Relief from 'parking wars': Researcher develops computer software to revamp city parking

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For those who live or work in cities, parking is a major source of stress and frustration. Researchers estimate that for every 110 vehicles circulating on the roads looking for spaces, there are 100 available spots, both in lots and on the street.

Now Nadav Levy, a Ph.D. student at Tel Aviv University's Porter School of Environmental Science, along with his supervisors Prof. Itzhak Benenson of the Department of Geography and the Human Environment and Dr. Karel Martens of Holland's Radboud University, are answering the need for a more efficient way to park. They have developed a computer simulator that models the real-life parking challenges of a particular district or city, identifying different strategies for improvement and testing the impact of new policies before they are implemented on the roads.

The simulator, called PARKAGENT, takes into account real parking policies, drivers, and parking inspectors for an exact replication of any given city, including roads, buildings, and parking lots. Recently published in the journal *Computers, Environment and Urban Systems*, the software has already been put to the test, evaluating the potential impact of parking policy changes in Israel and Europe.

Predicting policy outcomes

When considering issues such as where to place parking lots or how to establish the routes of the parking inspectors, city officials have few resources to measure the success of their choices. Their decisions, though seemingly mundane, have a high impact on a city's traffic flow. Up to 30 percent of cars driving in the center of the city at peak hours are looking for parking, says Levy, wasting gas and creating congestion, pollution, and noise.

The simulator tests a new parking policy by implementing it into the PARKAGENT environment, gathering information on how these policies impact the drivers, who have individualized parking needs. The software takes into account their probable destinations, how long they require parking, and how much they are willing to pay. Policies could include a change in the amount of time permitted in a public parking space, the construction or closing of a parking lot, or the construction of a new building in the environment — all of which alter parking demand.

The software assesses key values such as the drivers' cruising time, how long they park for, and the distance from the parking space to their destination. Levy analyzes the resulting data to determine whether a policy would decrease the time the drivers would spend to find a parking place near the destination. The software can also be used to determine which routes parking inspectors should travel for optimal distribution of parking tickets.

Levy and his supervisors have already completed an analysis to determine the impact of an additional multi-story parking garage in the Israeli city of Ramat Gan, and they are now working in collaboration with the city of Antwerp, Belgium, to predict the outcome of a plan to replace a parking lot with a boardwalk along a river.

Solving the parking woes of urban living

According to Levy, urban parking policies can use a major overhaul. Until now, he says, city officials have not dealt with these issues scientifically, working more on "hunches" about where they suspect parking is required, and for how long. PARKAGENT removes the guesswork.

Many major cities make two main mistakes with their parking policies, he adds. In North America and Israel, on-street parking is typically cheaper than off-street. Drivers then aim to find cheap parking in the city, and drive around more than necessary just to "check," explains Levy. City traffic would move more efficiently if drivers had incentive to park in lots straightaway. The second error is not enforcing a strict time limit for high-demand parking areas. Increased turnover, caused by time restrictions, will benefit both businesses and drivers, making the quest for a parking spot much easier.

Nonetheless, Levy predicts that the future of urban transportation lies in alternatives to private cars, such as mass transportation systems, bicycles, and car-sharing systems. As cities get denser, private cars will become inefficient, hindering urban mobility, he says.

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