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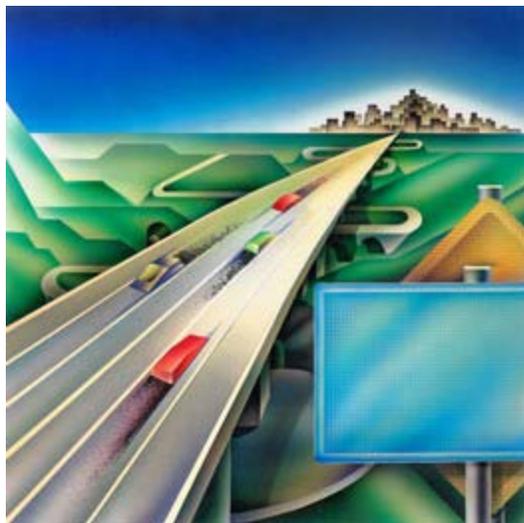
## Clifford Winston: Paving the Way for Driverless Cars

Instead of focusing on an enormously expensive high-speed rail system, government should promote modern highway design for cars of the future.

By **CLIFFORD WINSTON**

California's proposed bullet train between Los Angeles and San Francisco—which Gov. Jerry Brown is likely to sign off on soon—has been characterized by the Obama administration and its other supporters as an effective way to reduce highway congestion. These costs amount to more than \$100 billion annually in wasted time and higher fuel expenses.

In fact, a much better technological solution is on the horizon, if we pave the way by getting rid



of obsolete highway design. It is already possible to imagine a world in which you could predict exactly how long it would take to drive in your car from one point to another. No worries about rush hour, vacation congestion, bad drivers, speed traps and accidents. You could also text while you drive with no safety implications.

All this may be possible thanks to a "driverless" car that does a human driver's normal job and much more. The car is operated by a computer that obtains information 10 times per second from short-range transmitters on surrounding road conditions, including where other cars are and what they are doing.

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That's exponentially faster than the human mind can process the same information. By gathering and reacting immediately to real-time information, the technology can drastically reduce highway fatalities by preventing collisions. It also can significantly reduce delays by creating a smoother traffic flow and rerouting drivers who have programmed their destinations.

Google's version is being piloted in Nevada, and it could prove that faster, reliable and safer road travel is within reach. But one stumbling block would remain: the government-run roads this innovation must use. Auto makers have made one technological improvement after another since the car was introduced to consumers more than a century ago. Unfortunately, the paved road systems on which cars travel have not advanced much in comparison. Without reimagining the way we design and maintain highways, the driverless car will achieve little of its potential.

Despite the frustratingly frequent lane closures for repairs, about one-third of the nation's highways are still in poor or mediocre condition. Driving on damaged roads is hard on vehicles and is estimated to cost motorists billions of dollars annually. Those potholes could also defeat the purpose of the driverless car because it would be unable to avoid them, or succeed in doing so only by significantly disturbing the traffic flow.

Most highways in major metropolitan areas operate under congested conditions during much of the day. Yet highways are designed around standards based on higher free-flow travel speeds that call for wider but fewer lanes. Driverless cars don't need the same wide lanes, which would allow highway authorities to reconfigure roads to allow travel speeds to be raised during peak travel periods. All that is needed would be illuminated lane dividers that can increase the number of lanes available. Driverless cars could take advantage of the extra lane capacity to reduce congestion and delays.

Another design flaw is that highways have been built in terms of width and thickness to accommodate both cars and trucks. The smaller volume of trucks should be handled with one or two wide lanes with a road surface about a foot thick, to withstand trucks' weight and axle pressure. But the much larger volume of cars—which apply much less axle pressure that damages pavement—need more and narrower lanes that are only a few inches thick.

Building highways that separate cars and trucks by directing them to lanes with the appropriate thickness would save taxpayers a bundle. It would also favor the technology of driverless cars because they would not have to distinguish between cars and trucks and to adjust speeds and positions accordingly.

Traffic management also suffers from obsolete technology that could hinder implementing the driverless car. On local streets, signal timing contributes to hundreds of millions of vehicle hours of annual delay because it is based on out-of-date historical data that inaccurately measure relative traffic volumes at intersections. Without signals based on real-time traffic flows, driverless vehicles may not be able to accurately align their speeds with them.

The future also holds the promise of new communications technologies that could let road authorities use electronic tolls to charge motorists for their contribution to congestion, based on actual traffic conditions, and thus encourage them to travel during off-peak periods, use alternate routes, or switch to public transit. Driverless cars would significantly help motorists respond to congestion tolls because their technology can balance the cost of a toll with its travel time savings to optimize motorists' route choices.

The driverless car represents one of the most amazing breakthroughs in safety and quality of life in recent history. Instead of focusing on enormously expensive high-speed rail as our transportation future, the government would do well to stop hindering driverless cars by its obsolete thinking about our nation's roads.

One promising approach that would not require taxpayer funds would be to turn to innovative private highway companies, which have leased the Indiana toll road, Chicago Skyway and Dulles Greenway. By working closely with auto makers, they could significantly shorten the time that motorists must wait before they fully realize the benefits of driverless technology.

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