



Credit: MicromobilityNYC



Vision Zero Research on the Road, Part 6

Slowing Down for Safety: A Longitudinal Study of the Fixed Speed Cameras in NYC

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C2SMART(-ER) HISTORY

C2SMART won U.S. DOT Tier 1 Center designation in 2016

C2SMART-ER won U.S. DOT Tier 1 Center designation in 2022

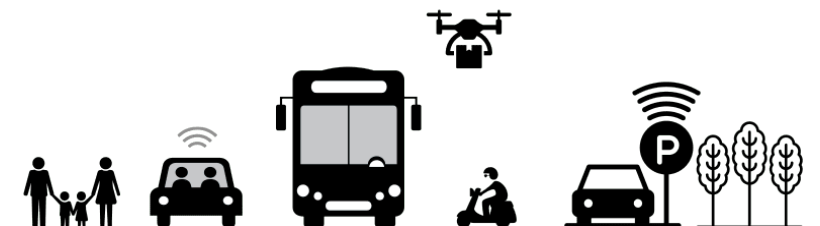
- 7-University consortium across the U.S.
- \$2 million in annual research funding provided by U.S. DOT

Research focus on *Emerging Mobility Solutions* to solve transp. problems and *Reduce Congestion* in Smart Cities

- New modes, shared services, automation, changing demand
- Congestion & transportation equity

Federal designation has led to New York State Research On-Call, NYC Projects, and other National initiatives

- Research relies on using our cities as testbeds for deployment
- Untangle system-of-systems interdependencies with **experimentation, big data**, and **emerging technologies** such as AI/ML and CAVs





Speeding is a leading contributor to fatal crashes.

This longitudinal study examines the **short-** and **long-term** changes associated with the **automated speed enforcement (ASE)** program in New York City, which is the **Fixed Speed Camera Program**.

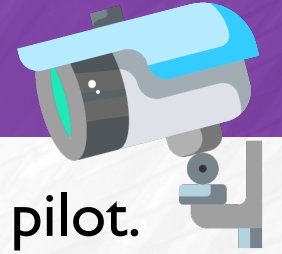
Related publication: J. Gao, D. Yang, C. Xu, K. Ozbay, and S. Sharma. 2023. Assessing the Impact of Fixed Speed Cameras on Speeding Behavior and Crashes: A Longitudinal Study in New York City. Accepted by the Transportation Research Board Annual Meeting 2024. [LINK](#)

FACTSHEET

- In 2021, there were 12,330 fatalities in speeding-related crashes, accounting for 29% of the total traffic-related deaths for that year.
- Pedestrians struck at 30 MPH are twice as likely to die as pedestrians struck at 25 MPH.

(Source: NHTSA & NYC DOT)

Timeline

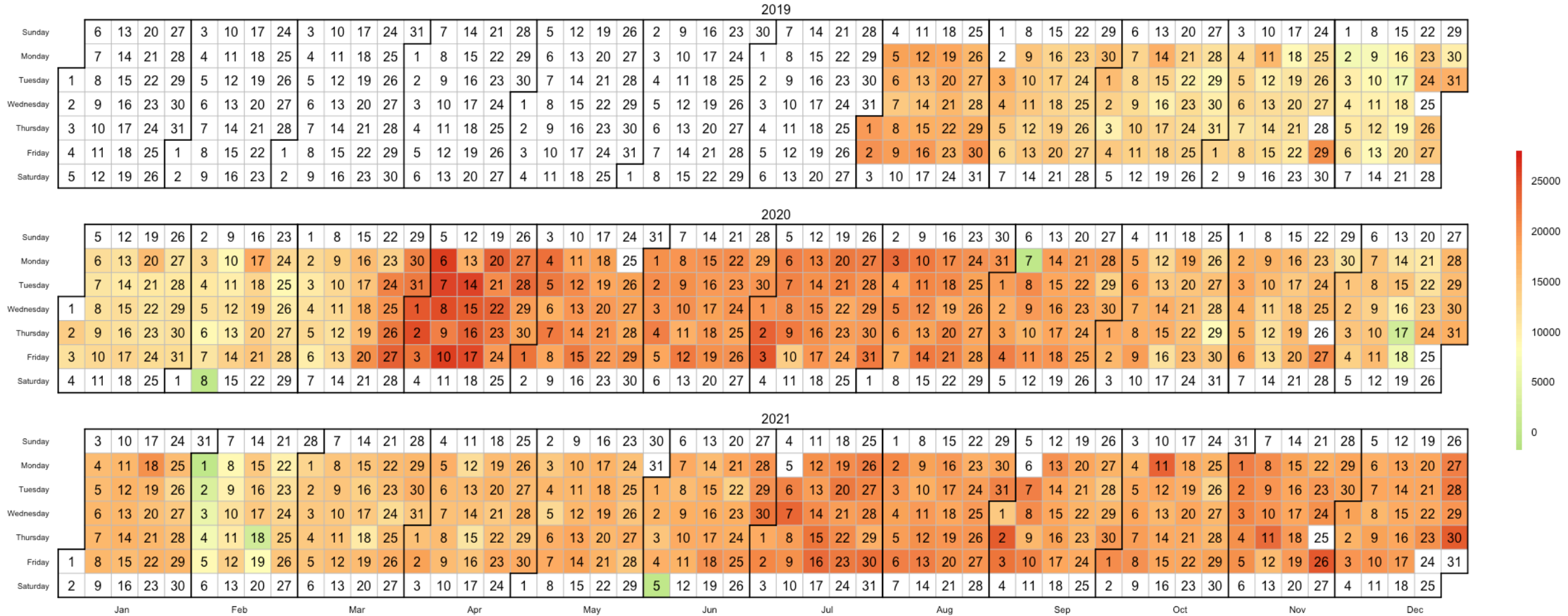


- 2013: Launch of NYC's Automated Speed Enforcement (ASE) program as a pilot.
- 2014: Expansion from 20 to 140 zones under Vision Zero initiative.
- July 2019: Program renewed; authorized 750 school speed zones for camera deployment, operational on weekdays from 6 AM to 10 PM.
- August 2022: Expanded camera operation hours to 24/7. Over 2000 cameras operational in NYC as of May 2022.

In this study:

- Focuses on the study period from August 2019 to 2021 when speed cameras were operating from 6 AM to 10 PM.
- Consider some confounding factors: New cameras every month & COVID-19

Calendar Heat Map of The Speeding Ticket Count

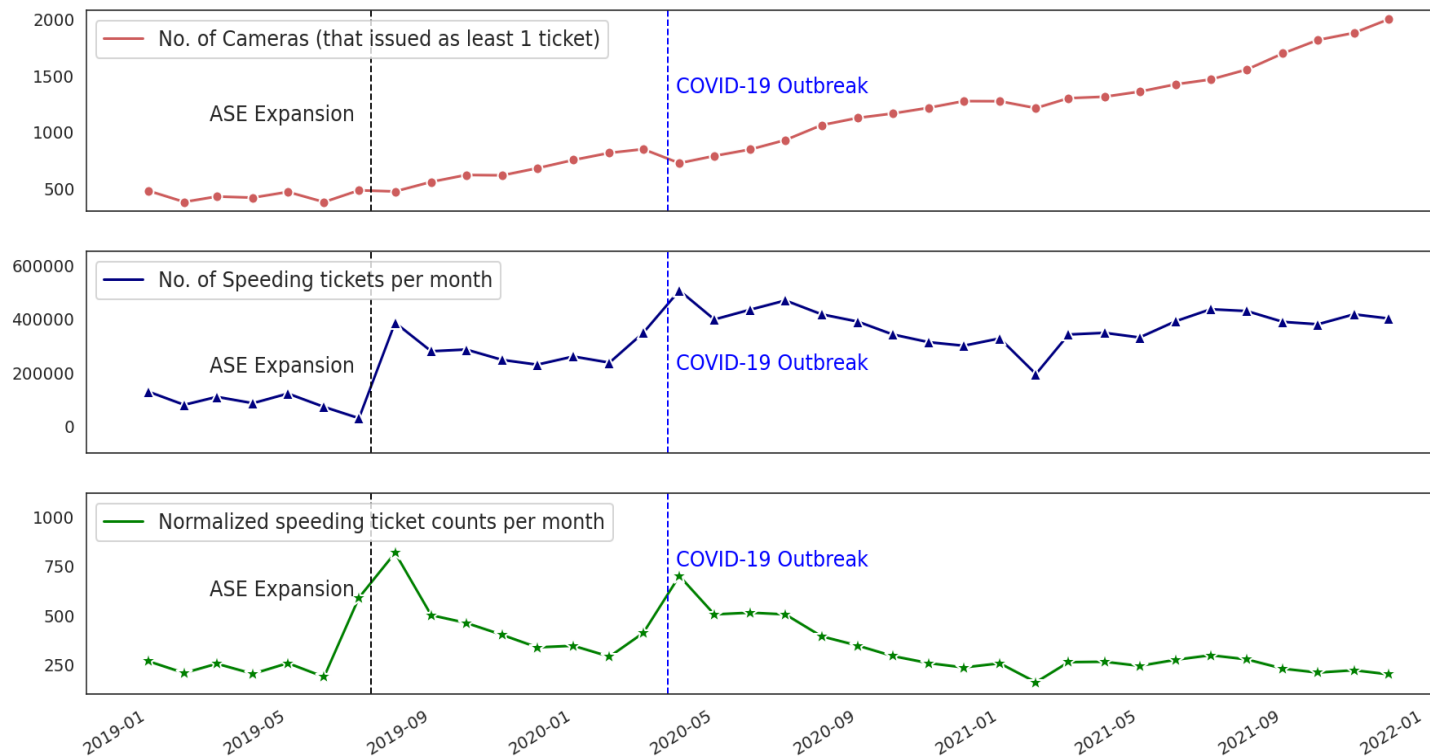


Number of camera is also increasing every year -> need to normalize the counts

Methods

- **Short-term analysis** (1200+ cameras, 4-month post-installation)
- **Long-term analysis** (600+ cameras, 2.5-year after camera installation)
- **Crash analysis**

Monthly counts for number of speeding cameras and normalized speeding tickets



Short-Term Analysis

Goal: Evaluate the immediate impact of speed cameras in reducing speeding in the first 4 months post-installation (first month as baseline).

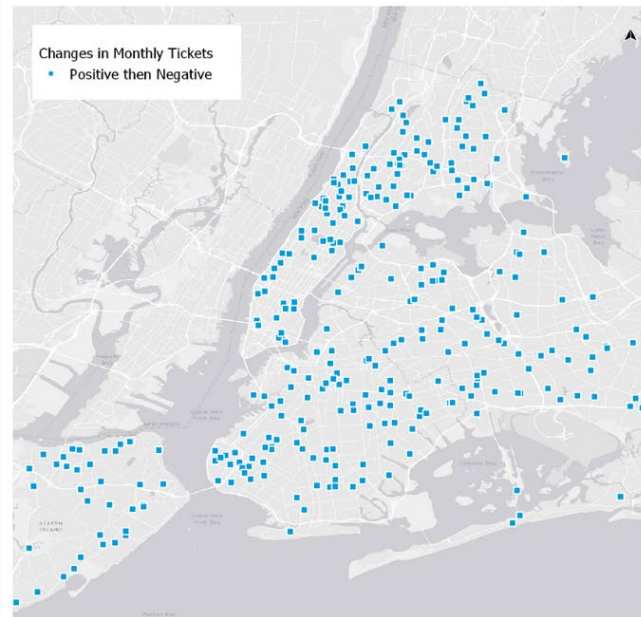
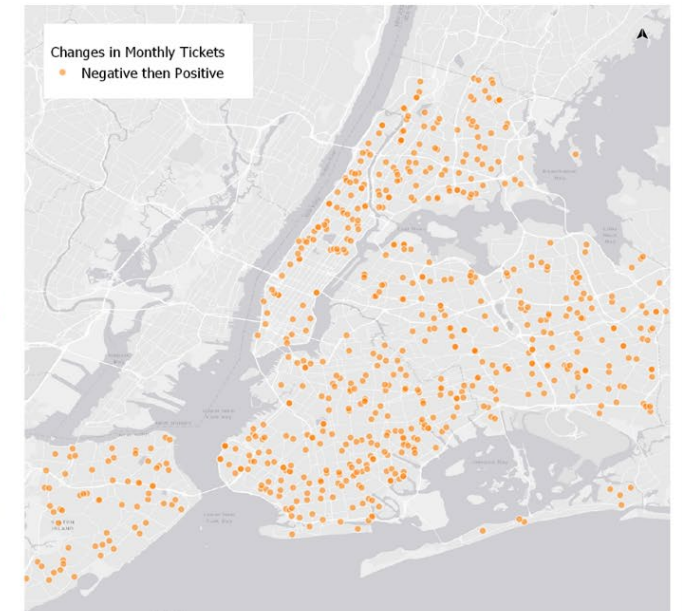
- Exclude cameras installed 4 months prior to the COVID-19 outbreak.
- Findings show a **consistent downward trend over three months**, indicating a reduction in speeding tickets post-camera deployment, although the magnitude of the average change also decreased each month, from **-18.4% to -0.6%**.

1,200+ cameras

Monthly Change	Lower Whisker*	Q1 (25th Percentile)	Median (50th Percentile)	Q3 (75th Percentile)	Upper Whisker**	Average
2 nd month-1 st month	-91.4%	-43.0%	-26.5%	-10.7%	37.7%	-18.4%
3 rd month-2 nd month	-96.0%	-37.6%	-16.4%	1.4%	59.9%	-13.3%
4 th month- 3 rd month	-99.9%	-38.6%	-18.2%	2.3%	63.6%	-0.6%

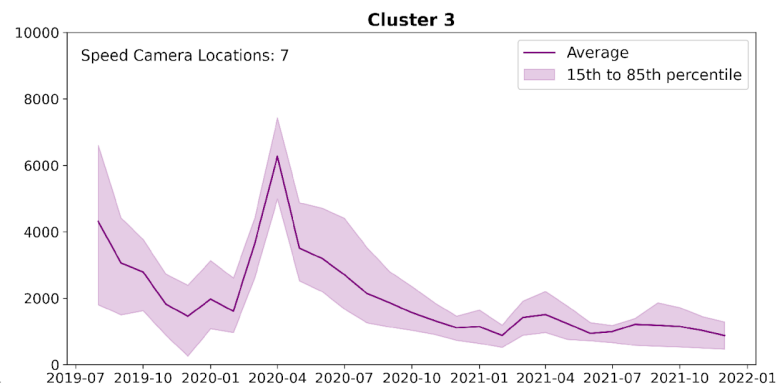
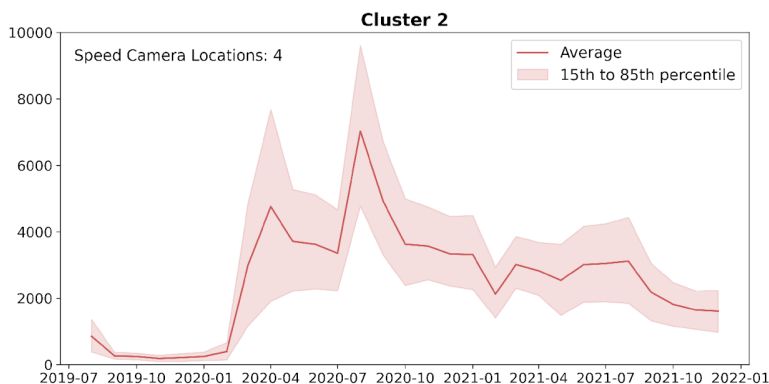
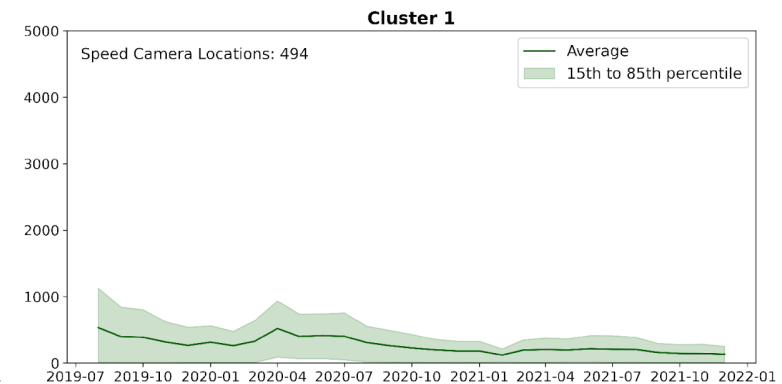
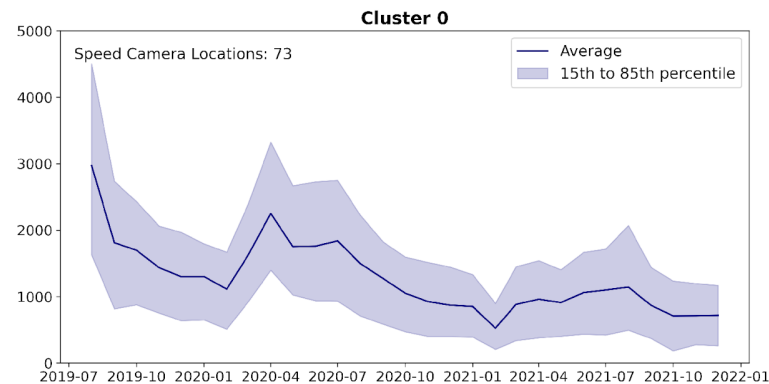
Short-Term Analysis

- **All Negative Group (Green):** 589 cameras (37%). Continued reduction in tickets over four months, showing sustained effectiveness.
- **Positive then Negative Group (Blue):** 333 cameras (21%). Initial increase in tickets, then fluctuating results, possibly due to growing driver awareness.
- **Negative then Positive Group (Orange):** 333 cameras (41%). Early ticket reductions followed by mixed outcomes, suggesting temporary driver adjustments or external influences; 85% remain effective.
- **All Positive Group (red):** 10 cameras (1%). Consistent ticket increases, indicating lack of driver response to cameras; found mostly on long road segments (800 - 3400 feet), may requiring further validation.



Long-Term Analysis

- ARIMA interrupted time-series analysis (ITSA) to identify whether a specific intervention led to significant behavior changes -> Found **ASE program expansion, Time after ASE program expansion, and Time after outbreak of COVID-19** all **Statistically significant**
- Cluster **600 cameras** active between 2019-2021 based on monthly speeding tickets changes per camera.



- Clusters 0 and 3 (14% of total) have been highly effective
- Cluster 1 (85% of total) also effectively reduced speeding, but with a relatively modest/minor effect
- Clusters 2, and 3 see persistent speeding issues due to COVID-19 impacts as of the end of 2021.
- Extending camera operating hours in Cluster 2 didn't yield benefits

Before-After Crash Analysis

- Survival analysis with random effect (SARE) ← relaxes the requirement for the reference group and can **accommodate different start time** of the safety treatments across sites.



14%

Statistically significant reduction in traffic crashes due to speed cameras.

- This reduction was solely from the ASE without impacts from COVID-19.
- This further underscores the safety benefits of the speed camera program.

Conclusion

- **Short-Term Analysis:** 93% showed an overall reduction in tickets in the first 4 months, indicating overall success.
- **Long-Term Analysis:** Over 2.5 years, a 75% reduction in tickets was observed by end of 2021 post-expansion.
- **Cluster Analysis Insights:** Most cameras effectively curbed speeding within six months of installation. A few showed no significant reductions and drastic increases during COVID, indicating a need for alternative safety measures.
- **Crash analysis:** Provided statistically significant evidence of a 14% decrease in traffic crashes following the implementation of speed cameras.

WHAT'S NEXT

**SPEED CAMERAS ARE
WORKING LONGER HOURS!**



THANK YOU

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