Smart cars to rule the roads

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It's been more than 20 years since Knight Rider hit the airwaves, but the next generation of KITT-style cars may be seen on freeways very soon. The next generation of autonomous "smart cars" is now on the agenda for both military and high-end automobile manufacturers, according to a report from the recent RoboBusiness conference. Smart cars would be able to recognize their occupants, understand driver and passenger needs and inform the driver how best to proceed.

Neena Buck, vice president of the emerging frontiers program, said the current industry interest was sparked by the recent Defense Advanced Research Projects Agency's "Grand Challenge." In this annual event, driverless vehicles race each other down a 175-mile track in the heart of the Mojave Desert to see which can reach the fastest time under 10 hours. The competitors have thus far included corporations and universities, including Oakland University, which were funded through donations from Ford.

Winning isn't just about the money -- although the victors take home a healthy $2 million cash prize -- since it costs an average of $5 million to $6 million to compete. Instead, the participants get to showcase the best and the fastest in unmanned vehicle technology, hopefully gain the respect of their peers and bring their innovations to the attention of the car industry itself.

And it's these vehicles that have caught the attention of automobile executives. The basic technology itself is certainly nothing new -- smart cars are simply automobiles that have some degree of artificial-

intelligence functionality. Advances in automation technology over recent decades have added new "smart" features to cars, including anti-lock braking devices, satellite monitoring systems and traction control. The recently developed NavMan iCN750 in-car navigations system uses built-in cameras allowing drivers to take pictures of destinations they've been to. Drivers can then choose a destination by clicking on one of their pictures rather than cumbersomely entering ZIP codes or addresses.

Yet these features have so far been incorporated in what was described as a "piecemeal" fashion, according to the research agency StrategyAnalytics. The problem is that there's a sizeable knowledge gap between the large automobile manufacturers and the little guys making the driverless cars that have been racing out in the Mojave. Mainstream vehicle manufacturers are used to top-down small-scale innovation, modifying specific features through incremental additions to their standard models of cars. Developers of autonomous vehicles, however, have had to take a much more radical approach, building their cars from the ground up.

The challenge for the car industry will come in figuring out just how and where they can slide new tricks, including those already developed in autonomous robotics systems, into a large-scale, already established manufacturing process. Fully integrated multidisciplinary teams of electrical engineers, computer scientists and mechanical and systems engineers will be needed to achieve these goals.

But assembling these capabilities won't be so much of a choice as a necessity, according to Buck's report. With each new high-tech widget that gets introduced, the more competition within the automobile industry comes to depend on the intellectual property and software built into the car, as well as its physical design and visual appeal.

The costs of developing the technology to drive the next generation of

self-aware smart cars means that initially they'll only be available at the high end of the market and will be priced accordingly -- these babies won't come cheap. However, as technology advances drive costs down, demand for the vehicles increases and manufacturing processes become more efficient, the high-end offering should migrate across the board.