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# Miovision Signal Performance Measures

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## Agenda

- Hardware and Solution Overview
- Intersection Health and Signal Performance Measures
- Red Light Running and Pedestrian Compliance

# Hardware | Counts | Detection

#### Miovision SmartLink

Miovision SmartSense





## Miovision TrafficLink hardware Smart Intersections Made Easy

### **Miovision SmartLink**

 Remote access through secure wireless communication (LTE).

### Miovision SmartView 360

 Generates video for monitoring, detection, and analytics.

### **Miovision SmartSense**

Roadside video analysis for vehicle detection, traffic counts, and event alerts.

### Miovision TrafficLink Portal

Cloud-based software suite for traffic operations.

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# **Detection and Counts**

Detection Stopbar, Advanced Vehicles + Bike + Pedestrians

Counting collects traffic data 24/7

Vehicles, pedestrians and bikes.





## Detection capable of handling complex high volume intersections





# **Continuous Counts**

Miovision provides continuous reliable, accurate traffic data collection for operations, engineering, and planning teams - including turning movement counts, volumes, and classification.





## Open API Access for trend and custom use

### Example:

### Covid-19 Volume trend Report

- Data from Roosevelt and Michigan
- Comparison of Volume trends Jan 2020 to April 2021



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# Signal Performance Measures and Intersection Health

# **ATSPMs**

Identify operational issues and opportunities for improvement through access to continuous hi-resolution controller data.

Key here.... Why model what you can measure?



FHWA Recommends retiming signals (at least) once every 3 years

Delay

# Where do ATSPM data come

Traffic Signal Performance Measures



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# **Signal Performance Measures**

#### **Corridor Congestion Scan**

Visualize travel time and speed performance metrics over the length of a corridor.



#### **Occupancy Ratio**

Using stop-bar detection, Occupancy Ratios help identify movements that have unserved demand on a cycle-by-cycle basis.



#### **Red Light Runner**

Red Light Runners illustrates the passage of vehicles through the intersection during the Yellow and Red signal.



#### Travel Time

Travel Time provides the amount of time it takes to traverse a segment of road between two intersections over days, weeks, or months.



#### Pedestrian Compliance

Pedestrian Compliance displays pedestrian crossings on Flashing Don't Walk and Don't Walk.



#### Simple Delay

Simple Delay displays the average time between stop-bar detector actuation during red and when the phase turns green.



#### Approach Volume

Approach volumes use upstream detectors to count vehicles arriving at an intersection for each approach.



#### Pedestrian Delay

Split Failure

Pedestrian Delay displays the occurrence and wait time of pedestrian actuations throughout the day.



This visualization plots stop-bar Green Occupancy vs. the First 5 seconds of Red Occupancy to identify Split Failures.



#### Arrivals on Red

Arrivals on Red characterize vehicle arrivals by the interval (color) of the corresponding traffic signal.



#### Phase Interval

The Phase Interval chart displays cycle by cycle Red / Green / Yellow durations over a 24-hour period.



#### Split Trends

The Split Trend chart categorizes values from the Split Failure chart into five groups over days, weeks, or months.



#### **Green Allocation**

Green Allocation illustrates the distribution of green time allocated to all phases over a 24-hour period.



#### Purdue Coordination Diagram

The PCD visualizes the relationships between individual vehicle arrivals and signal phasing.



#### **Turning Movement Count**

Explore Turning Movement Count data with vehicle classification and pedestrian volumes in DataLink.





## Automated Traffic Signal Performance Data (ATSPMs)

Data driven approach to understand:

- Is the signal infrastructure working as designed?
- Is a complaint valid? What can be done about it?
- Are the corridors performing to my expectations?
- Are intersections performing to my expectations?
- Which corridors are in most need of retiming?
- Are my corridors timed to their full potential?
- Which movements need attention and are failing?
- What times and where are the bottlenecks happening?



### Motivation

What we've heard from our customers:

"Too much Data"

"Not enough time/resources"

"Tell me where the problems are"

"Data manageable for 3 intersections but what about 30?"





#### Insights

INTERSECTION HEALTH

PERFORMANCE MEASURES





# **Signal Retiming On-Demand**

Optimize/re-time traffic signal timings without the need for any external data collection or optimization software.

Wherever. Whenever. As frequently as you like.

#### March Weekday Noon Optimization (Columbia St. W.)

Feb 22 - March 1, 2021 | Monday | 12:00 - 13:00 Direction of Traffic: EB 70, WB 30 | Speed: 30 mph

24% 37% Efficiency Score Original New 37% EB 42% WB 32% the manufacture of the state of Poor Great





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# Safety Analytics

## Why Surrogate Safety Measures?

- Surrogate safety measures are leading indicators of safety as opposed to lagging such as collision data
- In a considerable number of collisions the primary contributory cause is undetermined.
- Surrogate safety measures can help in identifying the causality behind high risk behaviour on the road before they occur





# **Pedestrian Performance**

- Non-compliance is defined as a pedestrian crossing event that takes place during the Don't Walk phase interval.
- The aim is not to "victimize" pedestrians but to understand their behavior and accommodate safer operations at the intersection.
- Understanding the spatial behavior of pedestrians at the intersection





# **Red Light Running**

 Using crossing events and associating them with the signal status we are able to quantify red light running





# **Pedestrian Signal Compliance**

"King et al. (2009)found that crossing against the lights exhibited a crash risk per crossing event approximately **eight times** that of legal crossing at signalized intersections"

**Pedestrian Compliance** 

East Roosevelt Rd and South Michigan Ave

Pedestrian Signal Compliance	61	5%	ጵ 🍂 🕅
	Total Pedestrian Counts		<b>39,356</b> Over1week
	East	60%	
	West	59%	
	North	63%	
	South	62%	





## **Pedestrian Non-Compliance (breakdown)**



## Most Common Occurrences of Non-Compliance (Video)

- Most of the West side non-compliance is when the conflicting movement is green
- Two stage crossing using the median when the other direction is less saturated
- Is the median creating a sense a security and encouraging non-compliance?



## Most Common Occurrences of Non-Compliance (Video)

- Most of the non-compliance on the North and South crosswalks are at the end of the pedestrian phase interval
- Do the crosswalks have countdowns?
- Another common occurrence includes non-compliance where vehicle queues spill back into the crosswalk.



# **Pedestrian Spatial Behavior**

Low Pedestrian Activity











# Red Light Running

According to the Insurance Institute for Highway Safety (IIHS), 846 people were killed in crashes that involved red light running in 2019. Over half of those killed were pedestrians, bicyclists and people in other vehicles who were hit by the red light runners.

In the same year, an estimated 143,000 people were injured in red light running crashes.

## **Red Light Running Example**



Red Yellow • Detector Hits • Detector Hits Over 10s ···· RLR Hourly Count



# **Questions?**