

# Smart highways to avoid traffic jams

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Credit: photos.com

(Phys.org) -- Traffic lights on highway access ramps can help prevent traffic jams. Swiss engineers are testing this approach to increase the capacity of Swiss highways.

Swiss [highways](#) are operating close to their limits in many parts of the country, as anyone how routinely spends time bumper to bumper on the fast lane will attest. And some indicators suggest that we may be reaching a tipping point: from 2009 to 2010, an only 2.6% increase in highway [traffic](#) raised the number of reported [traffic jams](#) by a third. With funding from the Swiss Federal Roads Office, engineers at the Laboratory of Urban Transport Systems (LUTS) are developing intelligent traffic management systems to optimize traffic flow on highways in real-time, by enforcing variable [speed limits](#) on highways and setting up [traffic lights](#) on the highway's access ramps.

The idea of setting up traffic lights at individual highway access ramps is already half a century old and has been successfully implemented in several countries. But because in Switzerland highway access ramps are short and built near urban areas, queues behind these traffic lights could easily spill back into cities. Congestion on the highway would simply be replaced by congestion in the city.

According to Nikolas Geroliminis, head of LUTS, regulating traffic onto highways at individual access points isn't good enough. Instead, he calls for a global approach. "What we need is a strategy that can control the influx of cars on all of the highway access points simultaneously to adapt to the queue on the road," he explains. By controlling speed limits and highway access across a large portion of the network, queues on access ramps and congestion on the highway can be efficiently mitigated.

The traffic lights and speed limits will be controlled by an algorithm that is being developed in Geroliminis's research group. Using data obtained from traffic monitoring devices mounted along the highway and on access roads, the algorithm would act as a virtual traffic warden, smoothening traffic by regulating the speed limit and restricting traffic flow onto the highway in real-time.

Nikolas Geroliminis and his team will select two frequently congested highway segments, one of them in Vaud, to provide traffic data and serve as a test sites for their models. After upgrading the current traffic monitoring infrastructure to match the requirements of a ramp metering approach, they will use the data obtained from these sites to test the feasibility of their method using computer simulations. Ideally, the project would then be pursued with an full-scale field implementation of their strategy.

"Experience from around the world has shown that ramp metering can reduce delays on highways by between ten to twenty percent. Reduced

congestion leads to less stop-and-go traffic, less gasoline consumption and CO2 emissions,” says Geroliminis. Swiss commuters may have to get used to waiting at traffic lights before they enter the highway, but knowing that their overall drive will be shorter, and safer, they will most likely be willing to pay this price.

Provided by Ecole Polytechnique Federale de Lausanne

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