efficiency, tailpipe emissions, driving performance, ride & handling, interior comfort & convenience, durability, fit & finish, value: vehicle price & total cost of ownership. Creating an automobile clearly calls for a series of innovations that in turn rely on a body of inventions, literature and competencies that are created and nurtured in academia and the broad industrial and public sector Research & Development base. This talk has two purposes: One is to highlight the emerging role of software technologies and processes in modern automotive product creation; the second is to stimulate thinking in terms of how academic curricula might need to evolve and what types of new collaboration styles might be needed for the creation of sustainable mobility solutions of tomorrow. Two examples of exciting on-going academic-public-private collaborations will be mentioned: One focused on improving the fuel efficiency of automobiles (www.futuretruck.org) and the other aimed at (www.team.caltech.edu) autonomously driving a vehicle through about 400 kilometers of desert terrain.