Perception for Outdoor Navigation on Highways, Cross-Country, and in the Air.

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The most crucial issue in building intelligent vehicles is perception: building sensors and algorithms that enable the vehicles to see the world around them. The Navlab project, begun in 1984, has built a series of 10 robot cars, trucks, and busses, with our main emphasis on intelligent perception. Our work has had two main applications: driving off road, for military scout vehicles, and driving on road, for transportation applications. We were a core member of the National Automated Highway Systems Consortium, and provided the technology for one of the AHS demos in 1997. We are continuing to work on vision systems to warn drivers who fall asleep and drift off the side of the road. We have two new projects for bus safety: one with sensors looking sideways, to watch for pedestrians and obstacles, and one with sensors looking backwards, to warn other vehicles before they run in to the back of a bus.

The same kinds of vision technologies that work for ground vehicles are also useful for air vehicles. The CMU Heli project has built a series of 7 robot helicopters. The most recent ones fly autonomously, carrying onboard sensing and processing. They build maps, track objects, and fly programmed courses.

In this talk I will describe some of the perception technologies we have developed for these projects. I will show videos to illustrate the land and air vehicles in action.