City of San José

Data Usage Protocol for a Vision Based Traffic Data Collection and Safety Analytics Device using Artificial Intelligence

Initial pilot vendor: Currux Vision

Owning department(s): Transportation
Department owner: Ho Nguyen, ITS Manager
Contact method: ho.nguyen@sanjoseca.gov, 408-975-3279

1) Purpose

The vision based, Artificial Intelligence (AI) enabled Intelligent Transportation System (ITS) from Currux Vision is an edge computing device that can detect and analyze traffic using IP based cameras, and provide notifications and enable automation to enhance traffic operations. The system can assess safety metrics related to traffic flow, such as:

- Red-light running, speeding, near misses, wrong way, jaywalking, stopped traffic, stop sign violation, and crosswalk, bike, or bus lane encroachment

The system supports advanced data collection of essential road traffic information used in operation, such as:

- Vehicle turning movement counts, vehicle classification, pedestrian counts, bike counts, delay, occupancy, headway, queue length, stop counts, and Level of Service[1] or congestion

The system is currently used to support the Citywide Collision Review process, which identifies the top intersections with the most collisions or highest crash rate. By collecting this data, the system allows City engineers to assess safety metrics and conditions before and after safety counter measures are implemented.

Initial pilot cameras will be placed at four intersections: Senter & Parrott, Bascom & Curtner, Curtner & Monterey, and Tully & Alvin. Following the pilot, additional devices may be installed at the same or other intersections.

2) Authorized Uses:

The system shall only be used for the purposes outlined below. It is a tool used primarily by traffic engineers and planners to make informed decisions about traffic operations, traffic safety and transportation planning.

Specifically, the system shall only be used by engineers to assess the collected metrics to:

- Inform traffic safety decisions;
- Adjust signal timing strategies and operations;
- Support transportation planning activities; and
- Guide installation of new traffic-related equipment, safety countermeasures, etc.

[1] Level of Service refers to the level of congestion at an intersection, from free flow to bumper-to-bump traffic.

At the request of City law enforcement, video clips may be sent to the City Police Department in support of ongoing criminal investigations. Video clips may also be shared to City departments such as the City Attorney's office if needed for litigation, and if required for an audit.

3) Prohibited Uses:

Uses not explicitly authorized in the "Authorized Uses" section are prohibited. In addition, the Currux device and any data generated shall:

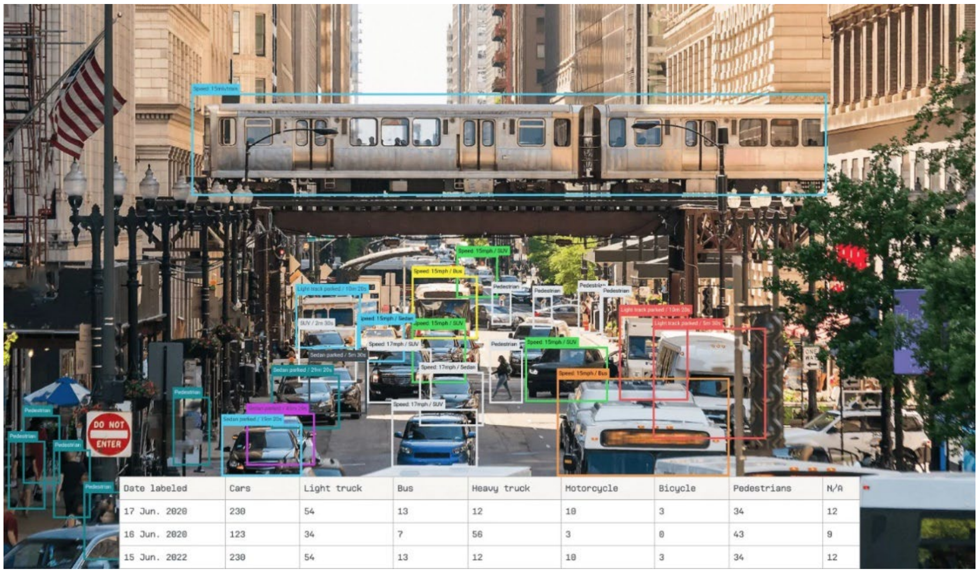
- Not be released to the public without a Public Information Request
- Not be used to enforce speeding tickets, red-light running, or other traffic infractions
- Not be proactively monitored for criminal surveillance
- Not be used to initiate a criminal investigation
- Not be used for any investigations regarding one's immigration status

4) Data Collection

The system derives its data and information using AI and streaming video from traffic surveillance or detection cameras. Data can be categorized into two main uses: safety incident analytics and traffic operations.

- Safety incident analytics: red-light running, speeding, near misses, wrong way driving, slow and stopped traffic, jaywalking, stop sign violation, and double line, crosswalk, bike or bus lane encroachment
- Traffic operations: vehicle turning movement counts, vehicle classification, pedestrian counts, bike counts, delay, occupancy, headway, queue length, stop counts, 85th percentile speed, average speed, arrivals on green, and Level of Service

Audio is not collected. The majority of the video footage is not stored, and is reported as graphs, tables, and can be exported to comma-separated values (csv) files. Figure 1 shows an example of the video footage (not stored) and the table produced from the counting of vehicles.



Date labeled	Cars	Light truck	Bus	Heavy truck	Motorcycle	Bicycle	Pedestrians	N/A
17 Jun. 2020	230	54	13	12	10	3	34	12
16 Jun. 2020	123	34	7	56	3	0	43	9
15 Jun. 2022	230	54	13	12	10	3	34	12

Figure 1: Example photo from the traffic video system, image not taken in San José. The system records the relevant data into a table, like the one shown in the bottom of the image, and deletes the image unless a safety incident was recorded.

In the event of safety incidents (e.g., speeding or near misses) the system can record images and video clips not to exceed 10 seconds to provide visual confirmation of the captured events and ensure accurate data collection. Figure 2 shows examples of safety incidences recorded by the cameras.

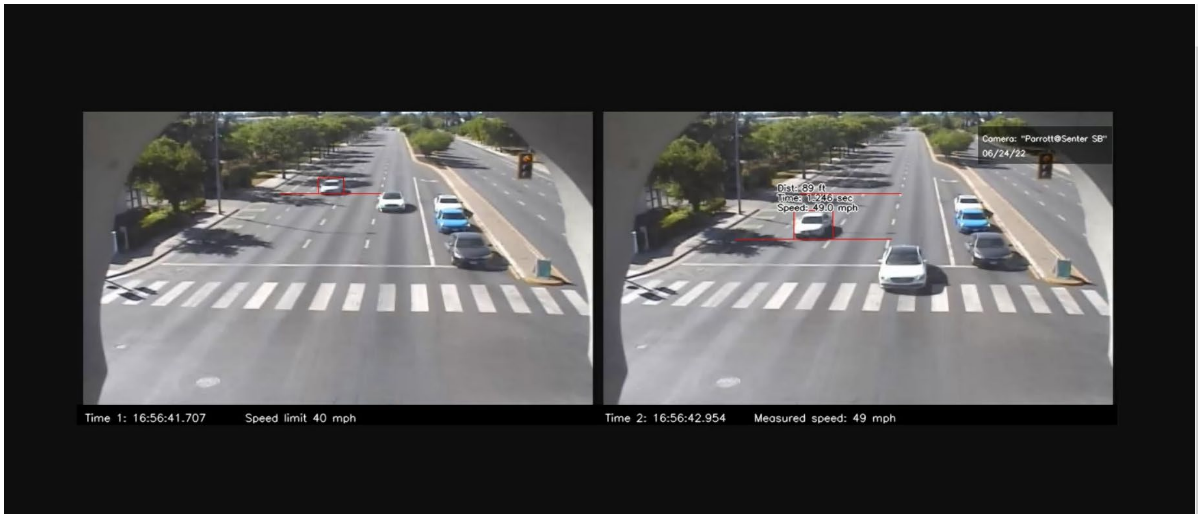


Figure 2: Images of safety incidents (e.g., speeding, near misses) can be stored. This shows examples of images collected from safety incidents in San José's pilot. Identifying information such as faces and license plates have been obscured.

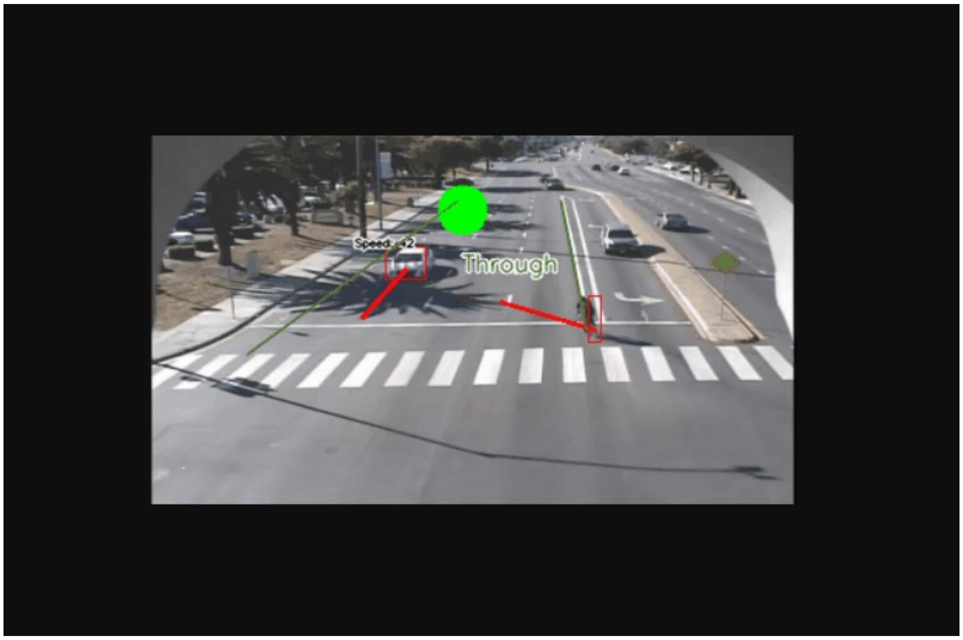


Figure 3: Additional image of safety incidents (e.g., speeding, near misses) can be stored. This shows examples of images collected from safety incidents in San José's pilot. Identifying information such as faces and license plates have been obscured.

5) Notice

Appropriate signage will be posted upon each approach to the intersection, alerting road users of the technology in use. Notice and additional detail, including this Data Usage Protocol, will be available on the City website.

6) Retention and Minimization

Video and images will be stored for one year, and all anonymized traffic metrics must be stored for a minimum of two years. For practical applications, the City's Department of Transportation (DOT) intends to store select anonymized data, such as turning movement counts and vehicle classification, for as long as useful, 5-10 years.

Data may be stored for longer if required by law or court order.

7) Access and Accuracy

The data collected and generated from this system is subject to the law and potential California Public Records Act (PRA) requests.

Video and images will not be available for public access unless required pursuant to city, state, or federal law, or a court order. Some personal information may be redacted prior to public disclosure if the City determines that releasing it may cause substantial harm to an individual.

DOT will monitor accuracy of the AI recognition through manual checks and system validation over the course of using the equipment, particularly during the initial pilot period that covers the 4 pilot locations which include Senter & Parrott, Bascom & Curtner, Curtner & Monterey, and Tully & Alvin.

Initial validation study on some of the traffic operations metrics such as speed and vehicle counts appear to result in an accuracy rate of 95%+. Accuracy as it pertains to the various metrics involving pedestrian and bicyclists requires high resolution cameras that are currently not in use in DOT. Therefore, the vendor still considers pedestrian and bicyclist detection an on-going development effort that may require many more iterations to achieve the desired accuracy and reliability threshold.

8) Accountability

Unless guided under a sharing agreement with external parties, only City staff can access the images and video. In this pilot, the system does not yet support the logging of user sign-on information. However, this feature will be added through a system enhancement. Once added, the system will store the username and the time the user logs on and logs off. Sign-on information will be stored for two years in accordance with California Government Code 34090.

The system will support role-based access, which gives individuals different levels of system access privileges based on the level the system administrator has assigned. This limits read (the ability to download information) and write (the ability to upload information) privileges to specific users.

9) Sharing

Non-personal information (e.g., # of vehicles that passed an intersection during a day) may be shared with other government entities, such as other city DOT's, metropolitan planning organizations (MPO's), academic institutions, or transit agencies. Formal sharing logistics and mechanisms will be managed by an agreement that requires respective parties to handle data in the same care as San José. Only processed, aggregated data providing traffic operation and safety metrics will be shared through any agreement. Images and videos will not be shared unless required by law.

10) Equity and community engagement

The system does not detect and read license plates nor perform facial recognition; the platform detects and analyzes traffic patterns and movements from all road users, including vehicles, bicyclists, and pedestrians.

The Data Usage Protocol will be made available for public comment before device installation and during usage. Members of the public may submit any concerns via the public comment feature at sanjoseca.gov/digitalprivacy. Comments may also be submitted by emailing the Digital Privacy Office at digitalprivacy@sanjoseca.gov

11) Storage and Security

Currently, all data, including video clips and images, are stored at the edge—in vendor provided processing units located at the intersections—inside locked traffic signal cabinets. Communications to these units is provided using DOT-owned hardwire infrastructure, such as fiber, copper, or wireless broadband radios. Device logon is controlled by assigned access-level specific sign-on credentials.

When the system scales beyond 10 units, the front-end application and primary data storage will be moved to a secure on-prem server located in the City's Network Operations Center (NOC). Access to the NOC is secured by card access. The on-prem server specifications will be determined based on performance needs and expected data growth.

In the event of a confirmed data breach where personal information such as photographs or video have been accessed by an unauthorized party, DOT will follow the City of San José's Incident Response Plan. This security protocol and further security details are overseen by the City's Cybersecurity Office.

12) Training

The device vendor has provided hands-on support thus far during the device's bench testing and limited field installations. As the installation scales, the ITS group, in coordination with the device manufacturer, will provide standard staff training for all relevant support staff, as is performed for all other field technology hardware.

13) Annual Data Usage Report requirements

To provide the City and the public with ongoing reporting on the usage, effectiveness, and accuracy of the vision and AI-based traffic analytics system, the following information will be required in an Annual Data Usage Report submitted every year to the Digital Privacy Office no later than March 1st and covers the previous calendar year (January 1st – December 31st).[2] In the year this Data Usage Policy goes into effect, the Department is only required to report on the period from the date the Data Usage Protocol goes into effect until the end of the calendar year.

1. Accuracy metric (# of flags that the Department saw as inaccurate vs # viewed)
2. Usage metric – how often the system is being used

[2] If this Data Usage Policy is passed after September 30th, the first Annual Data Usage Report will not be required until the following year, which will cover usage from the date the Data Usage Policy goes into effect to December 31st of the following year