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of the car (doors don't have to be opened), less room above the car (people don't need to stand up to get in or out), and less room taken up by the ramps and drive-aisles (people aren't driving).

Using less land in construction is significant when one considers the dramatic increase in the rate of land development in metropolitan areas in recent years. According to *Once There Were Greenfields*, a 1999 report published by NRDC, "from 1960 to 1990, the amount of developed land in metro areas more than doubled." Robotic Parking would significantly reduce the demand for land devoted to parking in cities—a welcome contribution.

ROBOTIC PARKING MAY NOT MAKE PARKING FUN, but it will make it safer and more convenient. When customers drive up to the garage, red or green lights direct them to the next available metal pallet. They turn off the engine, leave and lock the car, and take a ticket from a machine. At that point an automated door comes down over the parking bay, and the car is whisked away into the in-nards of the garage, to be sent by computer to one of many stacked slots on either side of a main aisle. To retrieve the car, the customer presents the ticket to a machine, and the car arrives in less than two minutes.

Haag developed his idea in the early 1980s when he was working for Krupp's automated parking systems in Germany. (Some 5,000 automated garages are already in operation in parts of Europe and Asia, where space is at a premium.) On impulse, Haag tipped a mechanic so he could ride his automobile into the automated garage—which was strictly *verboten*. The system used a stacker crane that ran on a track down a central aisle and lifted each car into its appointed slot. The stacker crane worked slowly, explains Haag, because it could only move one car at a time. "On the trip through the machine I really saw with my own eyes how it worked and I thought: 'How complicated this is; we must make it simpler.'"


By eliminating the stacker crane and substituting the moving metal pallets, Haag created a system in which up to thirty cars could be in motion simultaneously, directed by computers equipped with "fuzzy logic." Redundant equipment—two horizontal pallet carriers on

every floor, multiple elevators, and a back-up generator—ensures that cars will not get stuck because of mechanical failures or power interruption. "It's valet parking, but you keep the keys," says Haag.

The financial advantages are numerous, from lower land acquisition costs to smaller payrolls. Construction would be simpler and faster. These garages can be made out of relatively lightweight steel structures instead of massive steel and concrete buildings. And steel garages can be put up like giant erector sets, taken down, and recycled or re-erected elsewhere. Insurance costs also decline because customers never enter the garage, and the staff only goes in for repairs. Nonetheless, the parking industry is not yet taking a position on Robotic Parking. "Investors are afraid of putting their money into what they see as an untested technology," says Dick Beebe, director of parking and transportation planning at the Consulting Engineers Group, Inc., in Mount Prospect, Illinois. "I hear people in the industry say that if someone will build one and it works, there will be a rush to build more of them," adds Beebe, who did a feasibility study for the Hoboken Parking Authority on Haag's project.

ROBOTIC PARKING IS NO ENVIRONMENTAL panacea, however. "It might decrease air pollution and water pollution and save space—but it might also increase the capacity of neighborhoods to accommodate motor vehicles. Those 300 parking places might make ten new restaurants viable and create new destinations and increased traffic," says NRDC scientist Kaid Benfield. Benfield cites the example of a road that was widened to alleviate congestion. While traffic was less heavy in the short-term, the ease of driving on that road attracted new drivers and ultimately increased traffic.

Jon Orcutt, Assistant Director of the Tri-State Transportation Campaign, agrees. "Why shoehorn more cars into a city?" he asks. "This will only increase driving and demand. Parking is the biggest determinant of whether people are going to drive." Orcutt believes, however, that Robotic Parking could be part of the urban environmental solution. "Why not use those 324 spaces created in Hoboken to demolish the equivalent number of surface lots? Now *that* would be progress."

Whether the reception is welcome or wary, whether the expectations are great or guarded, robotic parking will soon be coming to a neighborhood near you. 

RESOURCES

- Robotic Parking, Inc.
www.robopark.com/news.htm
- Smart Growth Network
www.smartgrowth.org/index_frameset.html
- Tri-State Transportation Campaign
www.tstc.org
- Parking Market Research Company
<http://parkingresearch.com>
- Parking Spaces: A Design, Implementation, and Use Manual for Architects, Planners, and Engineers*, by Mark C. Childs, McGraw Hill, 1999.

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