

## TRANSPORTATION

# Baby, you can drive my car

Roadways of the not-so-distant future will put computers in the driver's seat

BY SIMSON L. GARFINKEL

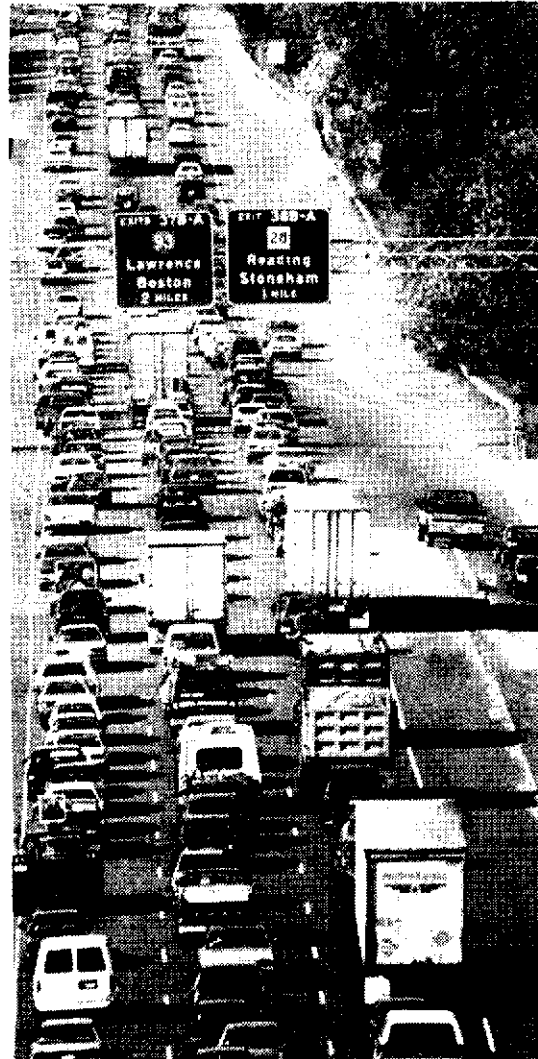
**H**aving learned that it can't build its way out of highway congestion, the United States is turning to a new generation of computerized "smart road" systems to help highways move cars more efficiently. Called Intelligent Transportation Systems, these new technologies will let us pay tolls without slowing down to

throw coins into baskets; will make our roads safer for all drivers; and will bring help faster when accidents do occur.

Already, the first ITS projects are appearing. The simplest allow drivers to pay bridge and highway tolls from a compact radio transponder inside their cars. When the car passes through a toll crossing, a computer reads the transponder's serial number, and the toll is automatically deducted from a pre-established account. Such systems are in use on New York's Tappan Zee Bridge and Florida's Orlando-Orange County Expressway.

Massachusetts drivers will get their first taste

(This article occupied the entire third page of the Boston Sunday Globe Focus section on June 11, 1985. It has been cut-and-pasted onto these 8x11 pages for clarity.)



GLOBE STAFF FILE PHOTO / DAVID L. RYAN

Morning rush-hour traffic slogs up Route 128 from Wakefield toward Boston in 1988.

of automatic toll systems later this year when the Third Harbor Tunnel opens for commercial traffic, says Sergiu Luchian, projectwide engineer for the Massachusetts Highway Department's Central Artery/Third Harbor Tunnel Project. According to Luchian, two of the tunnel's three lanes of travel in each direction will be set aside for electronic toll collection, called ETC. Luchian is on a statewide committee that will make sure the electronic tags used by the Artery/Tunnel project will also work on the Massachusetts Turnpike, the Tobin River Bridge and any future toll roads.

Indeed, since ETC makes toll collection nearly painless, ITS advocates expect it to issue in a new era of toll roads, or "road pricing." Specially-priced roads might cost more during rush hour than after 9 a.m., helping to cut traffic by spreading traffic over a longer period of time. Advanced systems might even sense the number of people in your car, allowing automatic discounts to people who car pool.

But for all the excitement, smart roads may pave over our privacy if state agencies specifying the systems do not consider how they might be abused.

Most automatic toll-collection systems in use today create a permanent record of every toll crossing to the nearest second. "The protections around those records is a very serious matter," warns Phil Agre, a professor of communications at the University of California at San Diego.

ITS records would almost certainly be used by law enforcement agencies, says Agre. The system would make it easy to monitor the movements of a person, or to electronically round up those driving away from the scene of a crime. ITS effectively places the entire populace under surveillance.

The databanks could also be abused by people outside the government. ITS might prove vital in forcing divorce settlements or workers' compensation suits, Agre says. "Insurance companies might

provide a discount to drivers who document that they have stayed on the right side of the tracks. Once the infrastructure is in place to track the locations of cars, we are going to have to face the implications."

Fortunately, there is a way to realize the benefits of smart roads without building in Big Brother. Instead of having the computer deduct your toll money from an account, some companies have developed ITS systems that actually store your money electronically in your car in a kind of "smart card." These systems offer the same convenience as the account-based systems but also offer the privacy of being able to pay your toll anonymously, as we pay our tolls today. The records of toll crossings don't have to be protected, because they are never created.

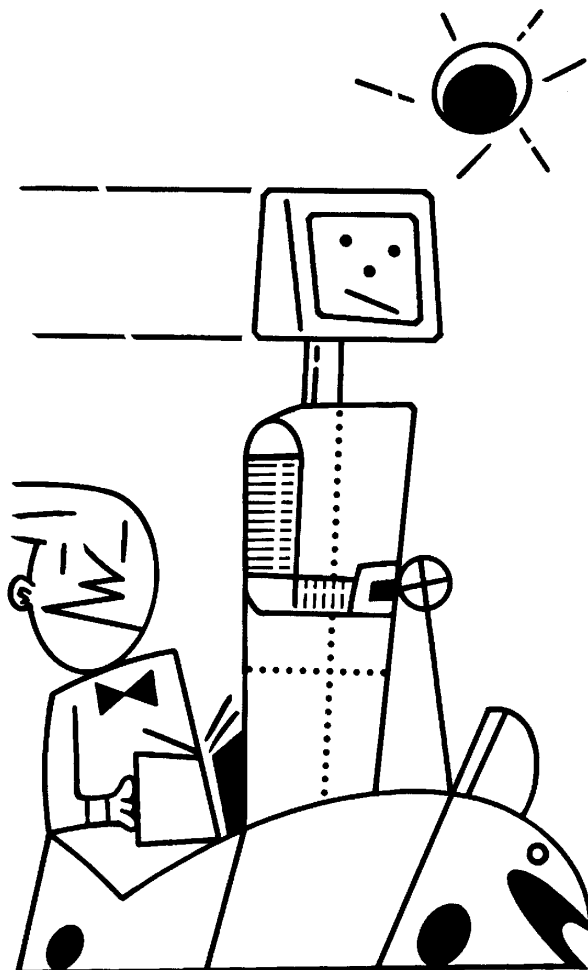
Unfortunately, Massachusetts highway officials say privacy is a non-issue. "It is a voluntary system," says John Judge, director of operations for the Turnpike Authority. "If you are of a mind where you might be concerned about privacy issues, you just don't have to join the program."

But it would be sad indeed if our state forces us to choose between the convenience and safety of electronic toll-collection systems and our personal privacy. And it would be stupid if the state adopts an electronic toll-collection system that forces us to choose between convenience and privacy when the technology exists that can solve our problems without creating new ones.

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*Simson L. Garfinkel, a contributing writer for Wired magazine, is moving to Martha's Vineyard, where he won't have to commute to work.*

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# SCENARIO

6:00 a.m. Tuesday, May 8, 2000

**Y**OU WAKE UP EARLY on a foggy morning to the sound of your telephone ringing. It's your personal travel service – let's call it SmartAgent – telling you the weather is predicted to delay your normal 40-mile, hourlong commute from Plymouth to downtown Boston by at least a half-hour.

If this had happened yesterday, the computer would have let you sleep, and recommended that you take the water shuttle to work. But you need your car in town this evening, so last night you told the system that you have to be in the office by 9 a.m., no matter what. To be safe, SmartAgent recommends that you leave for work by 7:30.

**YOU GET IN YOUR CAR** and start driving. Traffic is light, but a computerized display inside your car has a message from the State Police telling you that the speed limit has been dropped to 40 m.p.h. because of fog. As you pass Kingston, traffic starts to thicken.

**NOW YOU ARE 2 miles north of Hanover**, and the fog is turning to rain. A red light flashes on your dashboard: Your in-vehicle navigation system has received a message telling you of an accident ahead. The State Police recommend that you reduce your speed to 30 m.p.h. and move into the breakdown lane. Expect to add another 15 minutes to your travel time.

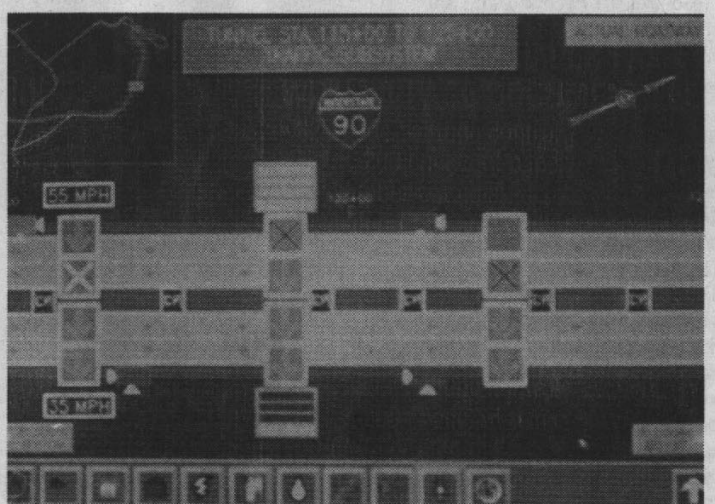
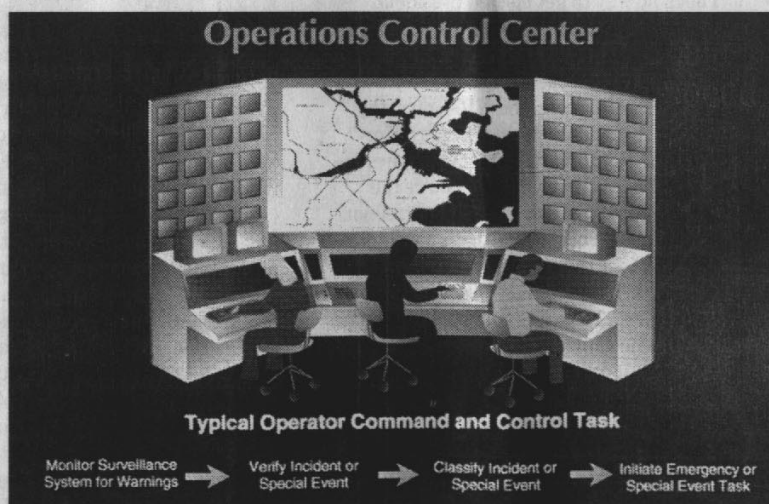
**A MINUTE LATER**, you get a second message from a premium traffic service – call it Bypass Systems – to which you subscribe. Because of local politics, the State Police will rarely divert traffic onto local roads – even when doing so would cut traffic and congestion. Fortunately for you, ITS is a competitive marketplace, and Bypass Systems is not run by elected officials. Bypass recommends that you take the Route 53 exit, just 2 miles ahead, and follow parallel to Route 3 for two exits.

**BACK ON ROUTE 3**, an alarm in your car tells you that you are following too closely the car in front of you. You back off, and think about the legislation pending on Beacon Hill that will let the state automatically issue tickets to any motorist caught speeding, tailgating or going through a red light. The smart roads system makes automatic traffic enforcement possible. It's an unanticipated consequence of the system but likely to be a moneymaker for the state and towns in these cash-strapped times. The new law should also cut down highway accidents.

**AS YOU DRIVE in on Interstate 93**, you see a little indicator on your dashboard slowly counting down the amount of money left in your toll-paying account. Under a new system called "road pricing," cars with a single occupant on the highways between 7 and 10 a.m. are charged a surcharge of 2 cents per mile. Road pricing has effectively turned every highway in Massachusetts into a toll road. It has also forced nearly all Massachusetts drivers to buy electronic tags for their cars, since drivers who don't have tags are forever searching their pockets for change.

**AS YOU TAKE the ramp off the highway**, your computer tells you that the parking lot where you normally park is filling up fast. ITS suggests a garage two blocks away, and asks if you want to reserve a space. You say "yes," and the computer reserves a spot, paying for it with \$20 from your account. As you pull into the garage, your dashboard teleprinter spits out a coupon for a free breakfast sandwich from the fast-food restaurant across the street.

It's 8:45, and you've made it to Boston in time for your meeting. But as you crumple up the coupon in your pocket, you wonder: Is your usual \$15-a-day garage really full, or did the restaurant pay to have your car diverted so that you could use its coupon?



A design rendering of a future operations traffic control room for the Central Artery/Third Harbor Tunnel project, alongside a sample screen.

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## **SmarTraveler: Your Own Traffic Report**

You can get a feel for tomorrow's smart roads today by using SmarTraveler, a service of SmartRoutes in Cambridge. SmarTraveler gives you up-to-the-minute traffic reports for more than 30 heavily-traveled routes within Interstate 495 and several mass transit routes. Each report is continually updated; SmarTraveler's information comes from a variety of sources including State Police, three aircraft, outdoor video cameras and several hundred trained drivers equipped with cellular telephones.

To use SmarTraveler, just call (617) 374-1234 from any telephone in the state. You'll hear the message: "Welcome to SmarTraveler! Please enter your route number now, followed by the star key." (The service is free. SmarTraveler gets its money from the state, whose dollars are better spent helping people use roads more effectively rather than building new ones.)

HERE ARE SOME OF THE ROUTES:

Tobin Bridge	<b>11 *</b>
Logan Airport and approaches	<b>5 *</b>
Boston and Cambridge roads, including Central Artery	<b>6 *</b>
Mass. Turnpike	<b>90 *</b>
MBTA subway system	<b>82 *</b>

Most traffic jams happen when the last few cars hop onto a highway that's already crowded. Thus, SmarTraveler can make a big impact even if only a few people use it, says Stephen P. Crosby, SmartRoutes' chairman.

In the long run, SmarTraveler will offer personalized traffic reports. For example, you might tell SmarTraveler your daily commute, and the system would call you on days that you need to leave more than 15 minutes early in order to get to work on time. The company also has a prototype that will give you personalized directions to help you get where you are going - directions updated minute-by-minute, depending on traffic.