

## Research project:

### Estimating Traffic Stream Density Using Connected Vehicle Data

## What's the issue?

Knowing how many cars are on a given part of the road – traffic density – is critical for traffic management, especially at intersections with traffic lights. Estimates of traffic density are used as inputs for the timing and duration of traffic lights. When every vehicle is a smart vehicle, able to communicate with infrastructure, estimating traffic density will be far easier, but until that day comes, researchers need to ensure that estimates are as accurate as possible.



## What did the research discover?

Researchers developed and evaluated several approaches to estimate traffic stream density on roads with traffic signals using data from the connected vehicles that are on the road. They tested the various approaches in downtown Blacksburg, Virginia. They found that the most accurate estimates resulted from using a linear Kalman filter approach; a Kalman filter is a type of algorithm. This also involved determining the level of market penetration of connected vehicles, which the researchers did by developing a machine-learning model. As that level increases, so, too, will the accuracy of the estimates.

## How can I implement this?

The linear Kalman filter approach detailed in this research is highly recommended for estimating traffic density and is fairly simple to use in the field. For regular drivers who aren't traffic engineers, more accurate estimates lead to intersections that work better, with fewer backups, emissions and crashes.

## Learn more:

The full report is available on our website

[at https://www.morgan.edu/school\\_of\\_engineering/research\\_centers/urban\\_mobility\\_and\\_equity\\_center/research/completed\\_research/estimating\\_traffic\\_stream\\_density.html](https://www.morgan.edu/school_of_engineering/research_centers/urban_mobility_and_equity_center/research/completed_research/estimating_traffic_stream_density.html)