

CASE STUDY

Smart Curbs in Paris

Healthy City

Built Environment

Climate Issue: Informal Ways to Measure Street Activities

Streets, including curbs and sidewalks, comprise 80% of all public space in cities. Yet, research on street activity is limited. Understanding street activity is important to:

- Better understand urban life, including commerce and civic engagement
- Propose specific solutions to reduce urban emissions
- Inform the evaluation of policy interventions, such as changes in zoning and infrastructure.

Traditional approaches to studying streets have relied on small-scale findings from interviews and observation.

Machine Learning and Computer Vision: A New Methodology for Measuring Streets

Novel techniques can obtain detailed measures of street activity using real-time images. Applying this science can be achieved by the following process:

- Train a deep-learning model that classifies street images based on observed activities
- Install a camera-based device that gathers real-time street images from moving transport (i.e., public bus)
- Process data using the street activity model
- Characterize the distribution of street and curb activity.

IN A NUTSHELL

- Traditional research on street activity is limited and draws heavily on small-scale findings
- Leveraging new technologies can provide a better picture of street activities and how they change over time
- Understanding these activities can help cities reduce conflicting uses of streets and curbs
- This framework can be applied to measure street activity across cities for more-informed planning interventions.



Paris: A Successful Application

The city of Paris partnered with the state-owned public transport operator to collect street data using cameras on buses. After five weeks of image collection, analysis of real-time pedestrian activity found:

- Street activity peaks in the afternoon
- More pedestrians are on the move than stay in one spot
- Street activity is highly dispersed across space
- Hotspots of street activity are spread out.

These activity maps showed that street types vary in their capacity to support different pedestrian activities.

Cities are hubs for activity.
Understanding these activities can help guide planning interventions, resolve infrastructure challenges, and inform future designs. This framework can foster active, equitable, and healthy streets.

WHAT CAN YOUR CITY DO?

INVEST in new technologies and effective partnerships for data collection on street activity

IDENTIFY conflicting uses between pedestrians, curbside delivery, and micro-mobility modes

PLAN strategic street interventions, such as slow street efforts or the development of new transit stops.

To find out more information on this case study, contact **Professor Arianna Salazar-Miranda** at arianna.salazarmiranda@yale.edu or visit the website for the **Livable City Lab** at <https://livablecitylab.yale.edu>. Case study based off Salazar-Miranda, A., Zhang, F., Sun, M., Leoni, P., Duarte, F., Ratti, F., (2023), Smart curbs: Measuring street activities in real-time using computer vision, Landscape and Urban Planning, ISSN 0169-2046, <https://doi.org/10.1016/j.landurbplan.2023.104715>.