**Biography**

Max Donath is a Professor of Mechanical Engineering and Director of the Intelligent Transportation Systems Institute at the University of Minnesota. The Institute's activities are guided by its theme of enhancing the safety and mobility of road- and transit-based transportation by focusing on human-centered technology. The ITS Institute, under his direction since 1997, pursues research in the areas of: human performance and behavior, driver interfaces, sensors, vehicle and traffic controls, communications, and traffic modeling and simulation – developing new approaches for confronting difficult transportation issues.

Professor Donath’s most recent research efforts have been directed toward the application of sensors and control systems to reduce driver error and the resulting road fatalities. The focus of his research can be grouped into three areas: (a) improved georeferenced location sensing (“which lane” and “where in lane” vehicle position), (b) collision avoidance and active safety, and (c) novel human interfaces for providing improved situation awareness to the driver and pedestrian.

Over the years, he has advised over 40 Masters and 8 PhD students. His present students are developing driver support systems for novice teen drivers and sensing systems that help bus drivers maintain their lane position in commercial business districts where GPS signals are inaccessible. Donath has been on the faculty at the University of Minnesota since he received his Ph.D. at MIT in 1978.

**Abstract**

Addressing Patterns of Risk: Driver Assist Technologies For Reducing Road Fatalities

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The ITS Institute is working to effect significant reductions in road fatalities and life changing crashes. Our focus is on those at highest risk - teenage drivers, driving on rural roads (right angle crashes at unsignalized intersections and lane departure crashes), and operating motorcycles. This seminar will elaborate on our approaches to the teenage driver and lane departure prevention.

More than five thousand teenagers lose their lives on roadways in the United States each year. These crashes account for 40% of all deaths among 15-20 year-olds, making motor-vehicle crashes the leading cause of death for this age group. Despite teen drivers making up only 7% of all licensed drivers in Minnesota, they are involved in nearly 14% of all fatal crashes across all age groups. Minnesota in fact has the dubious honor of having the highest percentage of teenage driver involved fatal crashes in the country.

A possible solution is through the use of vehicle-based driver support systems integrated with a Graduated Driving License program. In-vehicle technology offers an opportunity to address speeding, seat belt use, and distraction due to cell phones. If successfully deployed, a Teen Driver Support System
(TDSS), such as the one that will be described, could significantly decrease the number of teens killed on the road.

Thirty percent of road fatalities are rural lane departure crashes. Those who are most at risk are driving tired, distracted or impaired (and others around them). Our work is directed at detecting/predicting whether the vehicle is about to leave the road or lane, sensing the lateral vehicle position and generating appropriate feedback to the driver, or if the driver is not responsive, automatically steering the vehicle to the shoulder and bringing it to a safe stop.

In this seminar, we will focus on the sensing technologies and on the feedback elements for lane keeping. These will be illustrated by University of Minnesota deployed driver assist systems on snowplows operating in white out conditions and on buses running in narrow Bus-Only-Shoulder lanes. Besides providing visual cues, these systems improve the driver’s situation awareness for lane keeping through haptic feedback in the steering wheel and in the seat, and through a virtual mirror that reduces blind zones around the vehicle.