

Driving Tomorrow

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Advancements in Data and Analytics

- Vehicles are increasing the data and complexity of the data at an exponential rate.
- Intelligent connected in vehicles are becoming increasingly sophisticated in how they collect and analyze data, both in the vehicle and the cloud.
- Cameras have evolved from simply streaming video to being Smart Systems capable of collecting and analyzing video creating new data sources.
- Combining vehicle performance, computer vision, driving analyst, and external data (weather, speed, etc.) create opportunities to further improve safety, security, and operational efficiency.

The Systems triggers in More Ways



Speeding
Advanced Algorithms

Shock/Maneuvers

Computer Vision



10 Seconds Before



10 Seconds After



Convergence: Expert Review \ Computer Vision \ Data

Driving Analyst

Fundamental Driving Errors

Unprofessional Driving

- Unsafe Backing
- Unsafe Braking
- Unsafe Lane Change / Merging / Passing
- Unsafe Railroad Crossing
- Unsafe Turning
- Lane Departure/Straddling Lanes
- Competitive/Aggressive Driving
- Driving the Wrong Way - On Roadway
- Driving the Wrong Way - Off Roadway
- Curb Check/Jumped Curb

Vehicle Control

- Driving with Two Hands off Wheel
- Unattended Moving Vehicle

Stopping

- Incomplete Stop at Light
- Incomplete Stop at Stop Sign
- Failure to Attempt to Stop at Light
- Failure to Attempt to Stop at Stop Sign
- False Start

Database\Computer Vision

✓ Speeding

- Moderate Speeding (≤ 10 mph Over Limit)
- Excessive Speeding (> 10 mph Over Limit)
- Exceeded Maximum Fleet Speed

Situational Awareness

- Unsafe Following (≤ 1 second)
- Unsafe Following (1.25 - 2 seconds)
- Unsafe Following (2.25 - 3 seconds)
- Unsafe Following (3.25 - 4 seconds)
- Not Checking Mirrors
- Not Scanning Road Ahead
- Not Scanning Intersection

Distracted & Inattentive Driving Distraction

- ✓
 - Mobile Phone - Texting/Dialing
 - Mobile Phone - Talking (Handheld)
 - Mobile Phone - Talking (Hands Free)

Driving Analyst\Computer Vision

- Grooming/Personal Hygiene
- Food
- Beverage
- Smoking
- Passenger(s)
- Other Task

Fatigue

- Drowsy/Falling Asleep
- Yawning

Other Unsafe Driving

- ✓

Seatbelts

 - Driver Seatbelt Unfastened (≤ 20 mph)
 - Driver Seatbelt Unfastened (> 20 mph)
 - Passenger Seatbelt Unfastened

ECM\Computer Vision

Collision

- Collision with Pedestrian
- Collision with Vehicle in Transport
- Collision with Parked Vehicle
- Collision with Train
- Collision with Pedalcycle
- Collision with Animal
- Collision with Fixed Object
- Collision with Work Zone Equipment
- Collision with Other Movable Object
- Overturn (Rollover)

Driving Analyst\Computer Vision

Outcomes

- ✓

Near Collision

 - Near Collision with Pedestrian
 - Near Collision with Vehicle in Transport
 - Near Collision with Parked Vehicle
 - Near Collision with Train
 - Near Collision with Pedalcycle
 - Near Collision with Animal
 - Near Collision with Fixed Object
 - Near Collision with Work Zone Equipment
 - Near Collision with Other Movable Object

Other Outcomes

- Ran off Road
- Crossed Median/Centerline

Non-Driving Observations

Unprofessional Conduct

- Rude Gesture
- Raised Voice

✓ Event of Interest

- Captured Passenger Incident
- Captured Roadway Incident

SmartDrive Equipment

Obstructed View

- Obstructed View of Driver
- Obstructed Exterior View

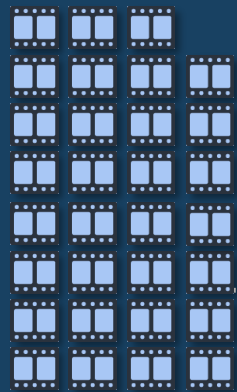
Tampering

- Tampering/Abusing Equipment

SmartRecorder

- Suboptimal Camera Position
- Non-Performing Camera

Video Based Safety Programs



**Videos
Captured**



**Review
& Scoring
verifies risk**



**Operator
& Risk
Prioritized**



Actionable Data

Distracted/Inattentive Assessment using Computer Vision

– Near Collision Texting/Dialing

SMARTDRIVE

External View: Nighttime street view from the vehicle's perspective.

Internal View: Driver's perspective from the dashboard, showing the driver's hands on the steering wheel and a smartphone in the driver's hand.

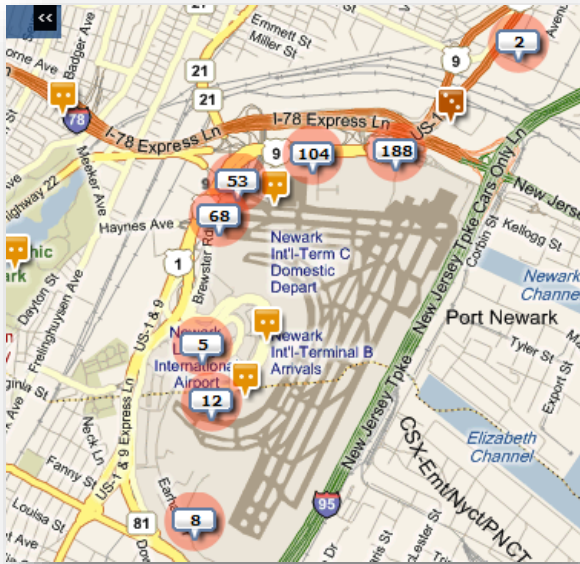
Driver Facial Analysis:
Age: N/A
User ID: N/A
FPS: 29
Attentive
Perclos: -1

Vehicle Performance Metrics:
RPM: 0 to 6000 (N/A)
Speed: 0 to 100 mph (26 mph GPS)
GPS: Low
Direction: FORWARD / BACKWARD (0.03), SIDE TO SIDE (-0.01)

Driver Status: Eyes closed, mouth open.

Speeding Heat Map

- In vehicle technology is giving us better insight to speed management including posted speed performance.
- Manual audits of video events are improving the efficacy and accuracy of speed data
- Incorporating weather information is giving us the ability to identify situations where drivers are operating vehicles faster than expected for the weather and road conditions



Quarter 1



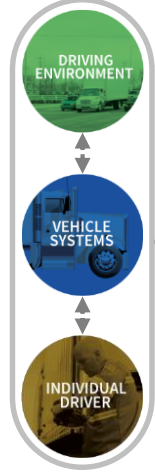
Quarter 2

Turning Data Silos into Transportation Intelligence

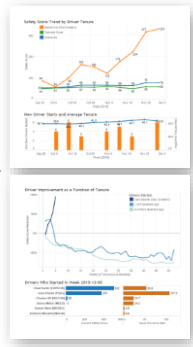


-  ANALYZED VIDEO
-  TELEMATICS
-  ENGINE DATA
-  ACTIVE SAFETY

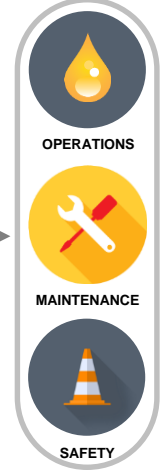
Management & Processing






Analysis & Insights



Shared Intelligence



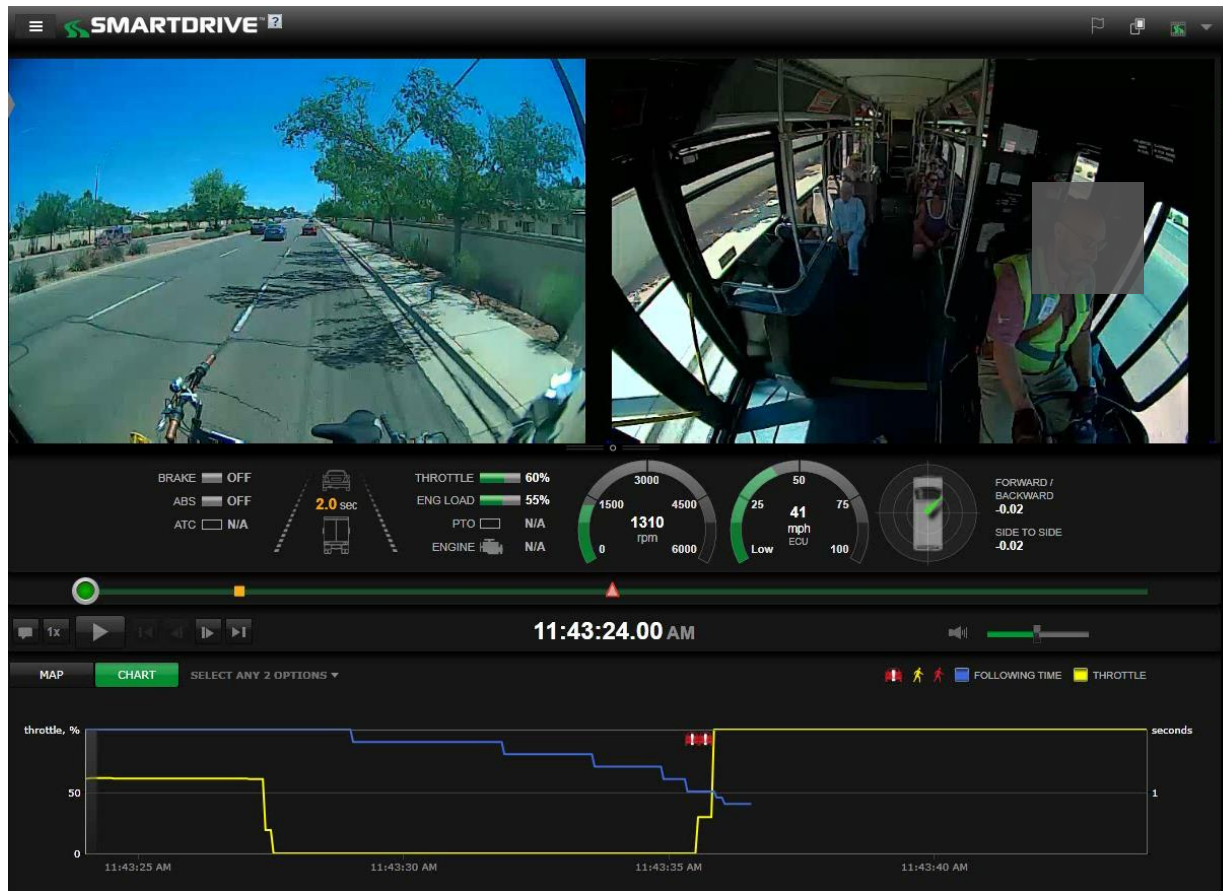
-  **Claims Cost Reduction**
-  **Collision Frequency Reduction**
-  **Fuel & Repairs Savings**

Computer Vision Pedestrian Detection Warning



Forward Collision Warning

– Unsafe Following Distance, Near Collision



Analyzed 4,456 Class 8 Buses
188.5 Million Miles Traveled
ADAS equipped vehicles had 19.87 fewer collisions than non equipped vehicles
(collisions – all types)

Thank you

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