**Smart Cars, Intelligent Highways**

Cars today are smart. No, they may not be smart enough to change their own   
oil or find the lost coins in their seats, but they are smart and getting smarter. The   
average car today has more computing power than the 1969 Apollo 11 spacecraft   
that carried the first astronauts to the moon. Every car produced today has at least   
one computer for monitoring fuel consumption and pollution controls. The average  
 car uses twelve computerized devices, and high-end cars have many more,   
controlling everything from the sunroof to the braking system. In the near future,

cars may be virtually stuffed with computer chips from front fender to taillight.

That's because motorists enjoy computerized gizmos, and providing these little

devices is cheaper for automakers than building a better engine or making other

engineering changes that might actually be more important.

Many of the smart features we are seeing today are safety-related. Some are

systems to avoid collisions. These may use sonar, radar, lasers, computers, or video

cameras, or some combination of these. These systems beep or warn drivers with a

voice signal if the vehicle gets too close to an object or another vehicle or if it strays

out of its lane. The system can suggest actions to the driver or even temporarily take

control to avoid wrecks. Another safety device is a smart airbag system. To deploy

airbags with the minimum necessary force, sensors determine an occupant's weight

and size and the severity of impact. This system should reduce the number of

children hurt by airbags that open too vigorously. Another system can automatically

notify emergency services that an accident has happened and, using a Global

Positioning System (GPS), can pinpoint the location of the vehicle for police and

rescue units. This system can save precious minutes and many lives.

One of the most convenient aspects of smart cars is their ability to navigate.

Drivers tell them where they want to go and then, by means of a GPS navigation

device and computerized maps, smart cars can figure out the best ways to reach the

drivers' destinations. The cars can show the information on a map or give drivers

voice directions. They can even correct drivers if they make a mistake. Using

communication devices connected to the Internet, cars can apprise drivers of

problems ahead – construction work, traffic jams, and accidents – and then suggest

different routes to the drivers' offices, favorite pizza places, or closest shopping

malls.

Smart cars create problems as well, however. One problem is how to control

all this automotive technology. More buttons take more of the drivers' attention.

Even voice controls are distracting for drivers. A recent study showed that drivers

talking on handheld cell phones were four times more likely to be involved in

accidents as drivers who were not. In fact, drivers using cell phones were almost as

likely to be involved in accidents as those who were legally intoxicated. Using voice

controls, even a hands-free system, might prove to be as perilous as chatting on the

phone. Nevertheless, the auto industry's answer to the control problem so far has

been voice control. When it comes to simple tasks – changing channels on the radio

or opening the trunk – voice controls work well enough. But it is probably not the

best method for directing more difficult operations such as navigating the Internet

or controlling the car itself. Engine noise, highway noise, and the music on the stereo

tend to garble instructions, and voice recognition systems often cannot decipher

strong accents.

No matter how smart cars become, they cannot solve all the problems facing

a “car-crazy” world by themselves. Anyone who has traveled by car in or around

almost any city in the world knows that the problem of traffic congestion is

becoming worse every year. Cars, buses, and trucks caught up in the incessant traffic

jams in the cities waste vast amounts of fuel and pour pollution into the atmosphere.

Then there are the terrible statistics for highway fatalities. In the United States

alone, over 40,000 people die a year. Around the world, it is believed that between

800,000 and 1.15 million perish in automobile accidents annually. Some

transportation planners believe that better mass transportation is the answer –

more monorails, subways, and bullet trains. Other analysts believe that there will

always be a demand for the convenience and independence of private automobiles.

The traditional solution has been to simply build more roads. However, another

solution is self-driving vehicles operating on automated “intelligent” roadways.

What is an “intelligent” roadway? It is one type of automated highway that

features one or more lanes on which vehicles with special sensors and

communications systems can travel completely under computer control. The

vehicles follow each other at closely spaced intervals in groups called “platoons”.

(Some lanes would also have to be open to conventional cars). Vehicles in platoons

traveling on the automated lanes would be temporarily linked into communications

networks. These vehicles could then constantly exchange information about speed,

acceleration, braking, and so on. To keep vehicles in their lanes and control their

speed and direction, special devices in cars might be used to sense magnets buried

in the roadbed. One expert has said that the typical highway lane today can handle

2,000 vehicles per hour but estimated that an intelligent highway lane could

accommodate up to 6,000 vehicles, depending on the number of entrances and exits.

The technology required to operate an automated highway already exists

and has been tested. On a stretch of San Diego Expressway, a platoon of seven smart

cars traveled on a lane of intelligent highway. The cars followed one another about 5

meters apart at around 105 kilometers per hour. The drivers sat back and sipped

their lattes. They said that traveling that fast and that close together with no control

was exciting and a little frightening at first, but that, it became rather humdrum in a

short time.

But don't plan to have your car chauffeur you to work any time soon. For one

thing, the cost would be staggering. Even equipping one lane of traffic on the busiest

urban expressways with the necessary technology would be too expensive to do in

the near future. Installing the required equipment on cars would also add thousands

of dollars to the cost of new cars. Besides, many people would not trust self-driven

cars. Much of the public has a warped sense of risk. Some people hesitate to fly even

though studies show that flying is safer than driving. That's because every plane

crash is highly publicized, while individual automobile accidents are not. Similarly,

although automated cars would certainly be safer than standard cars, when an

accident occurred it would probably involve hundreds of deaths and injuries. Even a

few such accidents would probably cause the public to call for the closing of

automated roads.