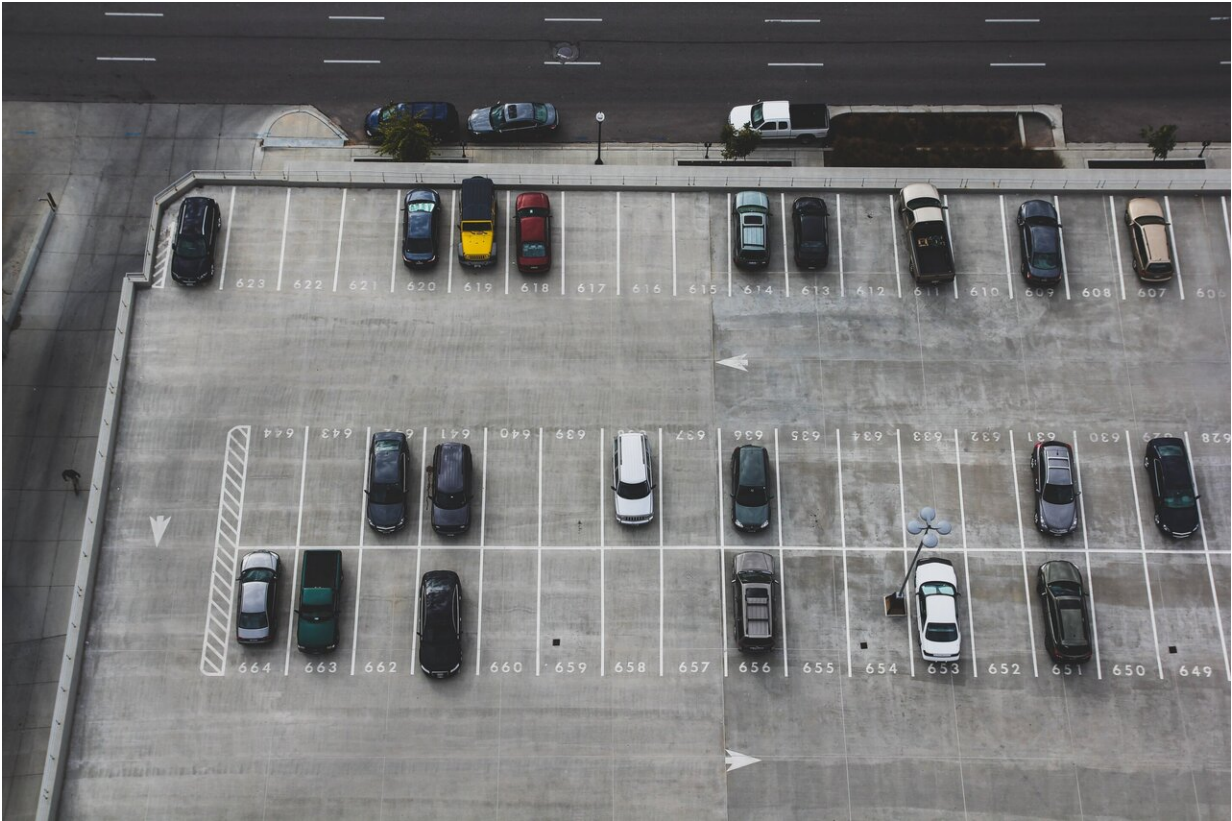


New smart parking software cuts congestion, emissions

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New smart parking software developed by Cornell University researchers, which matches drivers with parking garage spots based on travel time and other factors, could reduce congestion and emissions

while saving drivers the time of circling to look for available spots.

The system proposes an efficient price for customers and considers the [walking distance](#) from the [parking spot](#). Using San Francisco [parking](#) data, the software decreased the amount of time spent looking for parking an estimated 64% per vehicle compared with other parking strategies.

"One of the key issues that causes congestion and extra emissions is cars cruising to look for parking," said H. Oliver Gao, professor of civil and [environmental engineering](#) and director of systems engineering at Cornell University, and senior author of "A Scalable Non-Myopic Atomic Game for a Smart Parking Mechanism," which published in the journal *Transportation Research Part E*.

"Imagine if the parking garage was equipped with a smart software—they know where their empty spots are," said Gao, also a fellow with the Cornell Atkinson Center for Sustainability. "Drivers would come to an area and know which parking garage still has spots, and if you have software telling you the quickest path it will save you a lot of time, and it will also bring business to the parking garage."

Previous research shows that searching for parking creates 30% of the congestion in crowded areas, where drivers spend an average of 7.8 minutes looking for a spot. For example, a 2006 study found that vehicles in a 15-block range in Los Angeles' Westwood Village cruise more than 950,000 miles a year, wasting 47,000 gallons of gas and generating 730 tons of carbon dioxide.

The proposed parking app includes several functions such as walking distance, cruising time and parking facility occupancy. In addition to factoring in travel times, the new software includes a dynamic pricing policy that accounts for drivers' waiting times and offers priority to

drivers willing to pay more.

The system incorporates an individual driver's preferences in order to make the most efficient collective decisions. The algorithm can be designed to minimize drivers' out-of-pocket costs—the price of parking—or to reduce a total cost that considers both money and time.

Gao hopes the software could eventually be used as an app connecting parking garages and drivers, as well as showing drivers the optimal paths to their destinations.

Research on [traffic congestion](#) generally focuses on improving [traffic flow](#), Gao said, but improving parking systems not only eases the burden on individual [drivers](#), it also gets cars off the streets faster and reduces congestion for everyone.

"Smart parking can actually help mitigate congestion and reduce emissions," he said. "When the car goes in the parking lot, it improves the on-road traffic."

More information: Hamid R. Sayarshad et al, A scalable non-myopic atomic game for a smart parking mechanism, *Transportation Research Part E: Logistics and Transportation Review* (2020). [DOI: 10.1016/j.tre.2020.101974](#)

Provided by Cornell University

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