



Rail crossing and trespasser monitoring using AI

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Reviewing the numbers: National statistics

US Railroad System



732
Railroads



143,804
Route miles of track



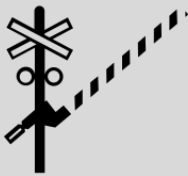
204,315
At-Grade Railroad Crossings
(Public, Private, and Pedestrian)

Nationwide Public At-Grade Crossings

Active

56%

(with gates, bells,
and/or flashing lights)



Passive

44%

(with signs/markings, but not
active warning devices)



9

People or vehicles
are hit by a train daily

96%

Of rail-related fatalities over past 10 years are due to
railroad grade crossing and trespassing incidents

The problem

- Fatalities at grade crossings and from trespasser incidents are increasing over last 5 years – not declining as desired
- Successful development & deployment of trespassing solutions also remains flat
 - Limited pockets of success
 - Sustainability has not been achieved



5-year Grade Crossing Trends

Fatalities

258
(2018)

273
(2022)



5.8%



➤ *Need a new approach with today's technology to solve this!*

5-year Trespassing Trends

Fatalities

499
(2018)

675
(2022)



35%



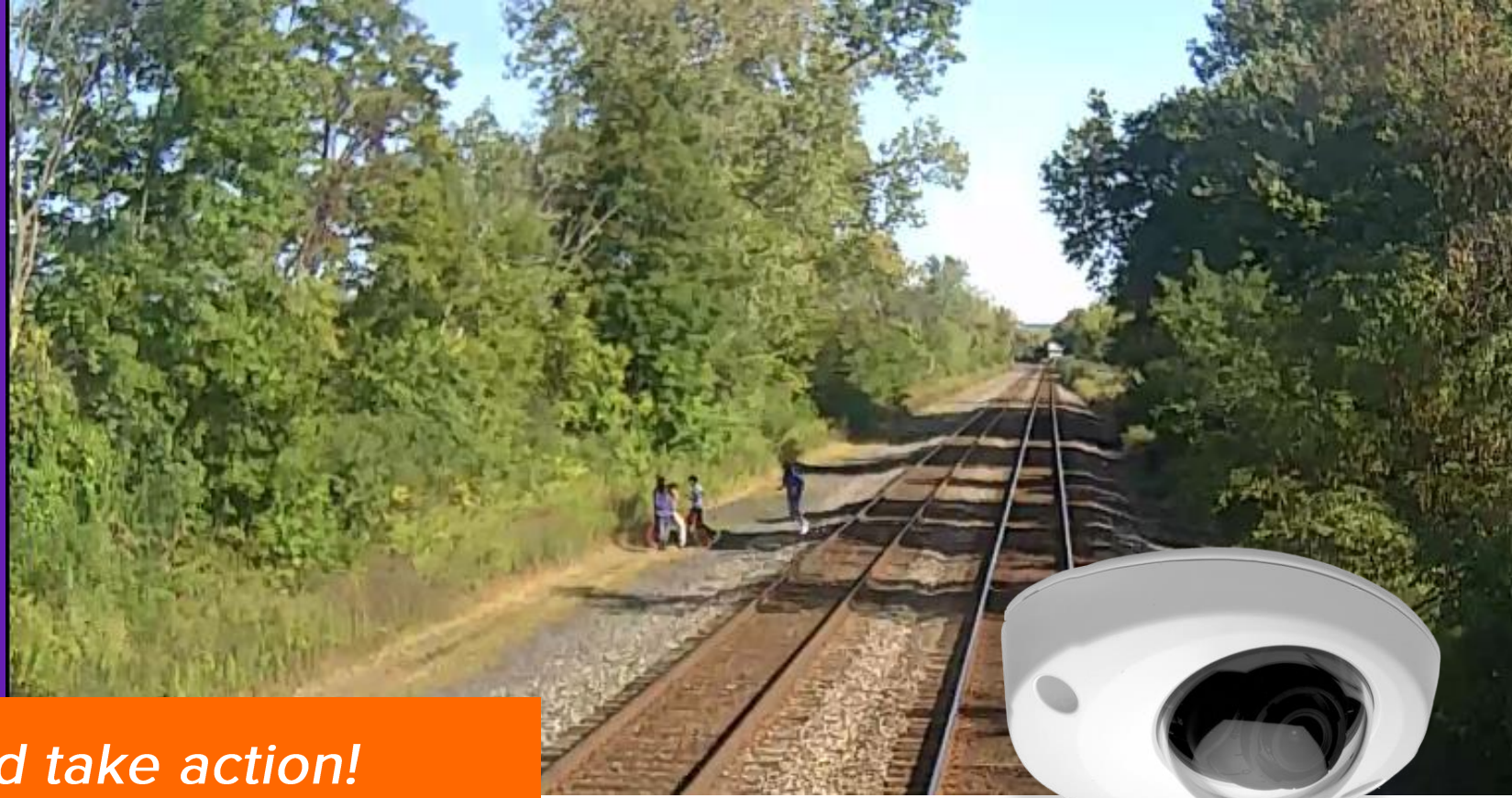
The solution:

Majority of rail vehicles have forward facing cameras

99.99% of captured camera imagery gets thrown away...

How can we use it for improving public safety?

➤ *Detect exceptions and take action!*



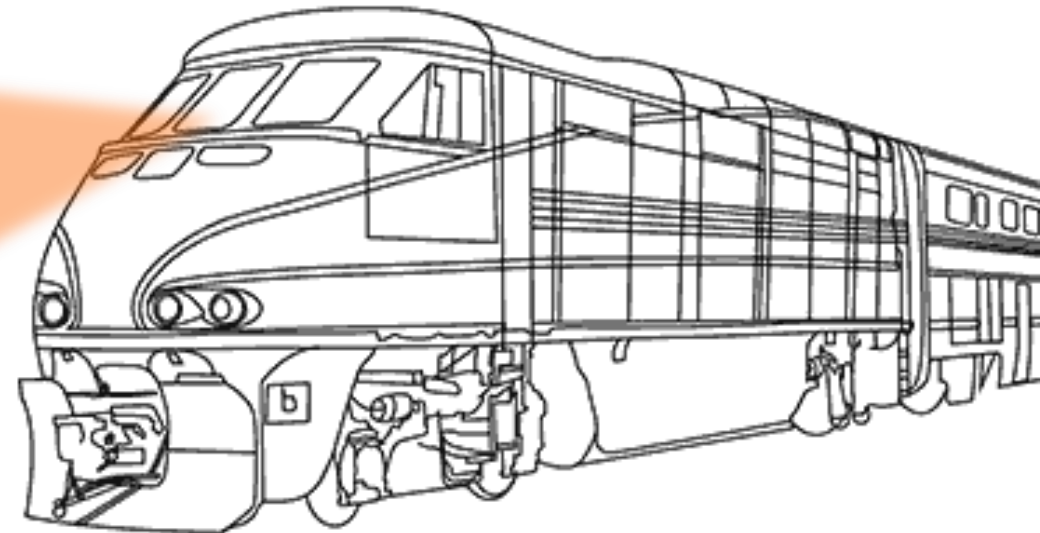
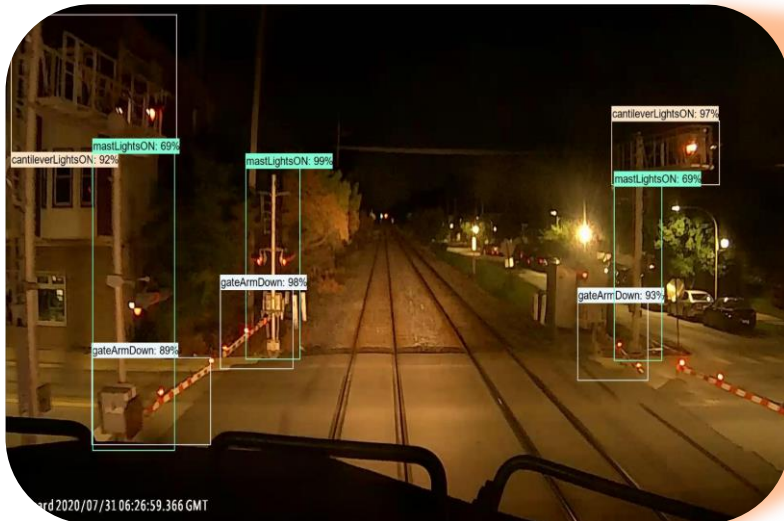
Utilize onboard cameras with AI to identify and improve grade crossing and trespasser problems

AI-powered crossing verification: What can be automated?

Goals:

- Gate arm status [CFR 234.223, CFR 234.255]
- Mast and Cantilever light flasher status [CFR 234.217, CFR 234.253]
- Detect gate arm misalignment [CFR 234.223, CFR 234.255]
- Warning system activation verification [CFR 234.225, 234.257]
- Commercial power availability verification

Front-facing imagery + AI to verify crossing



Assessing warning times

Additional visibility to crossing objects via long range cameras

Standard outward camera:



Long range camera:



- *Start activation: 20 seconds before*
- *Gates down: 5 sec before train arrives*

Wi-Tronix rail crossing assist

An innovative, AI-based vehicle platform approach for remote monitoring of crossings:

- ✓ Lower lifecycle cost: **Platform approach** allows for continuous innovation to solves for multiple problems today and in the future
- ✓ Reduced investment: **No sensors at crossing**
- ✓ Enhanced safety and **30% faster** response to gate arm malfunction reports
- ✓ **Reduce operational cost** by using AI and on-demand video to confirm proper operation of the crossing

000 7.5mps 6.0 0 60-90[2 Quad] LeftNear:[100 Other 0.46 101 Other 0.39] RightFar:[102 Down 0.88]
[4] LeftFar:[] LeftNear:[200 ON 0.54 205 Dark 0.53] RightFar:[206 ON 0.78 207 ON 0.68 210 ON 0.49 213 ON 0.40] RightNear:[]

Gate arm broken detected in real-time

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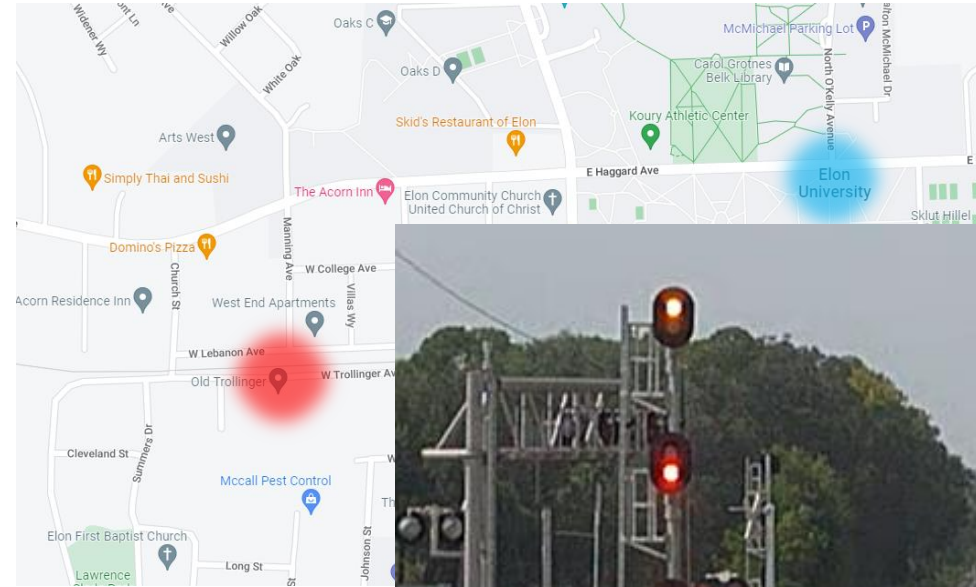
Trespasser hotspot detection

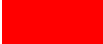

What:

- Solution that utilizes artificial intelligence (AI) to **collect trespasser hotspots** and trespasser behavior

Benefits:

- Focus investments on **high-risk areas**
- Enables railroads to perform **targeted public awareness** and educational campaigns
- Enables law enforcement personnel to perform **efficient policing** of public safety actions



-  Trespassing hot spot
-  Proximity to public areas (school, library, church, etc.)



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thank you

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