



Western Systems

Innovative Transportation Solutions

AI – Powered Traffic Detection & Safety Solutions

Enhancing Intersection Reliability &
Safety Through Vision-Based
Multimodal Detection

Micah Posey
Territory Manager
Oregon & Southern Washington
IMSA PNW Chapter Secretary & Treasurer



Western Systems
Innovative Transportation Solutions

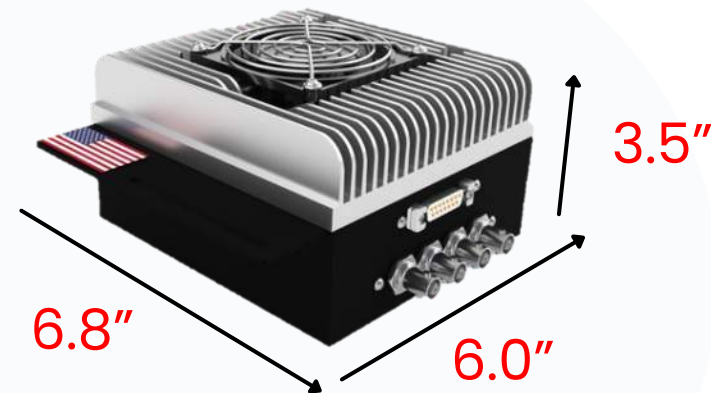
Agenda:

- **Currux Vision Overview**
- **Currux AI on Existing Infrastructure**
- **Reliable Multimodal Detection**
- **From Detection to Insight: Analytics & Near-Miss Safety**
- **Real-Time Alerts & Cloud Monitoring**
- **Deployment in the Cabinet, Tools & Support**
- **Regional Deployments**
- **Q&A**



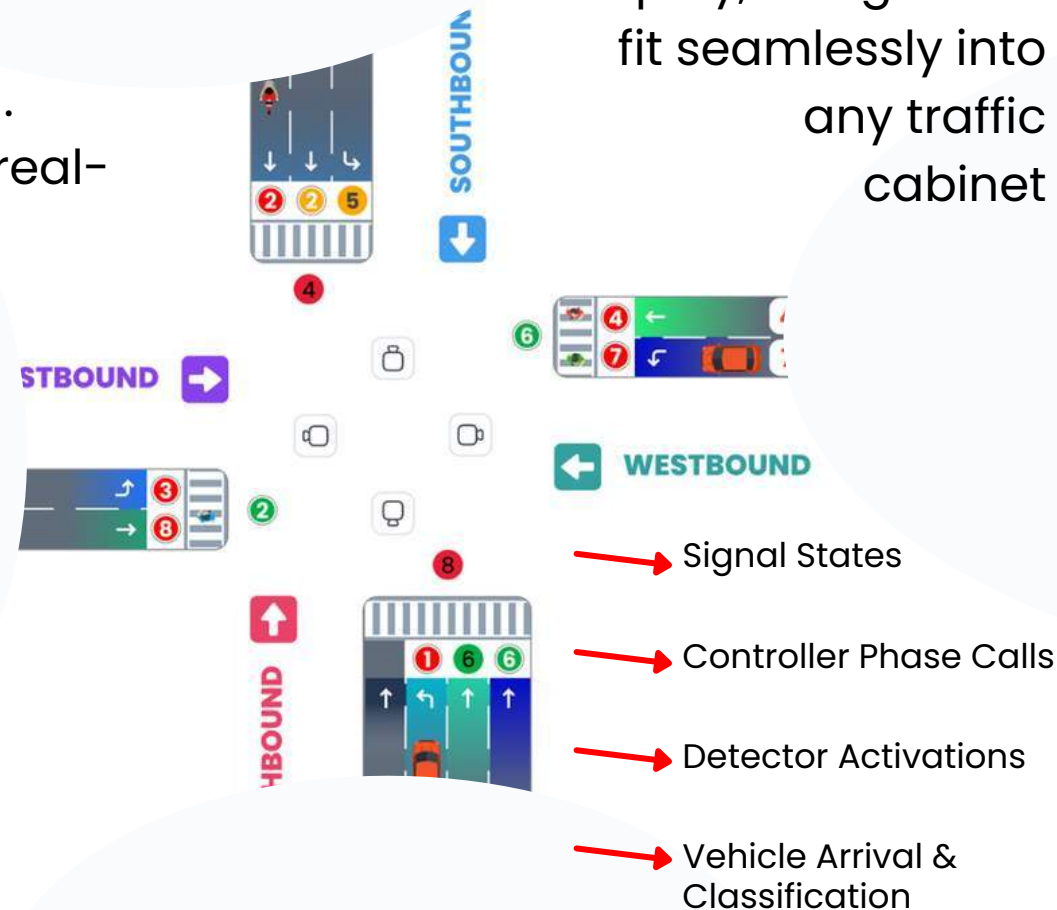
Western Systems
Innovative Transportation Solutions

Currux Vision Overview



Our Digital Twin provides a live, interactive replica of your intersection. Updates in real-time

Small, robust, and fully plug-and-play, designed to fit seamlessly into any traffic cabinet



AI-Powered Detection for Legacy Infrastructure

Currux Vision modernizes outdated traffic systems by layering advanced AI detection onto existing infrastructure—no replacements needed. Even with older or low-quality cameras, our system delivers high-accuracy detection in low-visibility conditions. This offers a cost-effective solution to upgrade thousands of outdated intersections across the U.S. and Canada without the need for full system overhauls.

Precise Detection

Our #1 priority: Highly accurate detection of vehicles, pedestrians, and bicyclists —paired with real-time signal actuation

Purpose-Built for the ITS Industry

Engineered specifically for traffic cabinet environments and fully complies with NEMA TS2 standards

Full Suite of Analytics for Traffic Engineers

Real-time & historical traffic analytics with video-based incident detection and notifications.

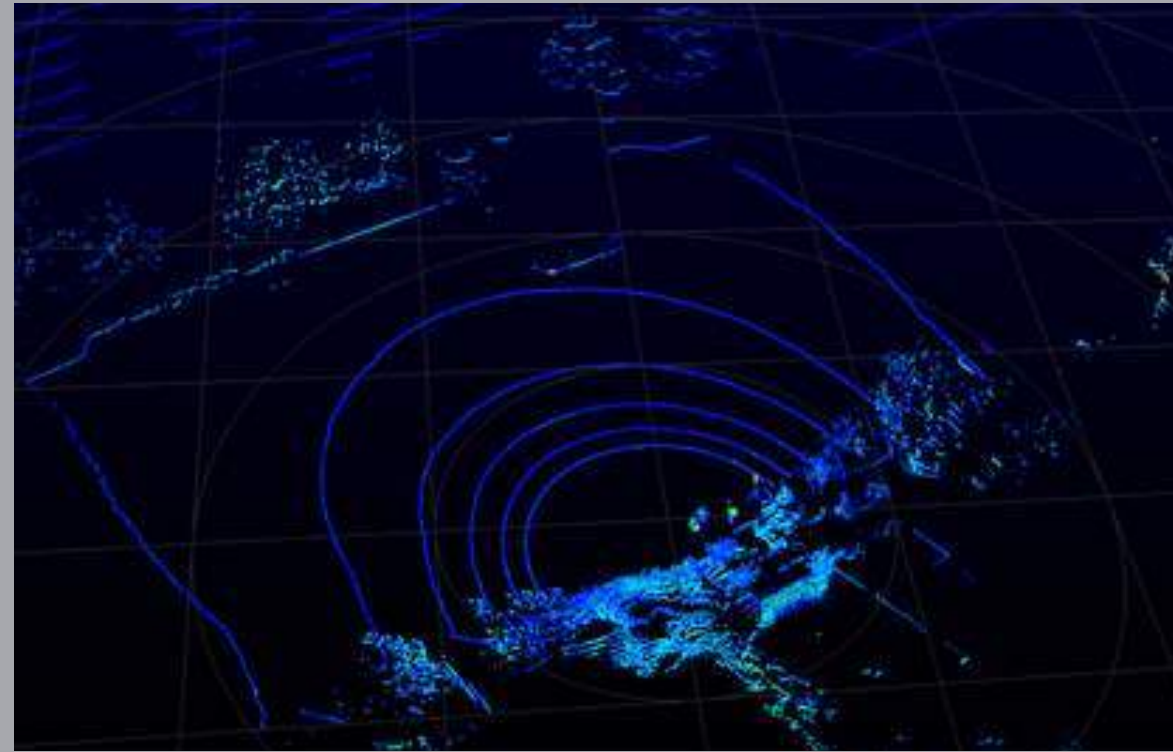
Currux Vision's AI Computer Vision vs Other Sensors

CURRUX
VISION



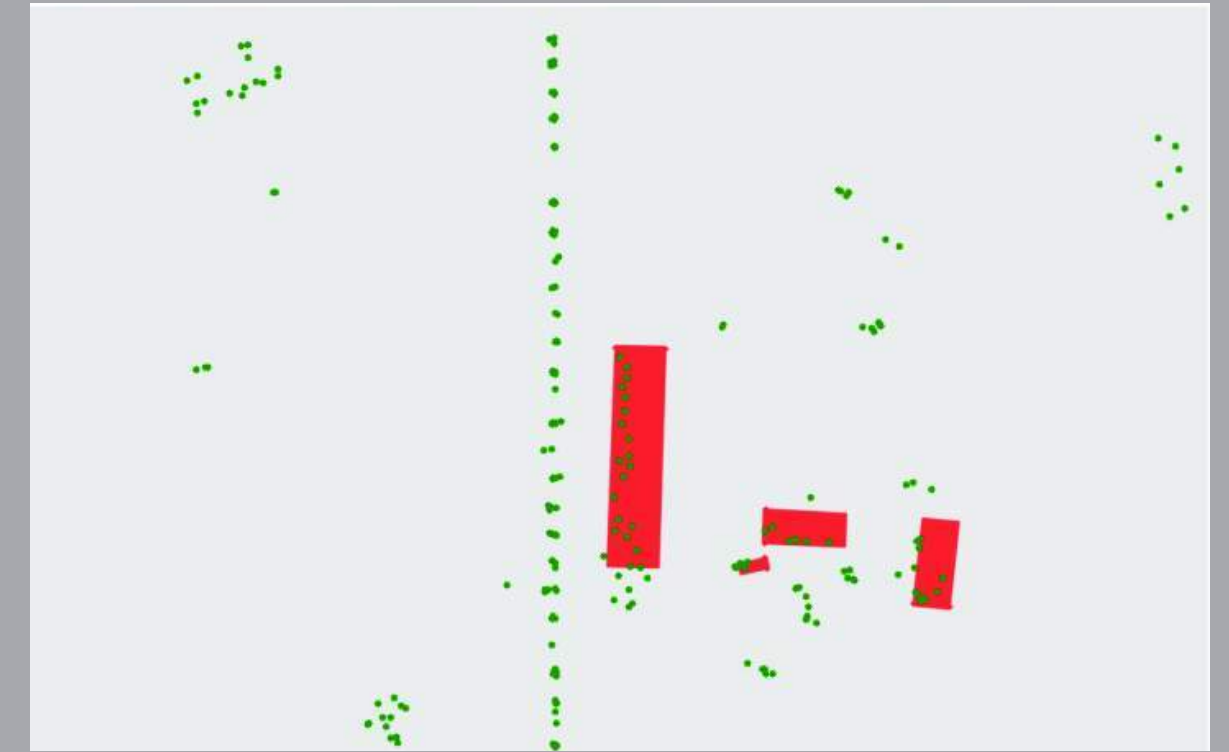
Computer Vision

Generates millions of dense, high-resolution pixel points per frame, and encodes them into “embeddings,” rich, multi-dimensional representations of objects —shape, color, texture, motion patterns, and environmental context.



LiDAR

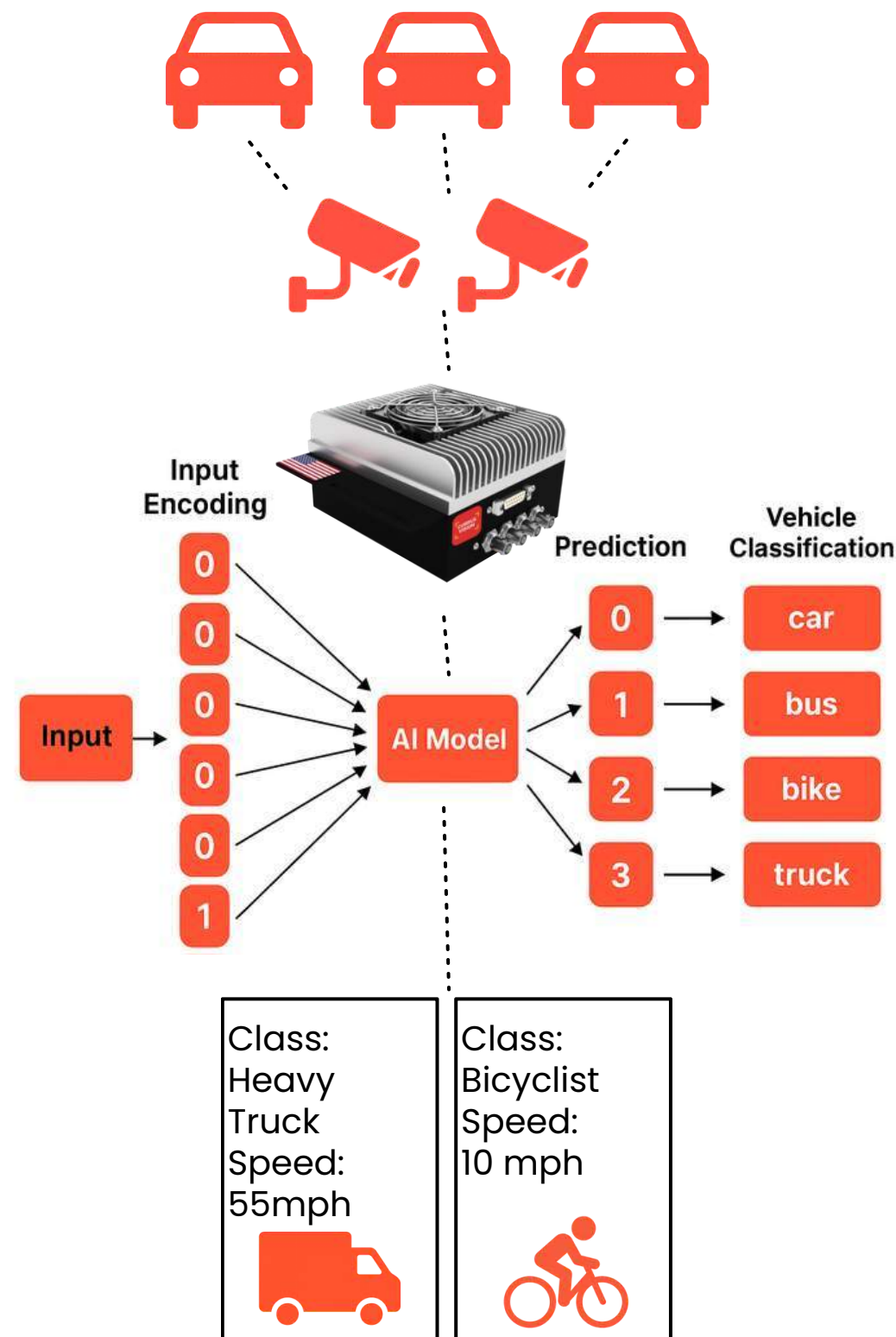
LiDAR for detection produces sparse point clouds, often with only 2–3 points on small objects like pedestrians or bikes



Radar

Radar provides just 1–5 sparse points per object, with no shape or appearance detail. In this image, green are the radar points and red are the ground truth boxes.

Accurate Detection with AI-Based Detection



Raw Video Acquisition

Cameras continuously stream raw video feeds to the edge server via RTSP

Neural Network Processing on Edge for Data Extraction

Each video frame is processed in real time using neural networks for object detection. The system generates millions of dense, high-resolution pixel points per frame and encodes them into embeddings – rich, multi-dimensional representations that capture shape, color, texture, motion patterns, and environmental context.

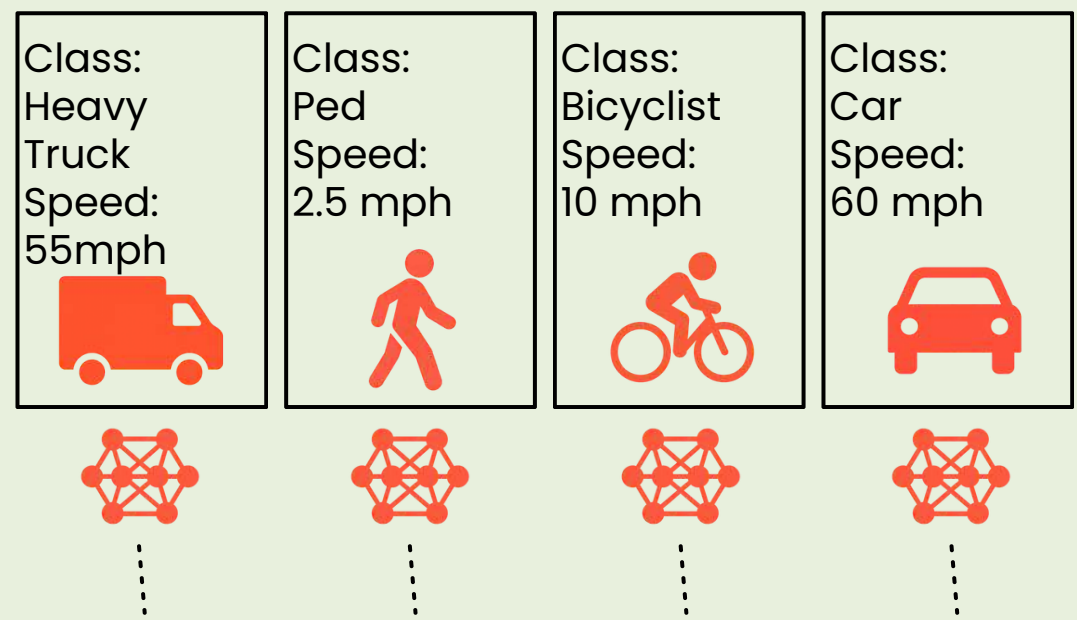
Building Reliable Metadata for Detection & Analytics

Objects are mapped to calibrated lanes and tracked across frames—even during brief occlusions.

Frame-wise detections include:

- Label: Object class
- Bbox: Bounding box coordinates
- Score: Confidence threshold
- Track_id: Unique ID to persistently track objects across frames

Why AI is Needed in Today's Modern Traffic Environment



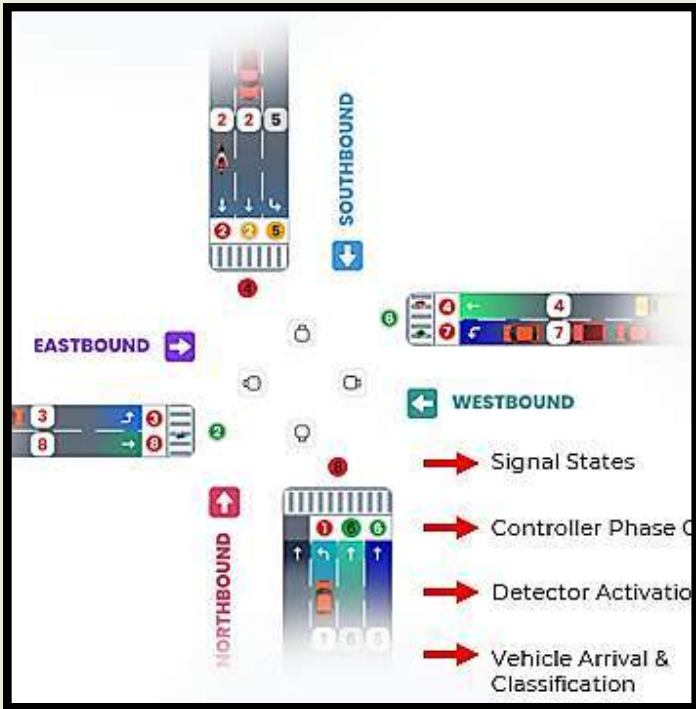
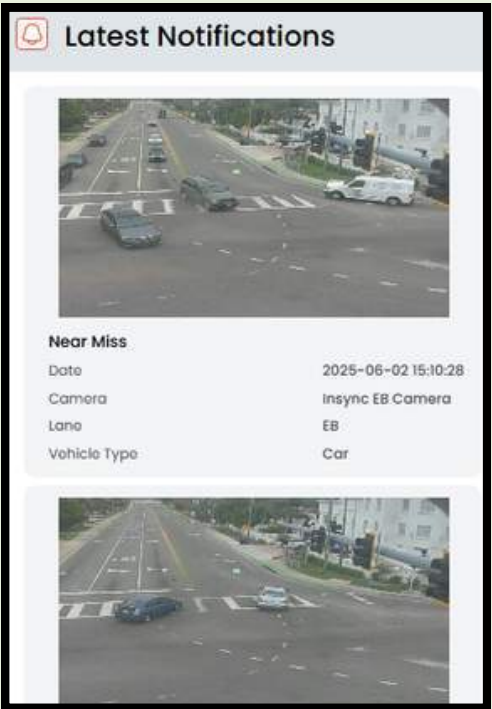
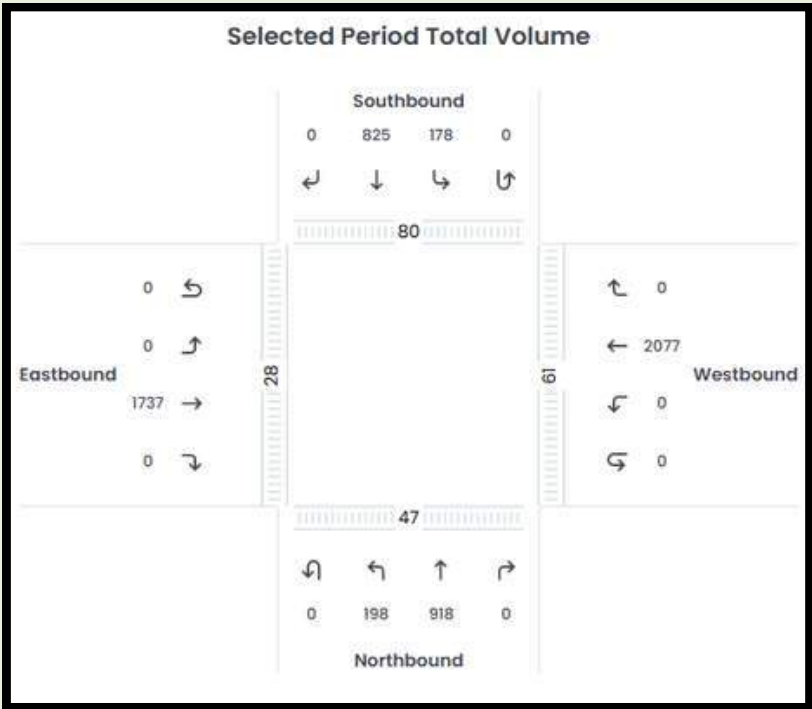
Real-Time Processing for Detection, Actuation and Event Notifications

Traffic events and decisions are identified by analyzing movement patterns and spatial relationships.

- **Positional Tracking:** Follows movement to assess specific position & lane
- **Actuation:** Triggers signals based on real-time detection
- **Events:** Detects video corruption, red-light violations, lane stopped, etc.
- **Data Output:** Sends filtered, relevant metadata to central systems

Post-Processing for a Full Suite of Insightful Reports & Analytics

- Standard Analytics: Counts by Lane & Object Category.
- Turn Count Analytics: Counts by Lane & Approach
- Event Notifications: With video evidence
- Advanced Analytics: Queue Length, Avg Delay, etc.
- Digital Twin: Interactive replica of your intersection



Hardware



Why We Build Our Own Hardware

CURRUX
VISION

“If you are serious about software, you need to build your own hardware”

– Alan Kay

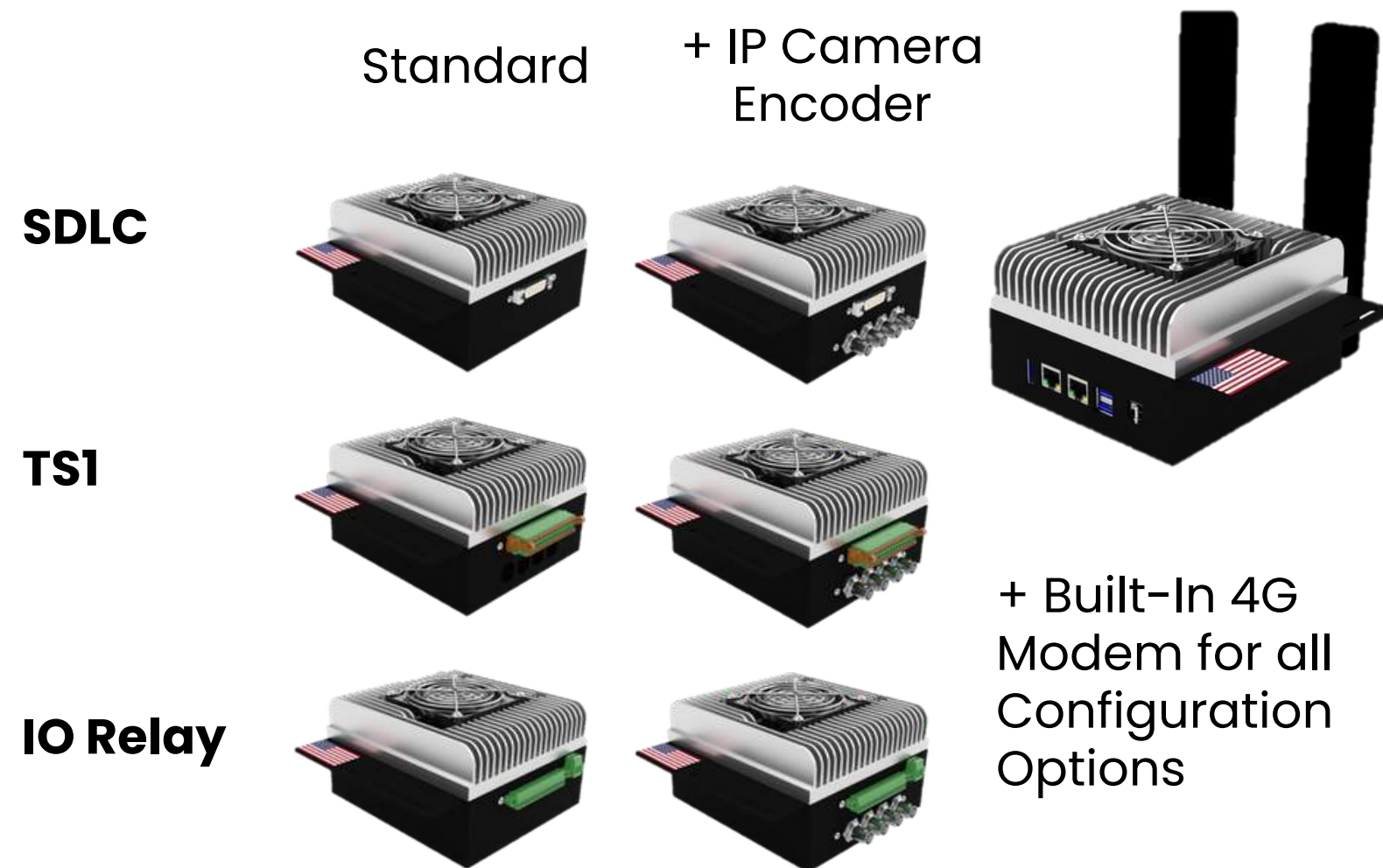
Pioneer of object-oriented programming



- **Designed, Integrated, and Built by Currux Vision in Texas**

- Eliminates the need for third-party appliances and reduces integration headaches.
- Purpose-built for Currux Vision’s AI software, using a powerful NVIDIA GPU and ARM CPU—the same chip trusted by Rivian and Toyota for autonomous systems.
- In-house design and manufacturing for rapid innovation and adaptation to customer needs.
- Manufactured in Houston, Texas, with fast turnaround—units are repaired in 1–2 weeks and backed by local warranty coverage.
- Consistent delivery of more powerful hardware versions over time.

Customized Configurations



- **Fully Customizable Integration**

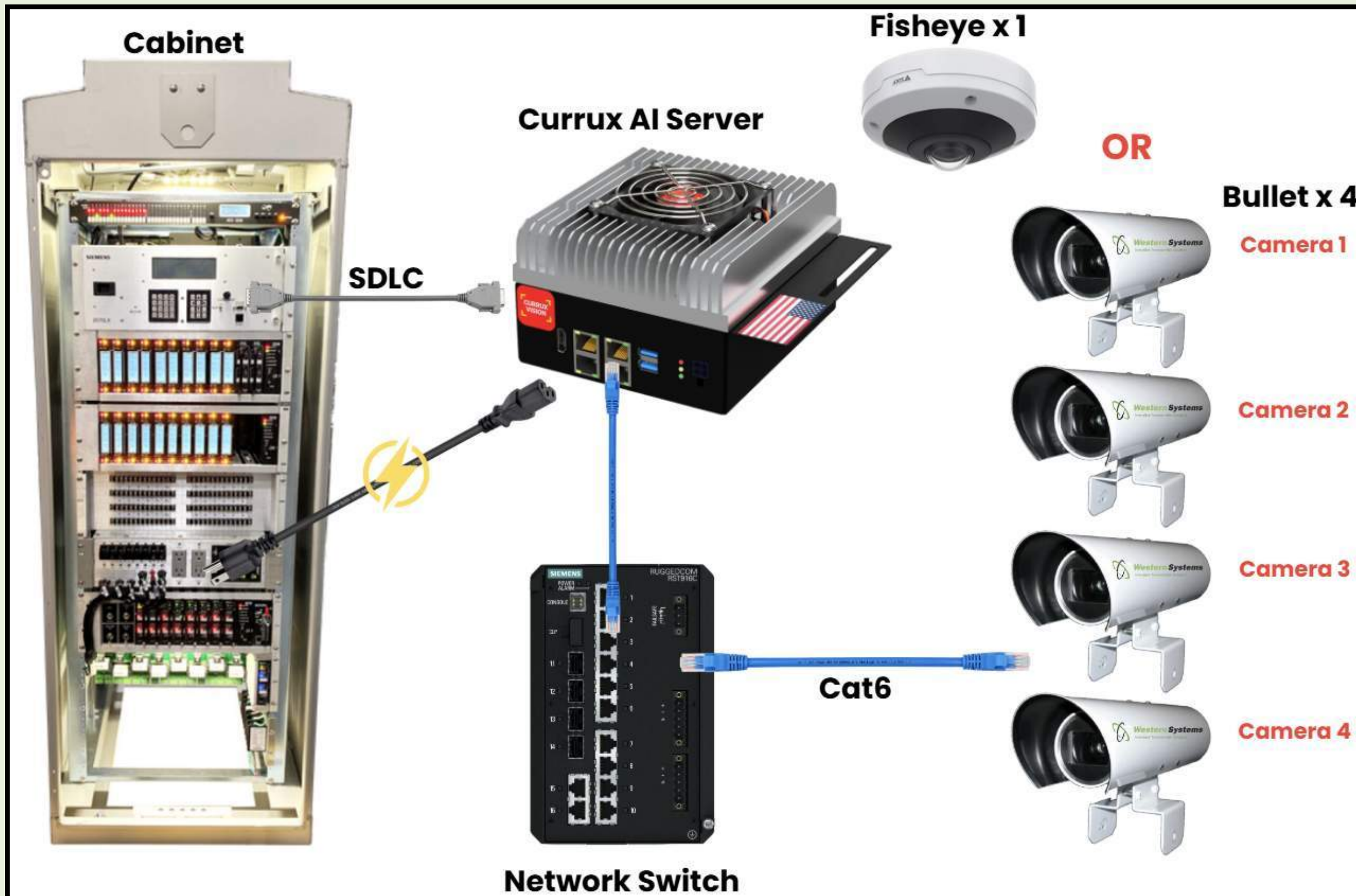
- Configurations tailored to exact customer needs with native support for SDLC, relays, IP camera encoders, 5 Channel IO Relay and 4G modems.
- Improves quality control and makes troubleshooting easier.

- **Purpose-Built, Certified, Hardened**

- Independently certified to NEMA TS2 standards.
- Includes hardened SSD memory up to 256GB
- Plug and Play: requires only power and a network connection.
- Compact form factor for easy deployment.

How Currux is Set Up in the Traffic Cabinet

CURRUX
VISION



• New & Existing Camera Integration

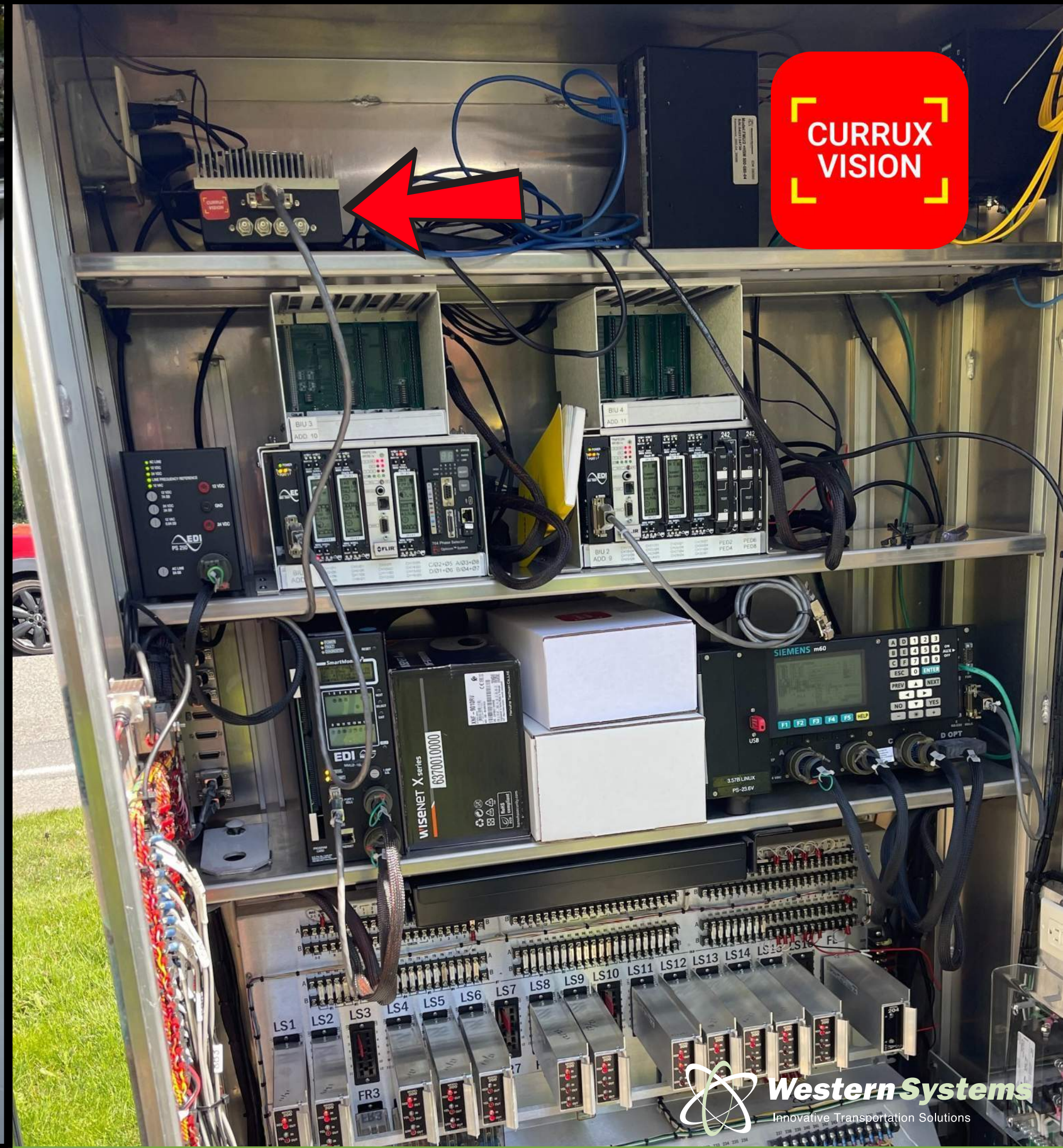
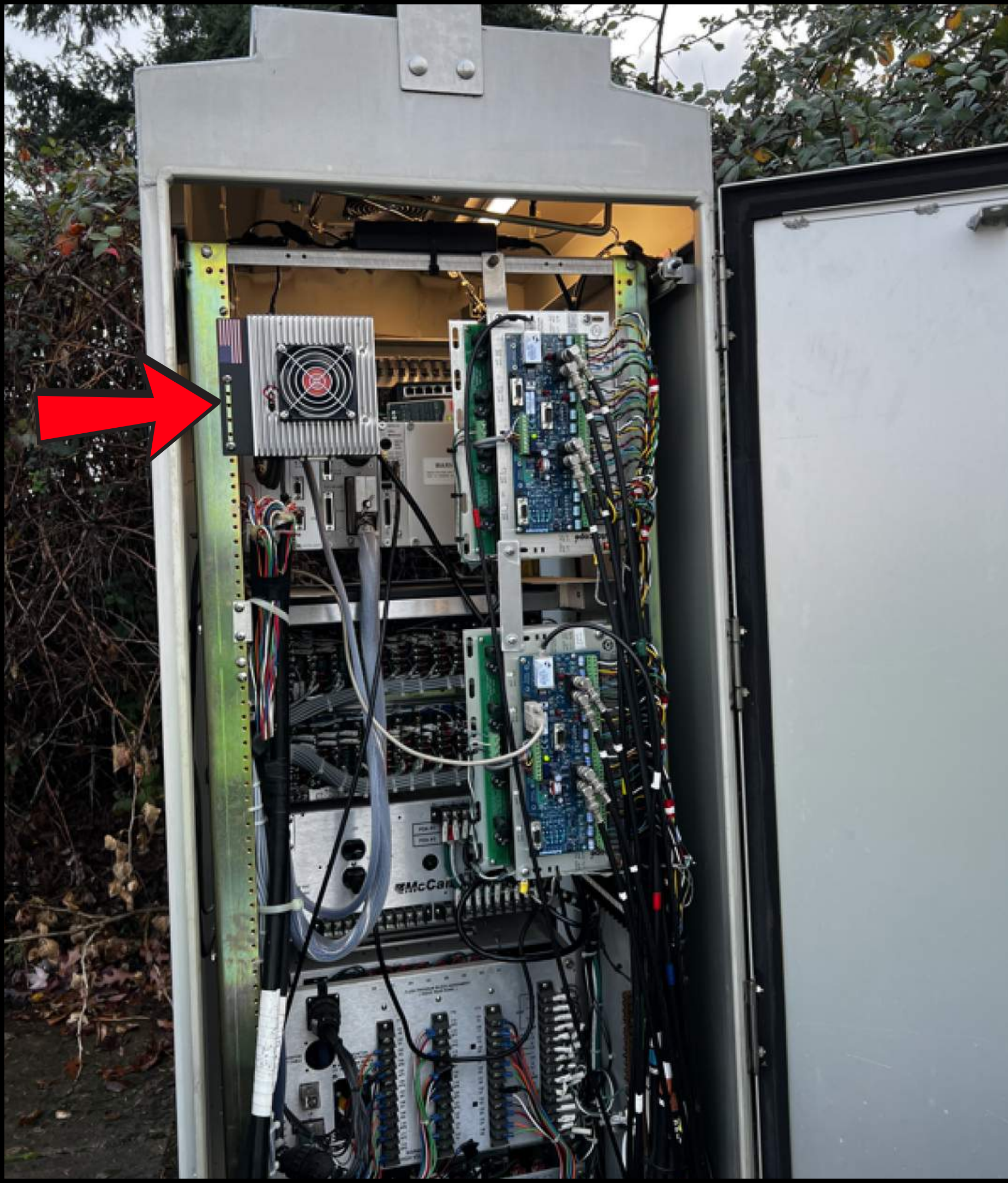
- Analog
- IP Cameras (Ethernet)
- Iteris
- Legacy
- Fisheye

• Cabinet Integration

- Integrates seamlessly with IP cameras and the traffic controller via the cabinet's Ethernet switch.
- BNC adaptors for analog cameras
- Triggers phase calls via NTCIP or SDLC based on real-time detections

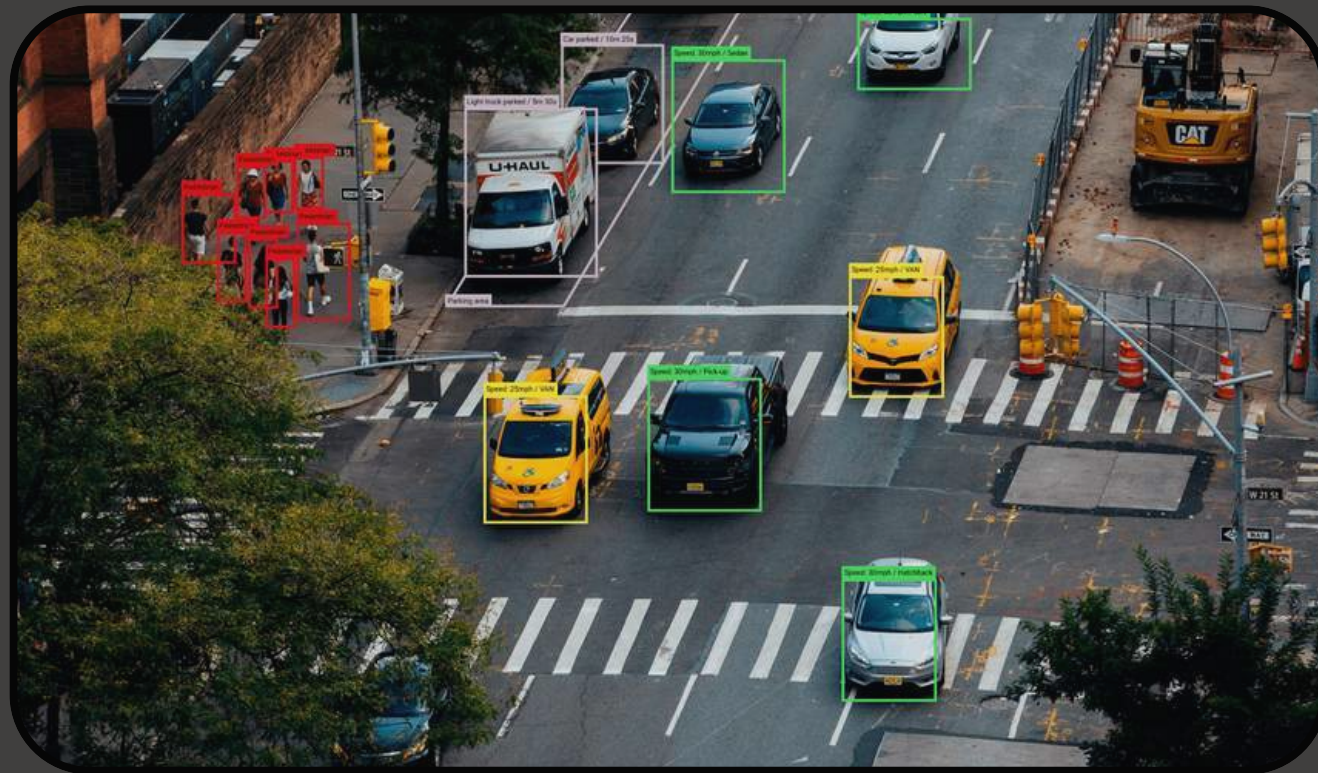
• Edge-Based: Offline Operation with A Closed-Loop System

- All data is locally processed and stored on our edge AI server
- No cloud or internet connection is required
- Optional cloud & 4G capabilities



Accurate Detection

CURRUX
VISION



INTELLIGENT MONITORING FOR SAFER ROADS

AI enhances real-time traffic safety measures.

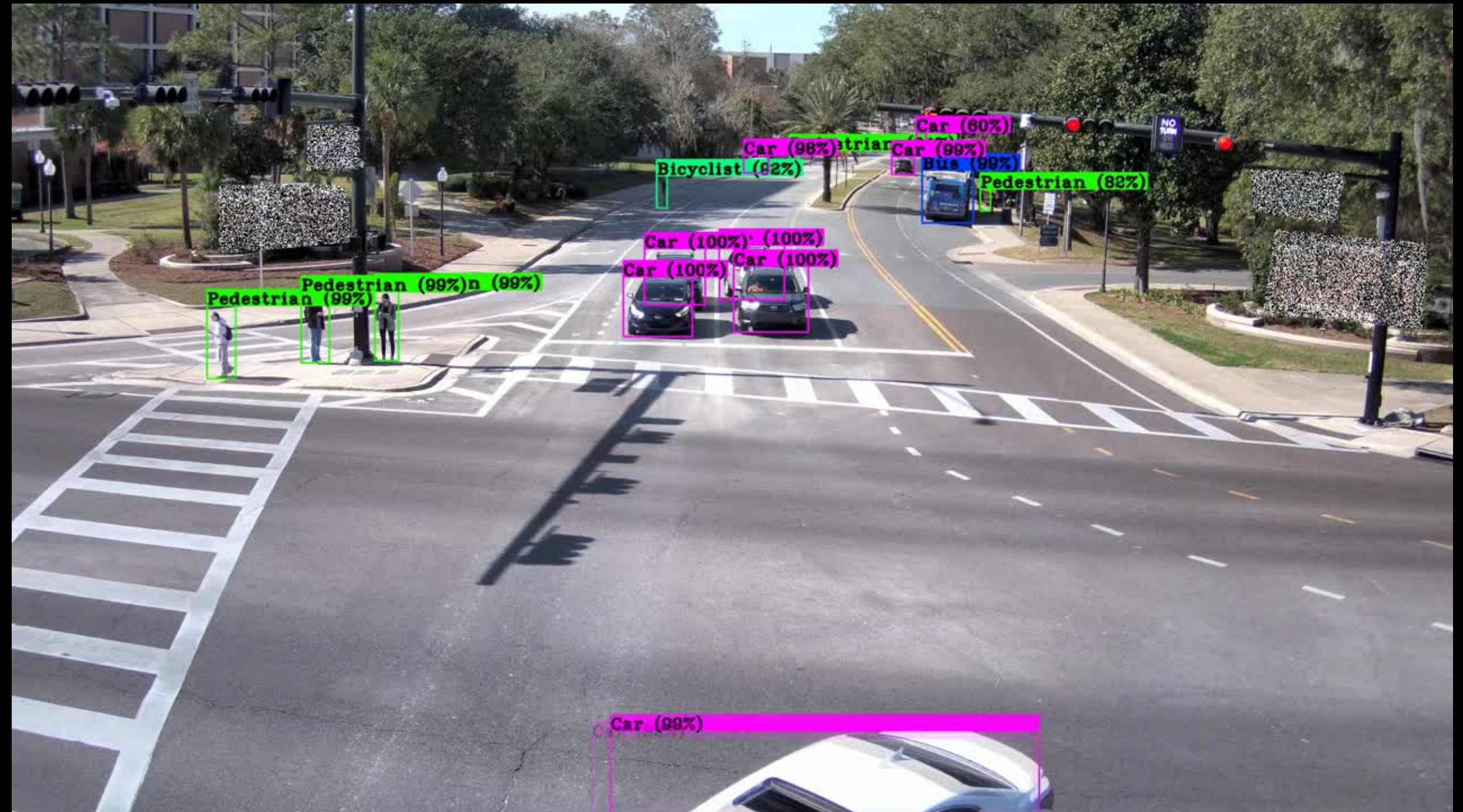
Industry Leading

Accuracy & Classification



Accurate Vehicle, PED, & Bicyclist Classification

- Car
- Light Truck
- Heavy Truck
- Bus
- Motorcycle
- Pedestrian
- Bicyclist
- Public Transportation



True Distinction

Trains, Buses, Light Truck, & Heavy Truck



Excellent Performance with Legacy Cameras



Out of the Box Integration

- ITERIS
- ECONOLITE
- RYTHM
- PEAK
- AND MORE....

Layer Currux Vision's advanced AI to your existing cameras and instantly upgrade legacy, low-quality systems into high-performance detection solutions.

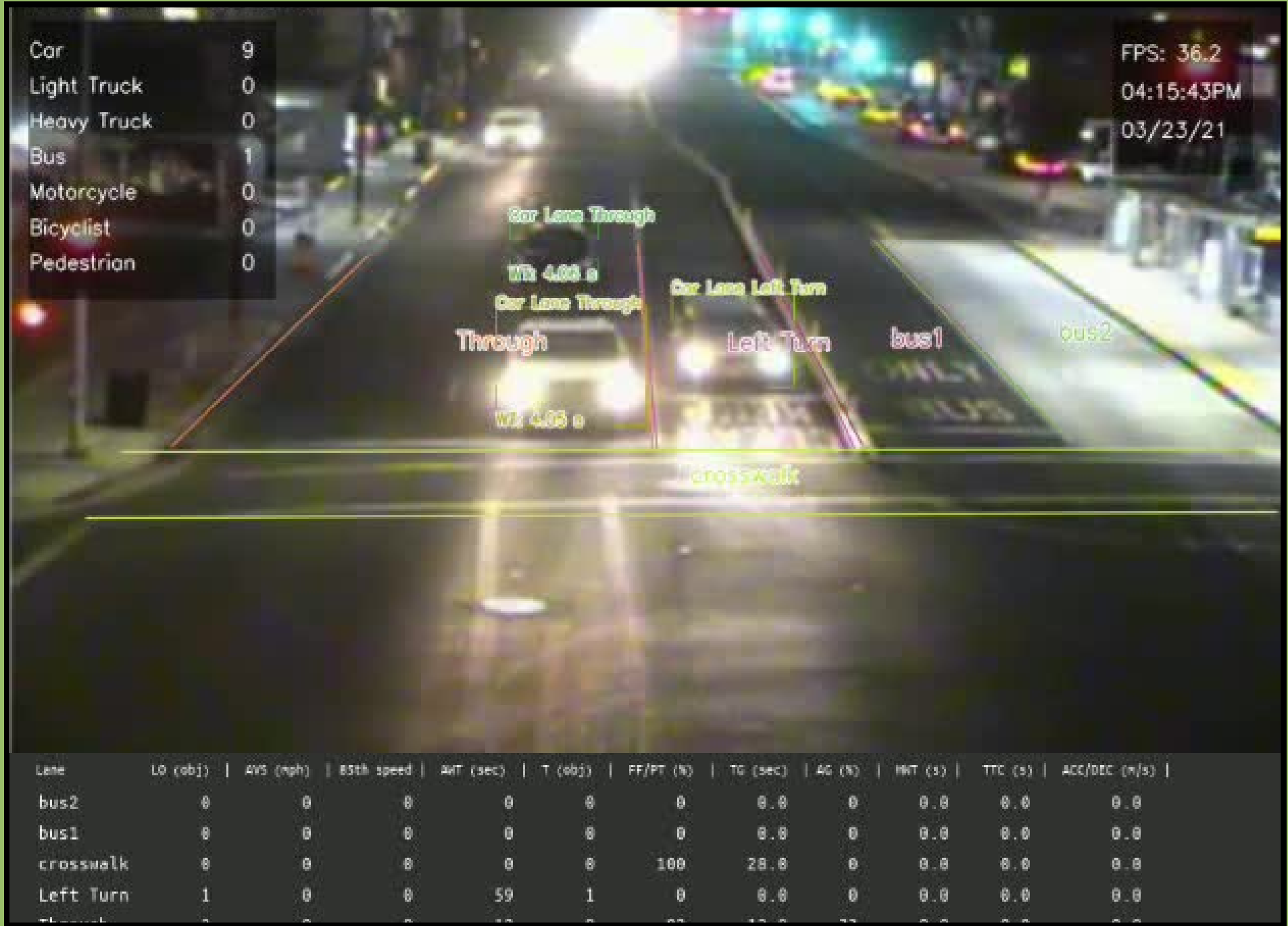
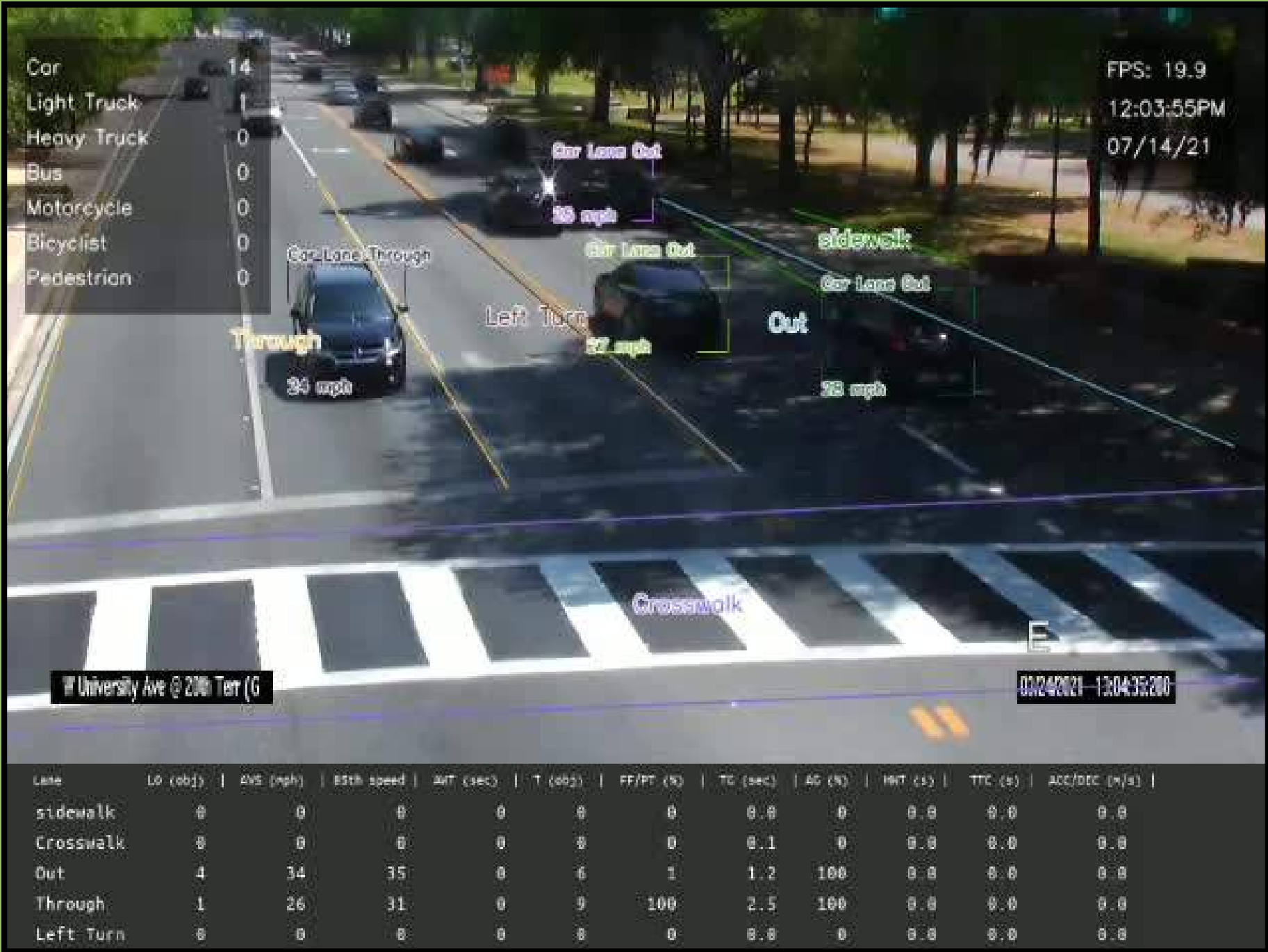


Unlocking Full Value From Your Existing Infrastructure

CURRUX
VISION



Accurate Detection with Low-Visibility: Heavy Shade or Night Time



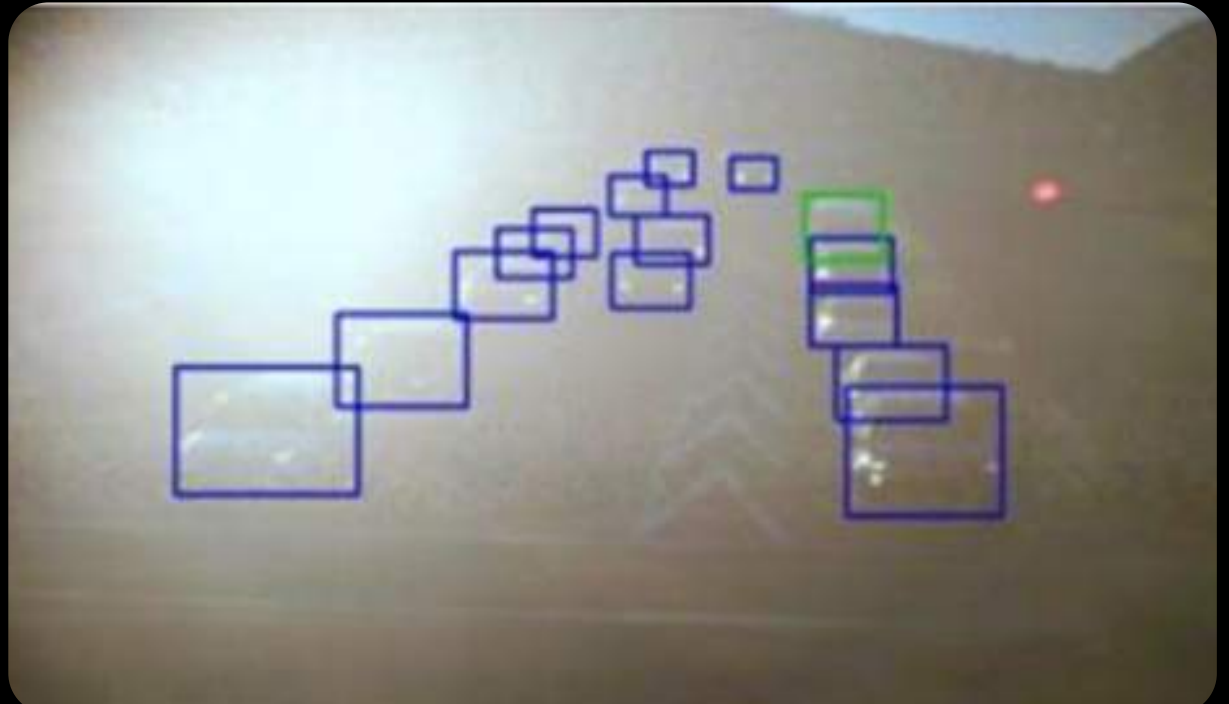
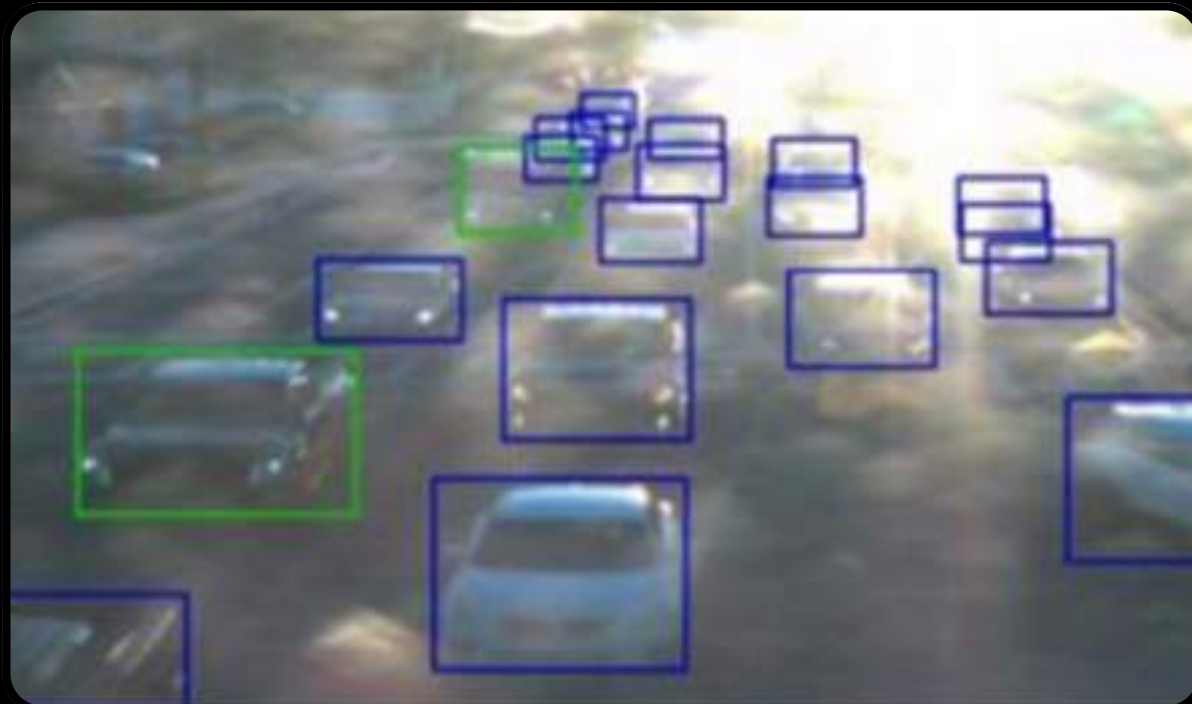
Accurate Detection with Low-Visibility: Rain, Snow, Fog

CURRUX
VISION



Accurate Detection with Low-Visibility: Glare, Dirty Lens

CURRUX
VISION



Accurate, Real-Time Near Miss Detection



Core Capabilities: Detection, Actuation, Analytics & Alerts

CURRUX
VISION

Standard SmartCity ITS Package with Detection

A complete edge-based detection and signal actuation system—designed for fast deployment and reliable day-to-day performance.

NTCIP / SDLC Detection and Actuation Module

Real-time signal actuation through direct controller integration using industry-standard protocols.



Digital Twin

Live intersection visualization with real-time phase calls



Twin Controller Timing Recommendation

Optimized signal timing suggestions through direct integration with the traffic controller via NTCIP.



Standard & Turn Count Analytics Report

- Counts, speed, and avg. speed by lane and vehicle class
- Intersection counts by turn movement and vehicle class
- Reports can be automatically sent by email or FPT server



Real-Time Notifications

Instant email / text alerts for:

- Video Corruption
- Vehicle & Lane Stopped (Accident Alert)
- Controller in Flash & Stuck Detector



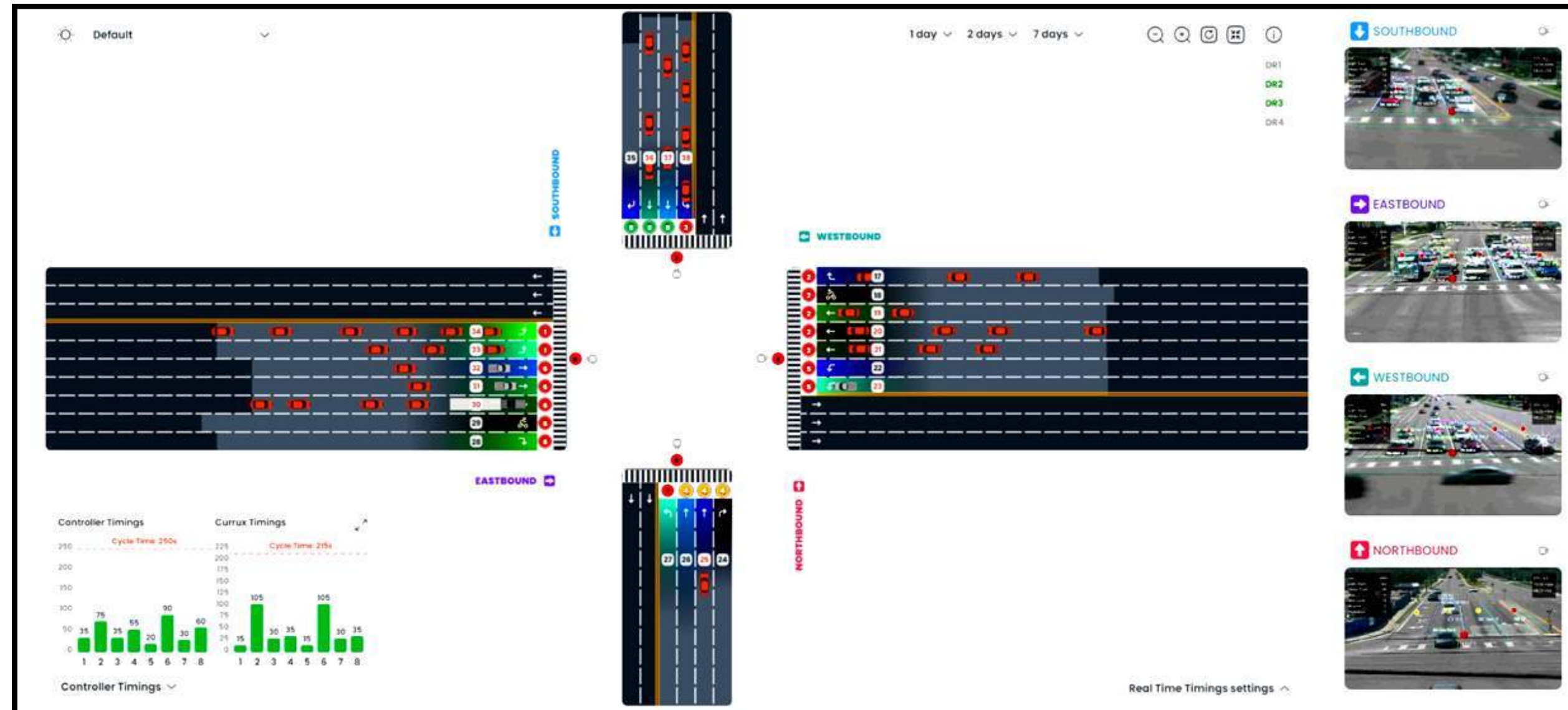
Cloud Monitoring (Optional)

Remote access for deployment health monitoring and aggregated data viewing via secure cloud dashboard.



Digital Twin

- Real-time intersection view synced with live traffic and camera data
- Lane-level detection and phase assignment visualization, providing a visual confirmation by approach
- Dynamic green time, pedestrian priority, and cycle time adjustments



- Compares controller vs. Currux-optimized signal cycles for units with NTCIP connection



Standard Analytics Report

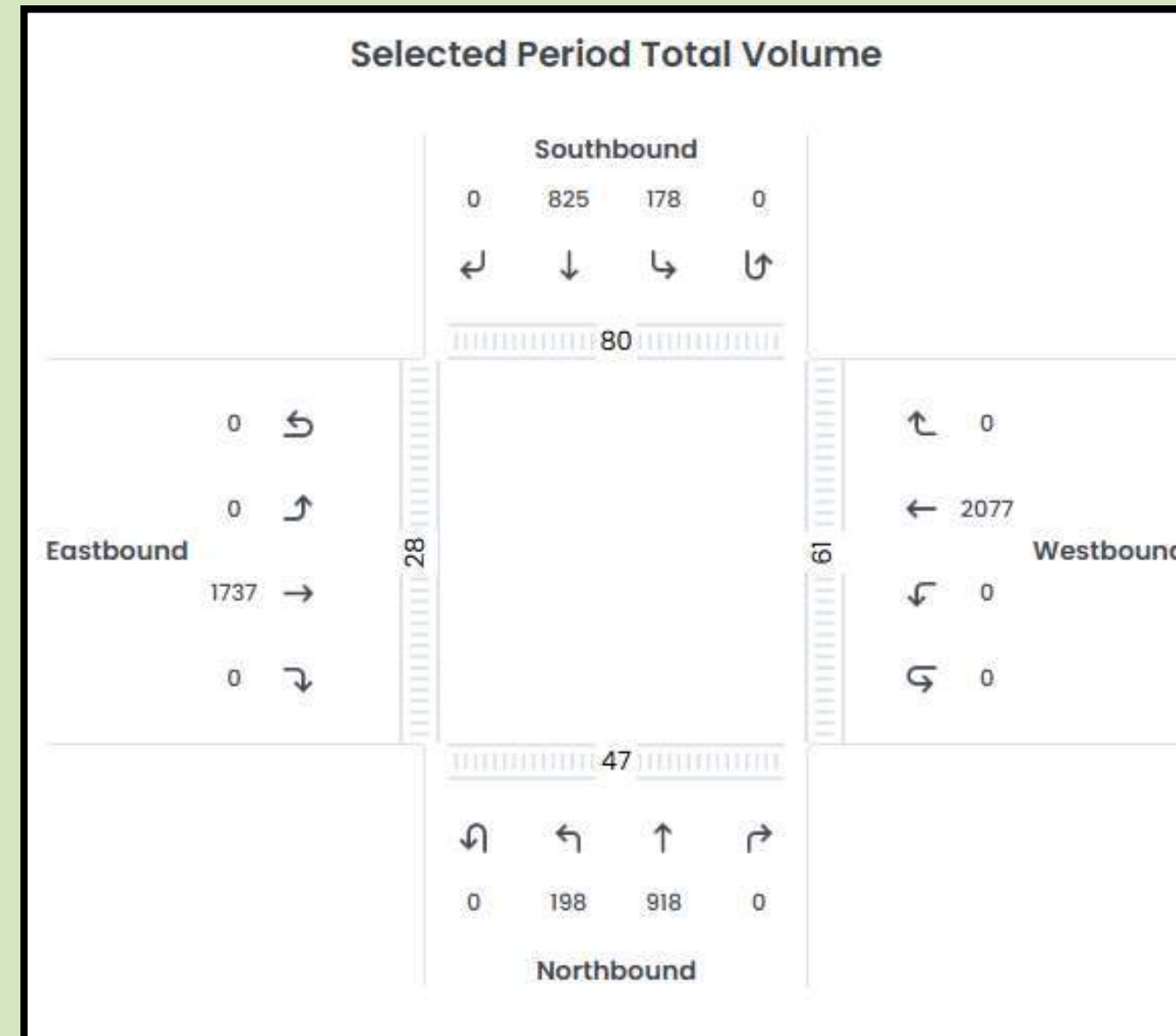
- Counts by lane by category
 - Car
 - Light Truck
 - Heavy Truck
 - Bus
 - Motorcycle
 - Pedestrian Bicyclist
- Speed & Average Speed by lane
- API Outputs for counts, classification and speed per lane



- Reports generate automatically and can be received by email daily or weekly if internet access is present.
- Reports can be exported in PDF and Excel.
- Reports can be generated in real time and viewed in browser

Turn Count Analytics Report

- Intersection level counts by turn movement and vehicle class
- Crosswalk ped and bike counts by approach
- 5 to 60 minutes time bins



- Reports generate automatically and can be received by email daily or weekly if internet access is present.
- Reports can be exported in PDF and Excel.
- Reports can be generated in real time and viewed in browser

Instant Alerts:

Standard Real-Time Notifications

- Video Corruption Alert
- Vehicle Stopped / Accident Alert
- Lane Stopped Alert
- Controller in Flash Alert
- Optional Real-Time Notifications
- Speeding
- Red Light Violation
- Crosswalk Violation
- Wrong Direction
- Double Line Crossing
- And more.....

 Latest Notifications

		
Red Light Crossing Alert	Red Light Crossing Alert	Red Light Crossing Alert
Date: 2025-05-05 10:24:42	Date: 2025-05-05 10:24:36	Date: 2025-05-05 05:40:53
Camera: Curlew Rd @ Gullaire SB	Camera: Curlew Rd @ Gullaire SB	Camera: Curlew Rd @ Gullaire SB
Lane: Crosswalk	Lane: Crosswalk	Lane: Crosswalk
Vehicle Type: Pedestrian	Vehicle Type: Pedestrian	Vehicle Type: Pedestrian

		
Red Light Crossing Alert	Red Light Crossing Alert	Red Light Crossing Alert
Date: 2025-05-05 05:33:06	Date: 2025-05-05 04:29:07	Date: 2025-05-05 00:46:49
Camera: Curlew Rd @ Gullaire SB	Camera: Curlew Rd @ Gullaire SB	Camera: Curlew Rd @ Gullaire SB
Lane: Crosswalk	Lane: Crosswalk	Lane: Crosswalk
Vehicle Type: Pedestrian	Vehicle Type: Pedestrian	Vehicle Type: Pedestrian

- View notifications remotely from the cloud
- Notifications include the event type, date and time, camera ID, lane, vehicle class, and before-and-after snapshots with timestamps for visual confirmation.
- Event Notifications can be received instantly through email or text

Additional Capabilities: Advanced, Safety, Adaptive Analytics & More

CURRUX
VISION

Additional SmartCity ITS Modules

For agencies seeking deeper operational insight, enhanced safety, and proactive traffic optimization.

Advanced Traffic Analytics Report

Metrics such as average queue length, 85th percentile speed by lane, level of service (LOS), and more

Safety Analytics / Near Miss Module

Trajectory-based conflict analysis and heatmaps to identify risk areas in real time

RSU / Connected Vehicle Module with API Integration

Integrates with roadside units for CV2X communication and external system interoperability

Enhanced Real-Time Notifications

Instant email / text alerts for red light running, speeding, double line crossing, false/missed detection call and more

Train Detection & Actuation Module

Detects stopped and approaching trains, actuates signals or relays accordingly

IO Relay Activation Module

Supports relay-based device control such as flashing signs, gates, or third-party hardware

Adaptive / Signal Timing Optimization Module

Self-contained adaptive signal control with real-time timing adjustments

Adaptive Pedestrian Module

Dynamic pedestrian detection and phase adjustment based on real-time conditions

Garage Occupancy Monitoring & Notification System

Tracks and reports vehicle entry/exit counts with real-time availability status

Additional Capabilities: Advanced, Safety, Adaptive Analytics & More

CURRUX
VISION

Advanced Analytics Report

- Lane Occupancy (Queue Length)
- Average Speed
- 85th Percentile Speed
- Average Wait Time
- HWT – Contact Car in Front
- Vehicle Counts
- Vehicle Stop Counts
- Passing Time
- Free Flow vs Sat Flow
- Gap Time
- Arrivals on Green
- Total Delay

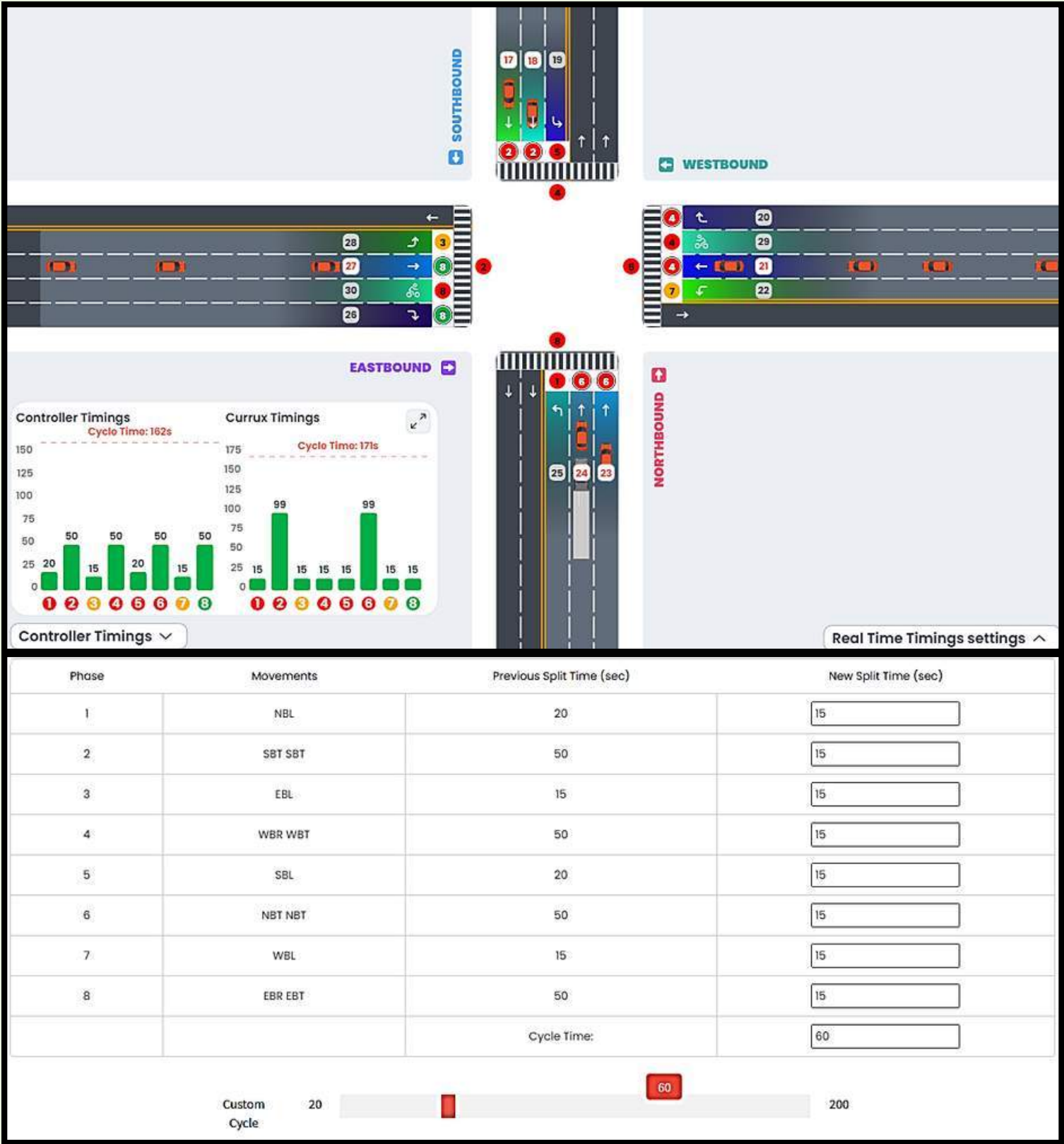


- Reports can be generated in real time and viewed in browser
- Reports generate automatically and can be received by email daily or weekly if internet access is present.
- Reports can be exported in PDF and Excel.



Adaptive & Signal Timing Optimization

Continuously optimizes signal timing using historical traffic patterns and real-time activity. It supports intersections and corridors with an emphasis on reducing congestion and maximizing green time.



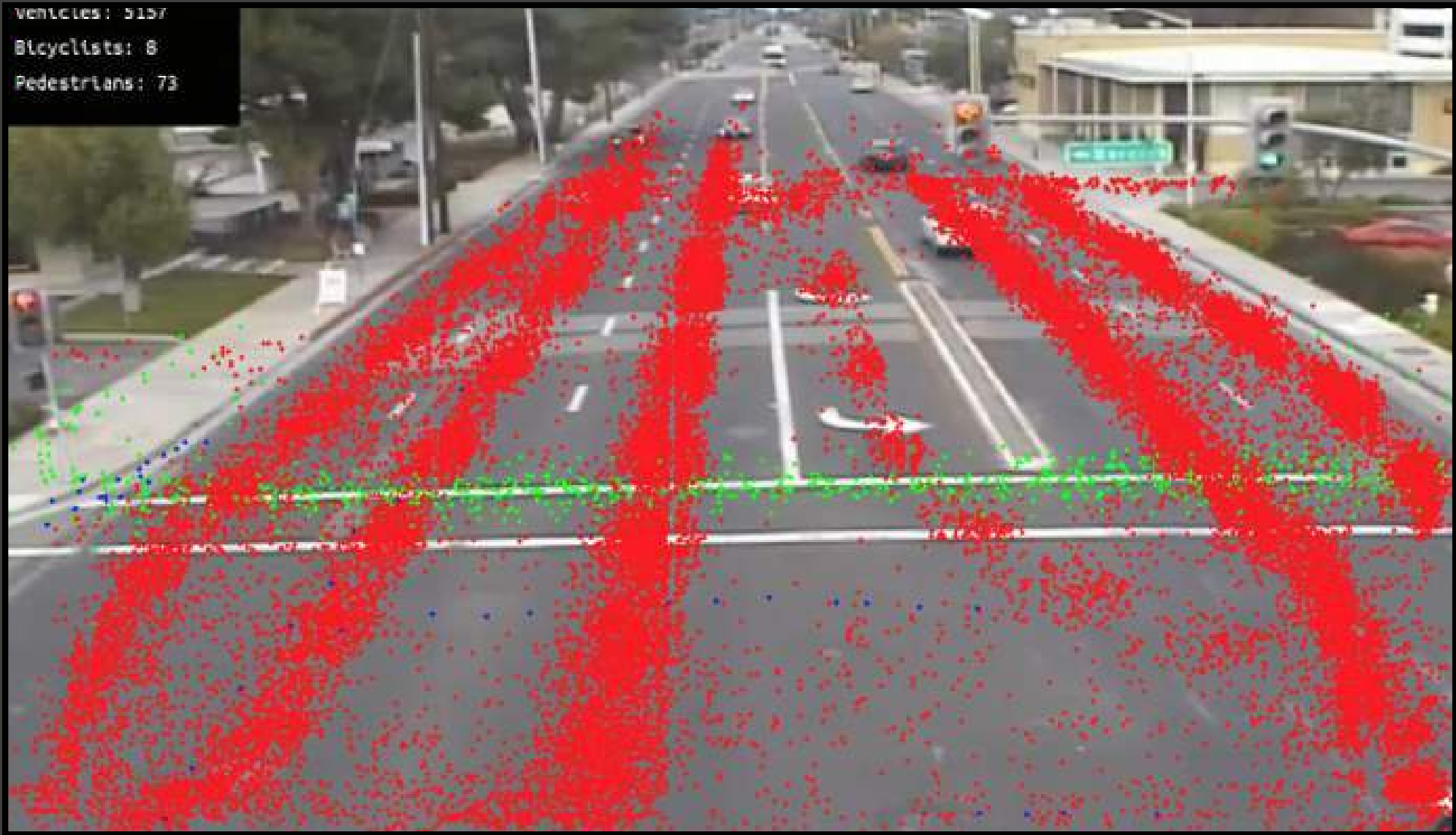
- Custom training period
- Custom update intervals
- Customize weights for North-South, East-West, and Pedestrian movements
- Optimizes signal phase split times based on detected traffic volume and patterns
- Outputs new cycle timing recommendations for each phase
- Visual time selector for applying optimizations throughout the day



Safety Analytics with Near Miss

Scatter Report:

- Shows where vehicles, pedestrians and bicyclists come into conflict – areas of potential danger for peds/bikes
- Where peds tend to cross mid-block.

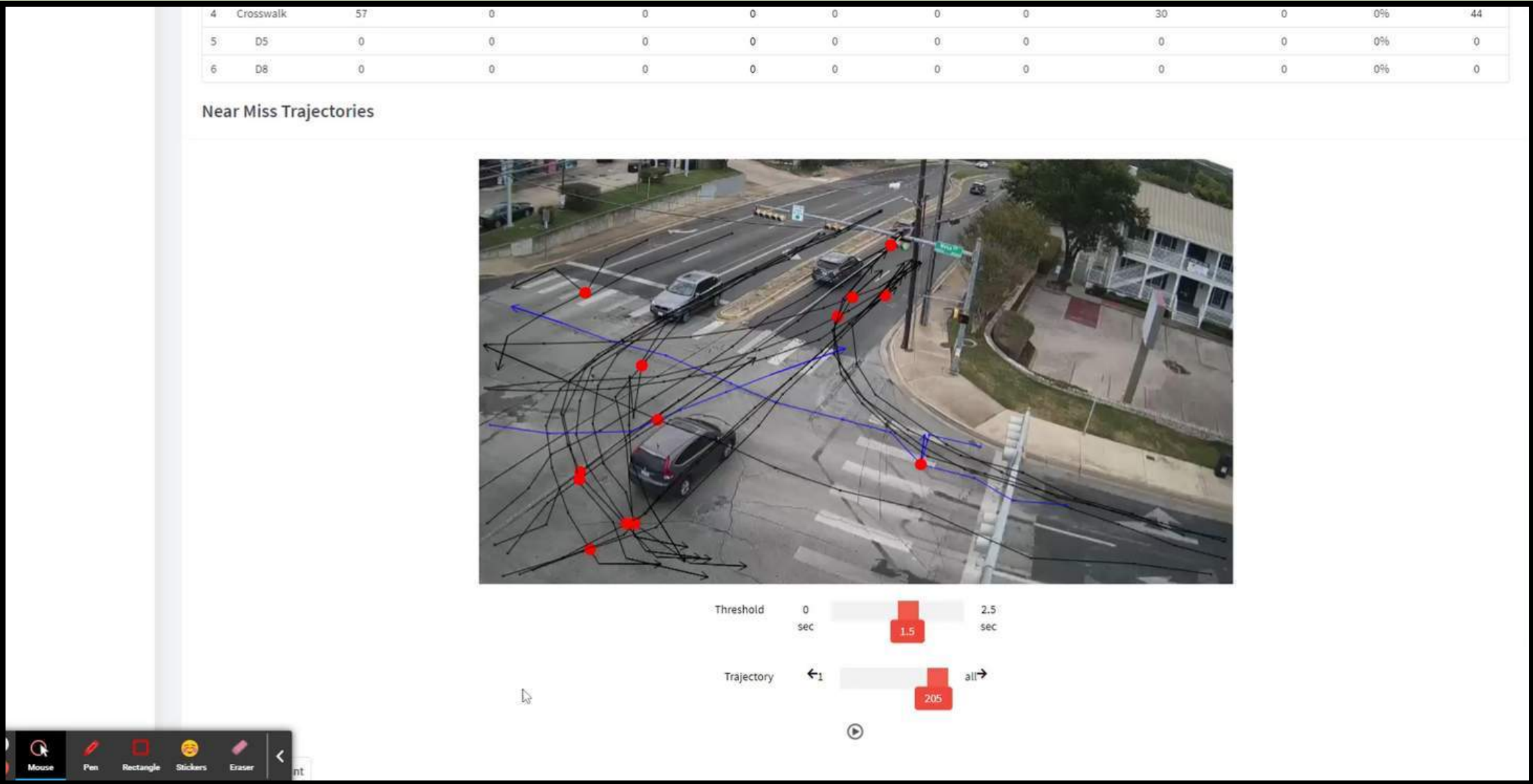


#	Lane	Number of Vehicles	Crosswalk Violations	Car Stopped at Intersection	HWT	Red Light Crossing	Near Misses	Lane Stopped	85th Percentile Speed(mph)	Speeding	% of Cars Speeding
1	Through	2146	0	0	2.8	0	0	0	44	200	0.09%
2	Left Turn	154	0	0	4.9	0	0	0	4	0	0%
3	Right Turn	50	0	0	4.7	0	0	0	32	0	0%



Near Miss Trajectory Analytics

Full trajectory based near miss analysis – Near Miss Trajectories – that will display the trajectories of objects with TTC of 0–2.5 seconds



#	Lane	Number of Vehicles	Crosswalk Violations	Car Stopped at Intersection	HWT	Red Light Crossing	Near Misses	Lane Stopped	85th Percentile Speed(mph)	Speeding	% of Cars Speeding
1	Through	2146	0	0	2.8	0	0	0	44	200	0.09%
2	Left Turn	154	0	0	4.9	0	0	0	4	0	0%
3	Right Turn	50	0	0	4.7	0	0	0	32	0	0%

Additional Capabilities: Near Miss Trajectory Replay



Near Miss Trajectory Replay

Each near miss trajectory can be re-played in real time to see the exact circumstances of each event.

4	Crosswalk	57	0	0	0	0	0	0	0	30	0	0%	44
5	D5	0	0	0	0	0	0	0	0	0	0	0%	0
6	D8	0	0	0	0	0	0	0	0	0	0	0%	0

Near Miss Trajectories

Threshold 0 sec 2.5 sec
1.75 sec

Trajectory ← 1 118 all →

Mouse Pen Rectangle Stickers Eraser

int

#	Lane	Number of Vehicles	Crosswalk Violations	Car Stopped at Intersection	HWT	Red Light Crossing	Near Misses	Lane Stopped	85th Percentile Speed(mph)	Speeding	% of Cars Speeding
1	Through	2146	0	0	2.8	0	0	0	44	200	0.09%
2	Left Turn	154	0	0	4.9	0	0	0	4	0	0%
3	Right Turn	50	0	0	4.7	0	0	0	32	0	0%

Optional Cloud Integration & Monitoring



Real-Time Operational Monitoring

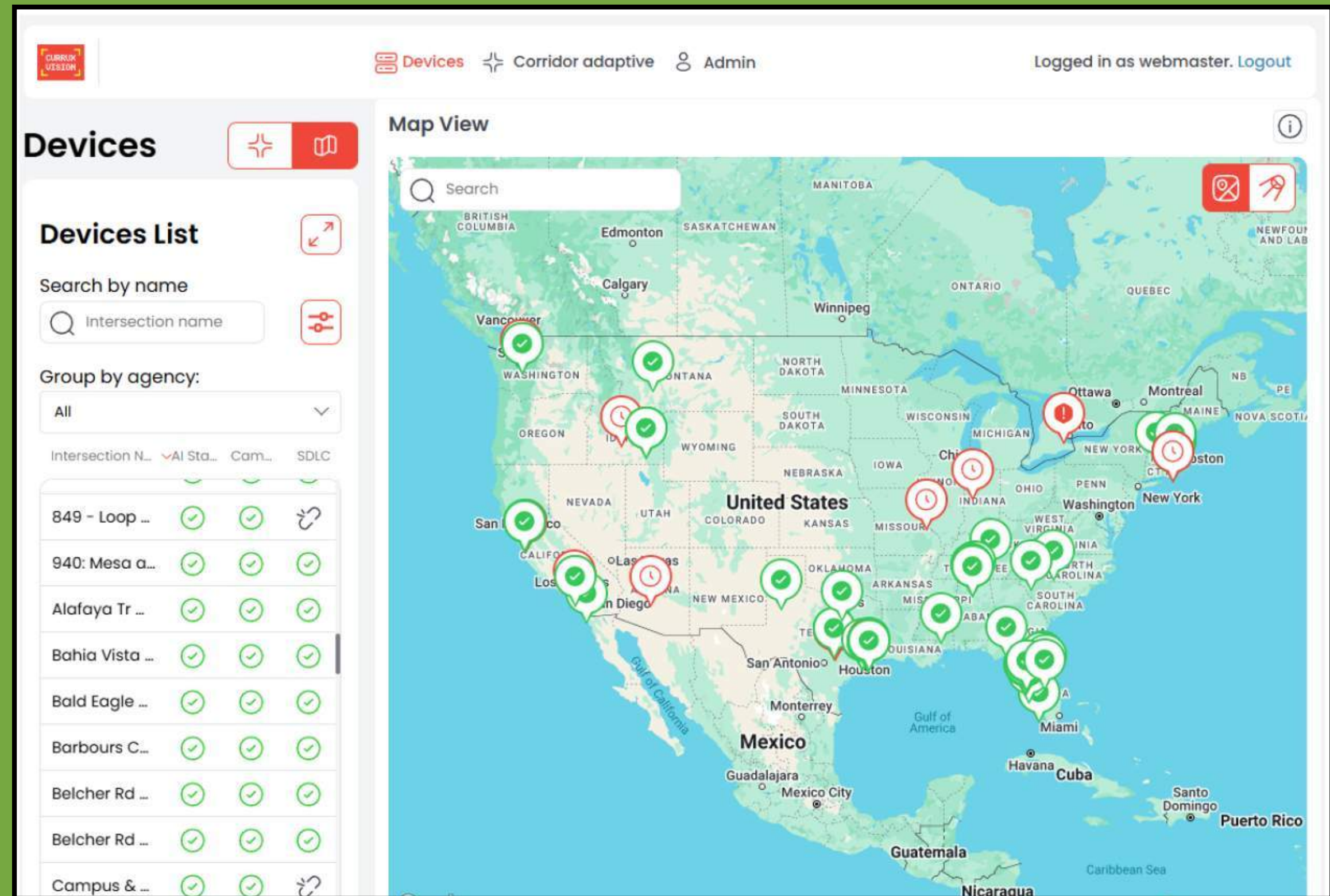
Map-Based System Overview

Access units securely from any modern web browser—no local software required.

- All intersections are accessible without needing to change the network

Agency-Level Operational View

Visualize your agency's intersections, corridors, and devices through an interactive map and device list, providing instant insight into operational status and system health.



Cloud Portal (Optional)

CURRUX
VISION

Device-Level Diagnostics

Monitor Remotely from Anywhere

- AI status, system health
- RAM %
- Temperature
- Camera performance

Search and Filter Devices

Easily search by name, filter by status, and group by agency to streamline management.

The screenshot displays the Currux Vision Cloud Portal interface. The top navigation bar includes the Currux Vision logo, a 'Devices' tab, a 'Corridor adaptive' icon, and a user profile labeled 'Admin' with the text 'Logged in as webmaster. Logout'.

The main interface is divided into two primary sections: 'Devices' on the left and 'Map View' on the right.

Devices Section:

- Devices List:** Features a search bar labeled 'Search by name' with the placeholder 'Intersection name'. Below it is a 'Group by agency:' dropdown menu set to 'All'. A table lists various intersections with columns for 'Intersection N...', 'AI Sta...', 'Cam...', and 'SDLC'. Each row shows a green checkmark in the 'AI Sta...' and 'Cam...' columns, and a green checkmark or a hand icon in the 'SDLC' column.
- Filters:** A panel on the right of the Devices section allows filtering by 'State' (Active/Inactive), 'Camera State' (Active/Inactive), and 'SDLC State' (Active/Inactive). It also includes sliders for 'RAM' (0% to 100%), 'Temperature' (0°C to 100°C), and 'HDD Free Space' (0GB to 30GB). At the bottom, there are checkboxes for 'Alerts' (No unseen alerts / Has unseen alerts) and a 'Show Results' button.

Map View:

- A map of the Austin area is shown with several green location pins.
- A detailed popup for the location '849 - Loop 360 and Great Hills' displays the following status: AI State: (green checkmark), Camera State: (green checkmark), SDLC State: (hand icon), RAM: 54% (green circle), Temp: 44°C (green circle), and HDD Free Space: 1.900GB (yellow circle).
- Another popup for '611 - Jollyville and Balcones Woods' shows 'Take me there' and 'Delete' buttons.



Live Intersection Status

Live Video Feeds

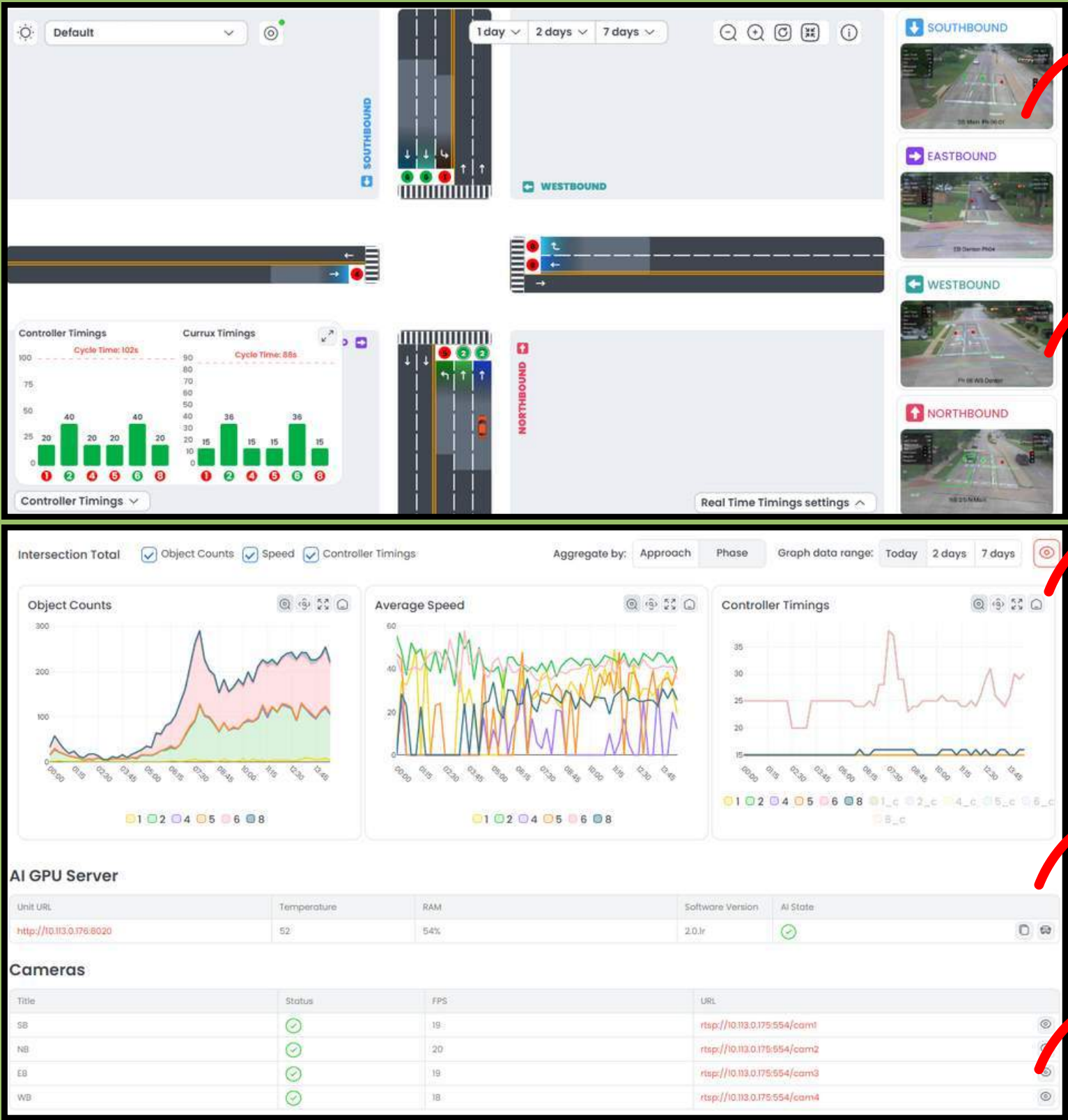
Instantly verify traffic, pedestrian activity, and incidents through live video feeds, while monitoring lane-level movements in real time via the digital twin view.

Visualize Traffic Trends

Track object counts, average vehicle speeds, and controller signal timings by approach or phase

Intelligent Camera Diagnostics

Monitor camera status and FPS to ensure system is running smoothly & diagnose any technical issues



Live Camera Feeds

Digital Twin

Dashboard Analytics

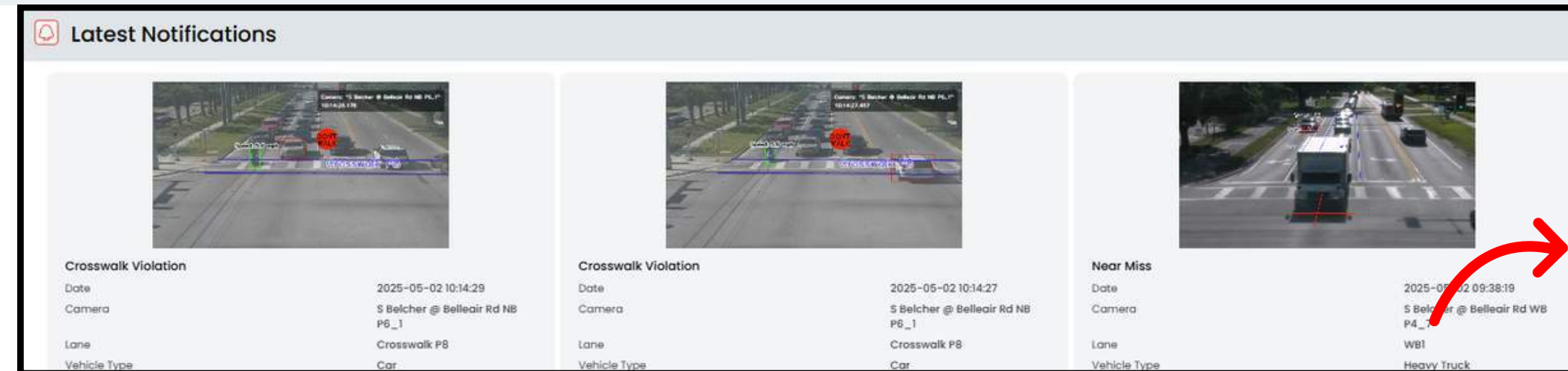
GPU Status

Camera Status

Cloud Portal (Optional)



Live Intersection Status



Real-Time Notifications

Latest Notifications

Instantly view Real-Time Notification Alerts remotely.

Reports

All Reports can be downloaded in PDF or Excel format.

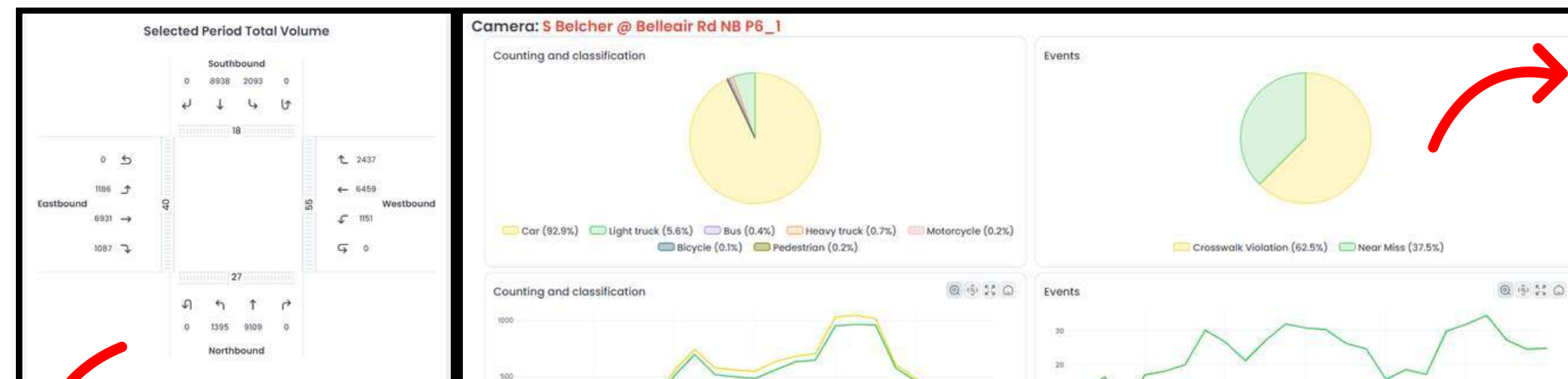
- Dashboard Report
- Standard Analytics Report
- Turn Count Analytics Report

Belcher Rd @ Belleair Rd

Dashboard

Standard Report

Turn Count Analytics



Standard Report

Turn Count Report



Dashboard Report

Tools for Quick Configuration

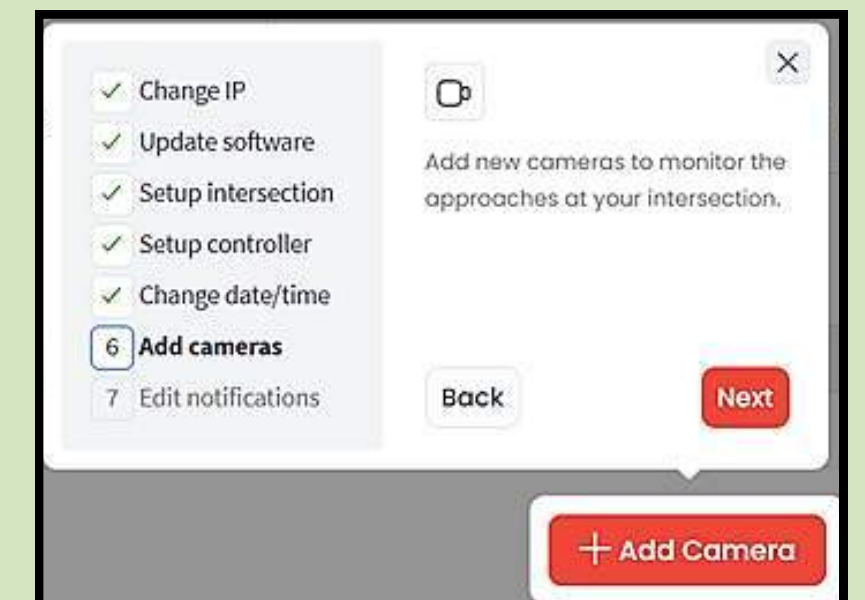
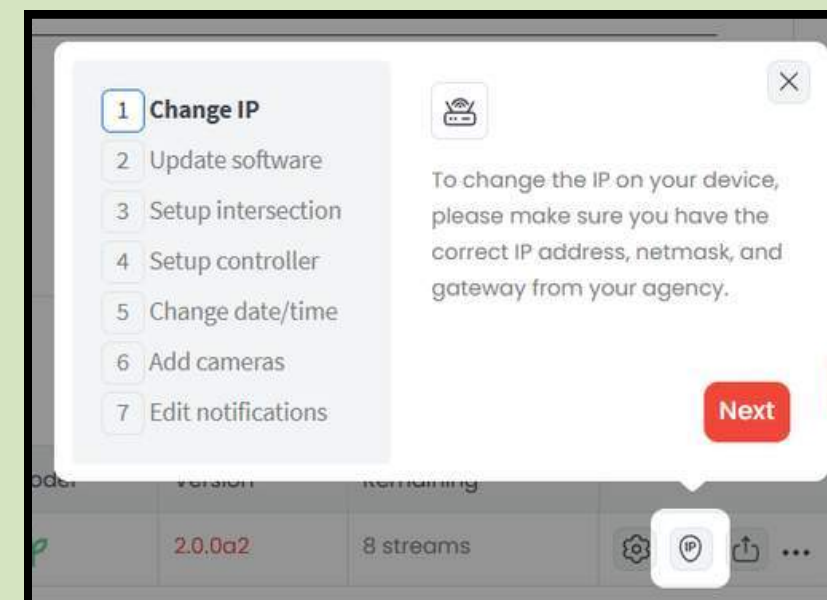
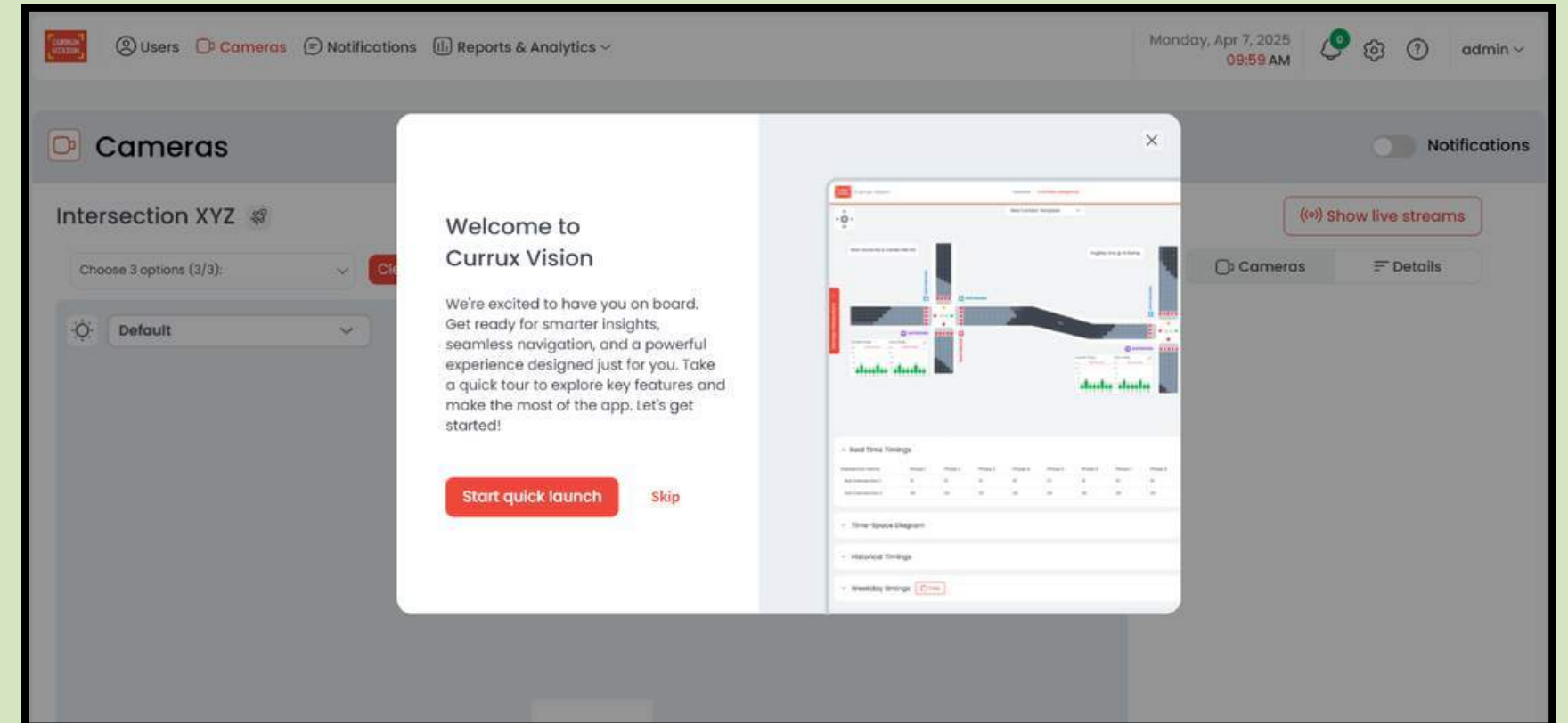


Quick Launch Tool

CURRUX
VISION

Fast, Guided Setup for Deployment—Built for Field Technicians

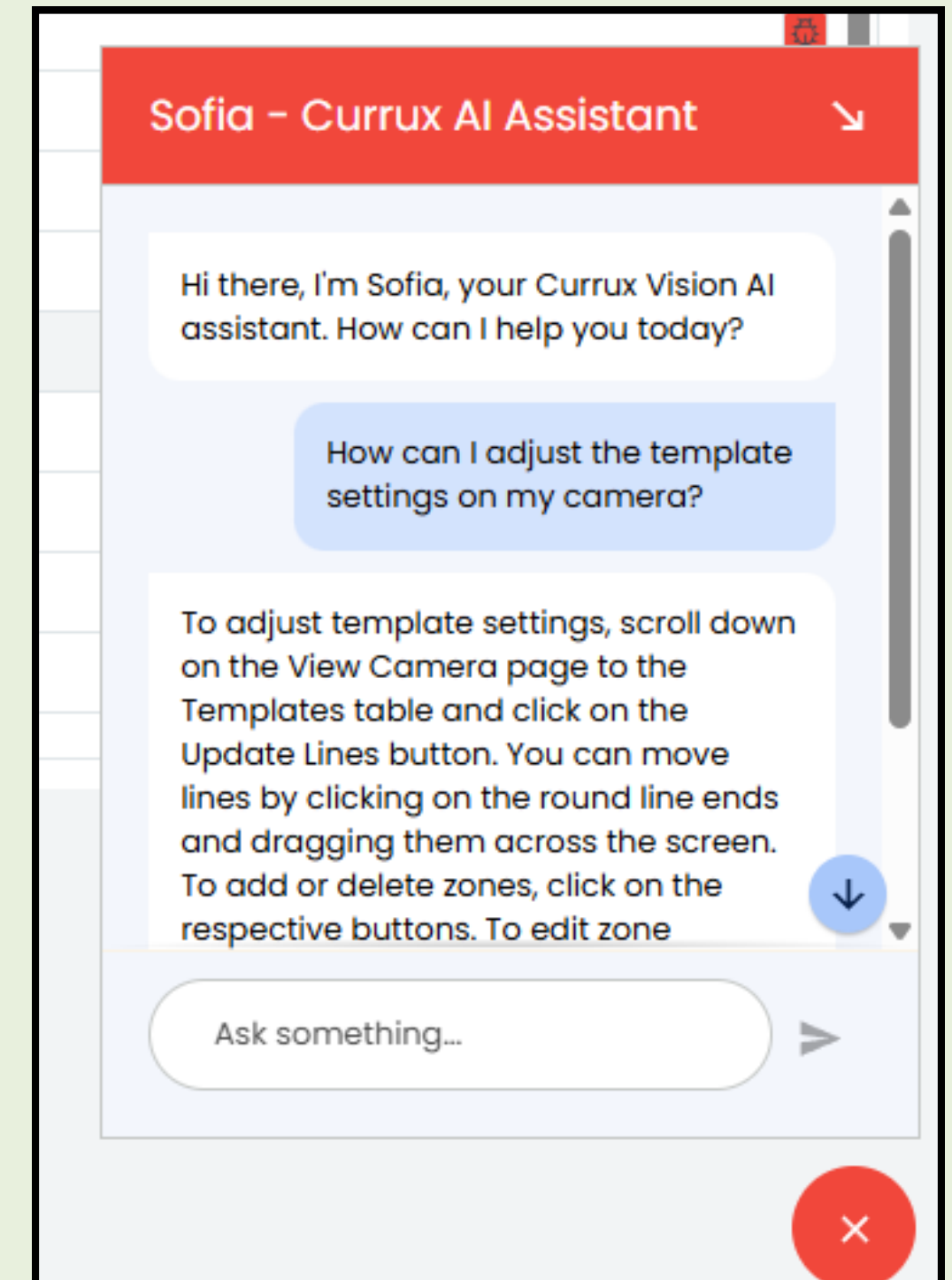
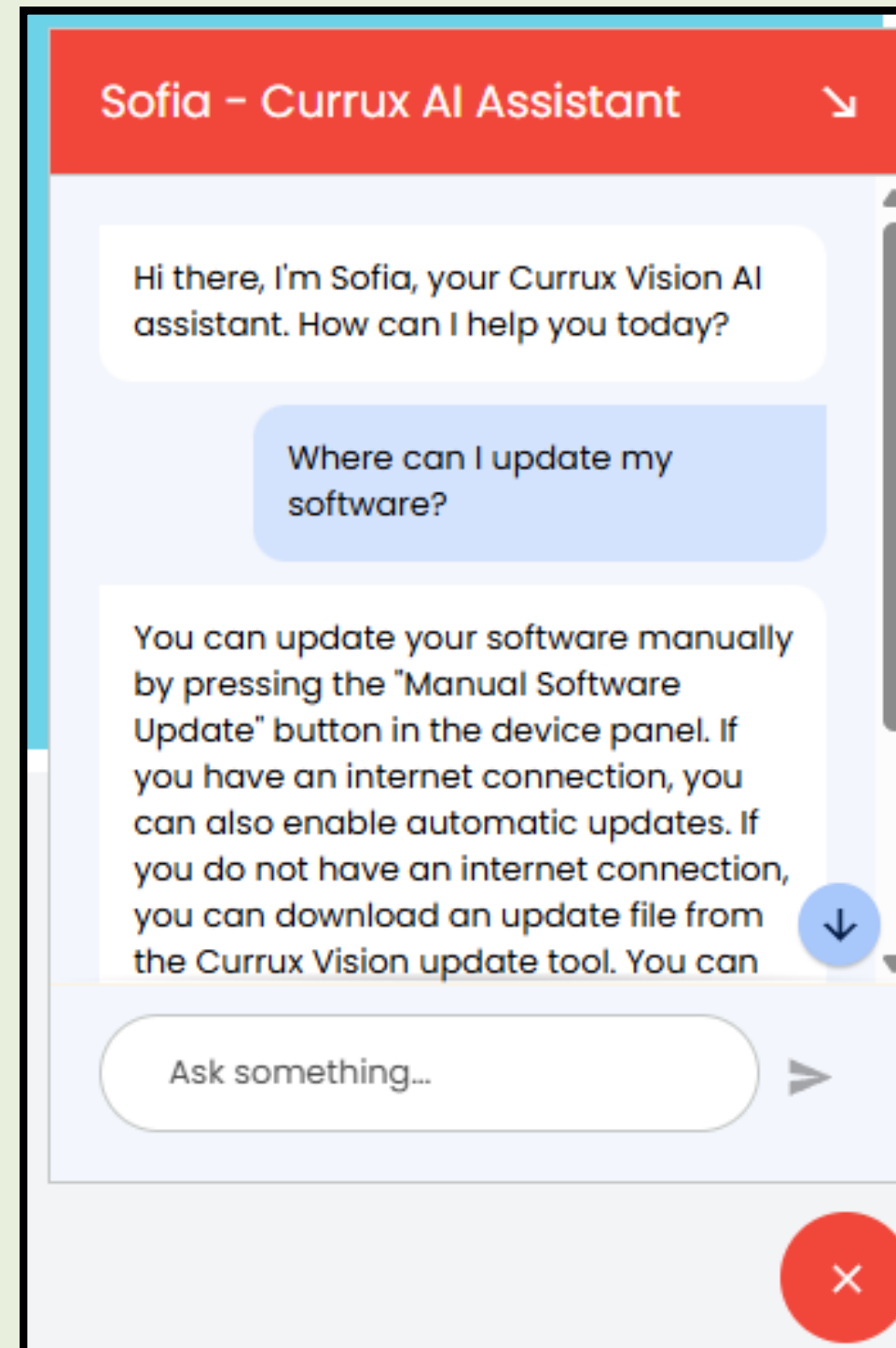
A step-by-step guide that follows the most logical order in configuration setup, reducing guesswork and preventing errors





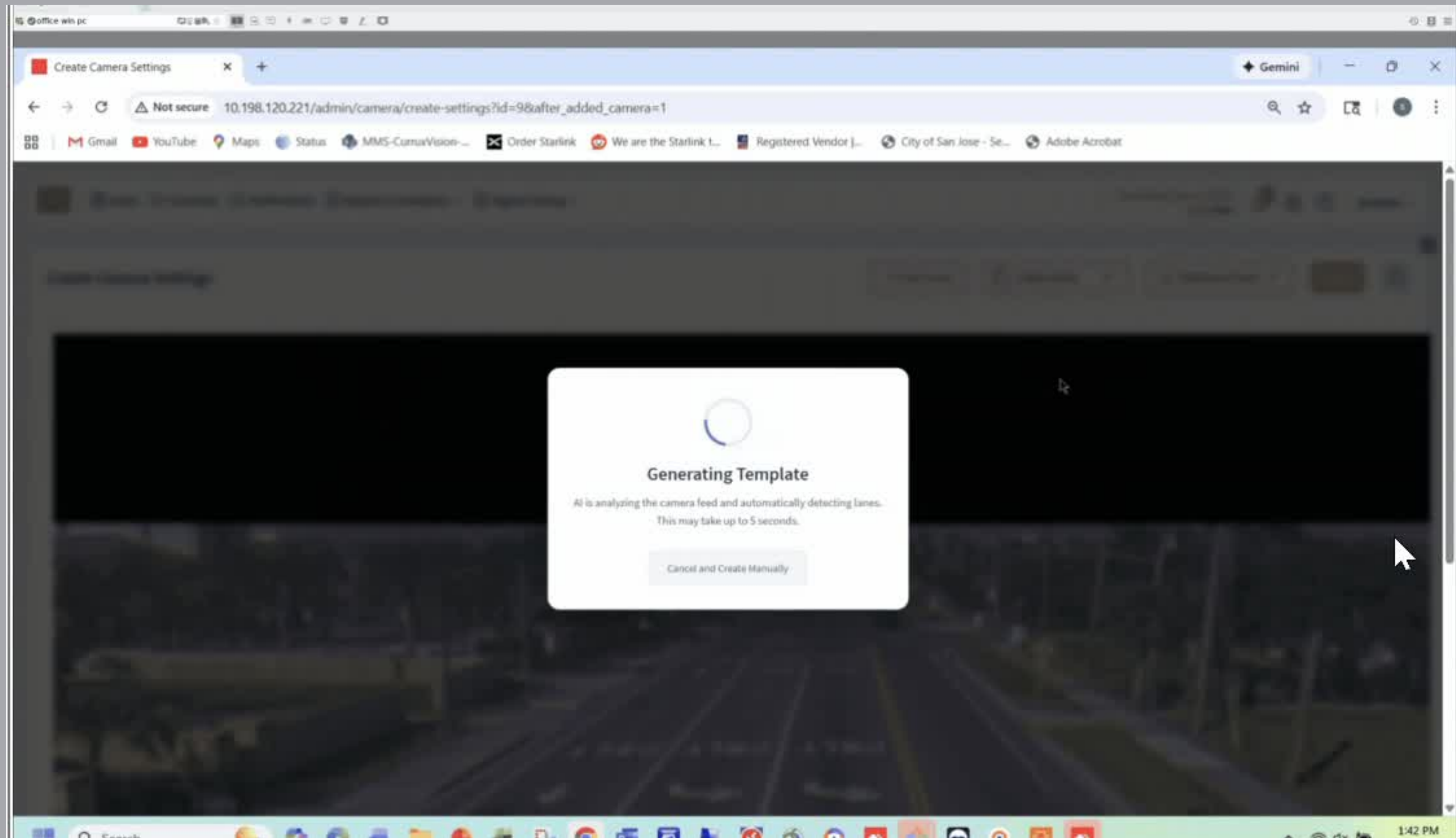
Designed to help users seamlessly navigate our system

Built directly into the Currux Cloud platform and provides 24/7 support by referencing all of our technical documentation. It was made to provide immediate answers to technical and operational questions.



AI Lane Detection & Templates – Faster Setup, Fewer Clicks

CURRUX
VISION



Trusted By Public Agencies Across the U.S.



Texas DOT



Idaho DOT



Florida DOT



Austin, TX



Pinellas County, FL



San Jose, CA



Massachusetts DOT



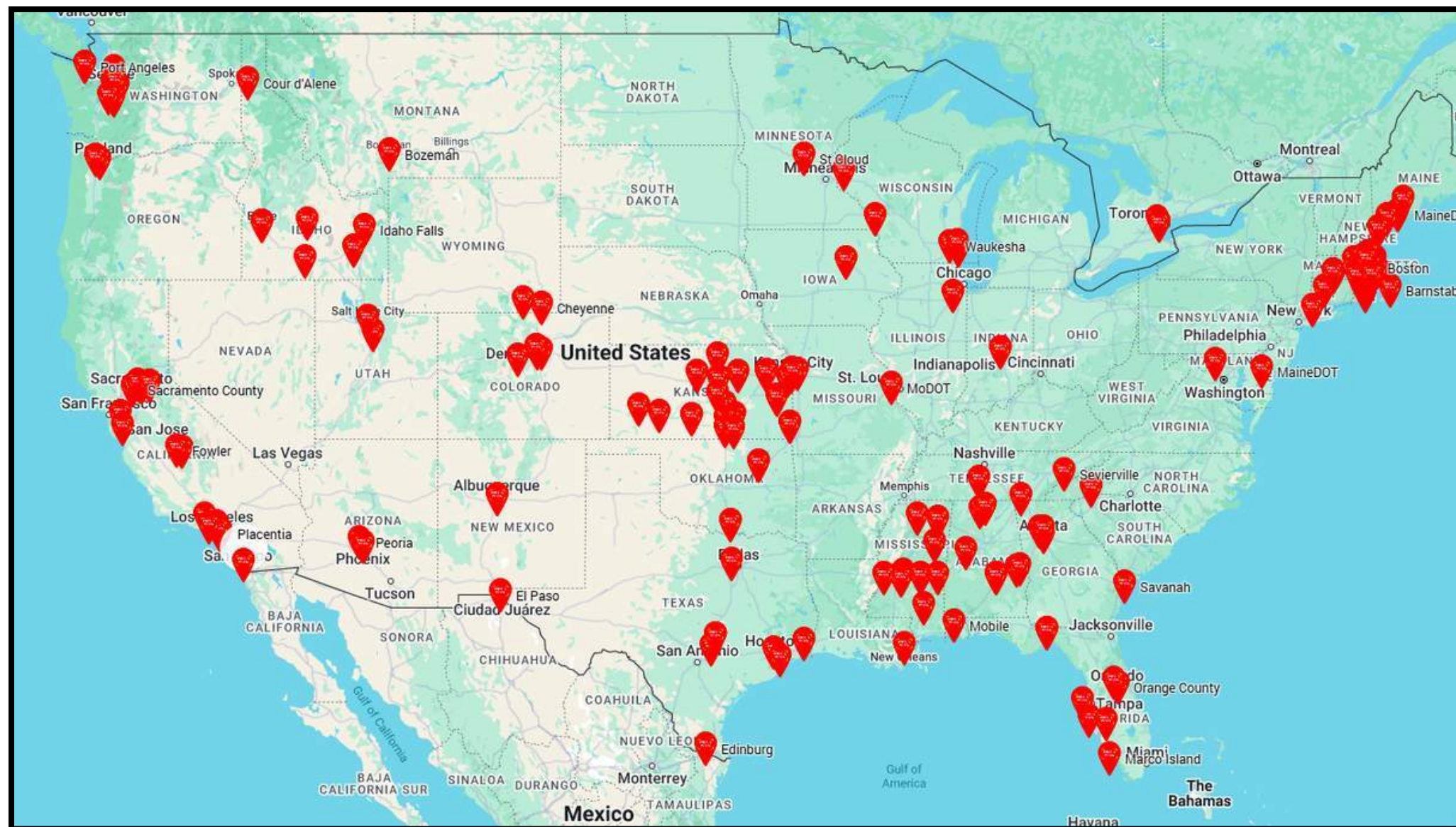
Indianapolis, IN



Maine DOT



Colorado DOT



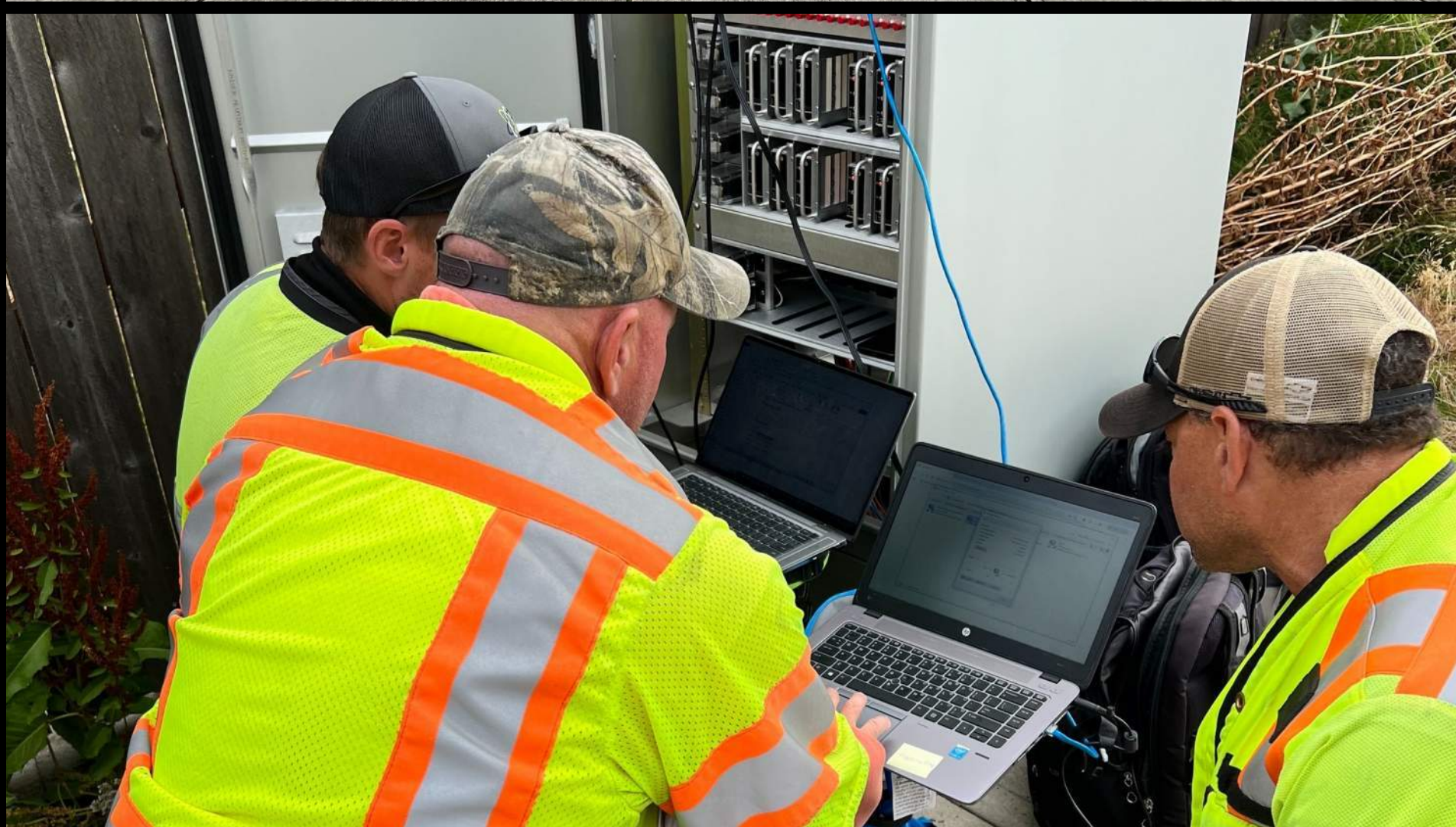
Currux AI Detection Across the Region

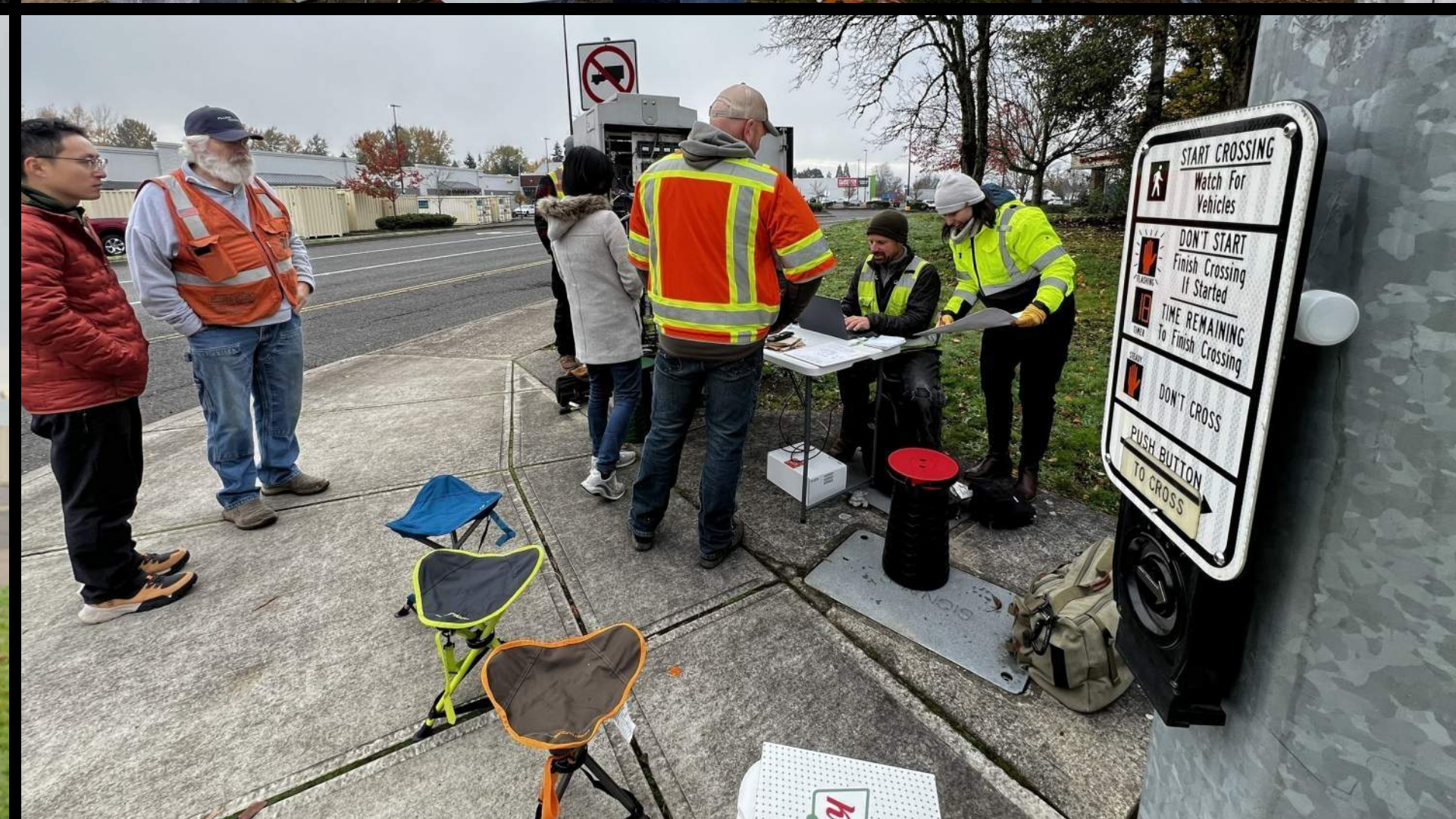
CURRUX
VISION

Deployed with regional partners to improve safety, efficiency, and data quality

In partnership with Washington County and Clackamas County, we're deploying Currux AI detection to improve safety, drive innovation, and make every infrastructure dollar work harder.







THANK YOU!

**Currux & Western Systems – Transforming
Traffic Management with Cutting-Edge AI for
Safer, Smarter Roads.**



Micah Posey

Territory Manager

+1 (503) 979-3042
+1 (425) 438-1133
mposey@westernsystems-inc.com
OR & SW WA



Let's Connect

**CURRUX
VISION**



Western Systems
Innovative Transportation Solutions