

A photograph of a silver and blue MTA Long Island Rail Road train, numbered 9013, on tracks. The train is moving from left to right. The background shows a clear blue sky and some trees. The text "LIRR: Bringing the Future Forward With Technology Innovation" is overlaid on the image in white. The MTA logo and "Long Island Rail Road" text are visible on the front of the train.

# LIRR: Bringing the Future Forward With Technology Innovation



Safer, more reliable service

Improve public communication

Find root causes

Tackle recurring problems

Proactively address issues

Seek innovation



**Hardening over 100 distribution and transmission poles.**

newsday.com  
\$2.50 LI EDITION  
Monday  
May 28, 2018

# Newsday

THE LONG ISLAND NEWSPAPER

SPORTS FINAL

HI 67° LO 59°  
MOSTLY CLOUDY

N/C

## LIRR: WE'LL FIX COUNTDOWN CLOCKS

Commuters say devices that show when trains will arrive aren't accurate

A3 | [UPDATES AT NEWSDAY.COM](#)



**MEMORIAL DAY**  
**Honoring Those  
We've Lost**  
A6-7, [exploreLI](#)



**TRUMP:  
U.S. TEAM  
IN N. KOREA  
TO PLAN  
SUMMIT**  
A2



**See where your train is in real time, which trains/cars have the least amount of passengers, and more.**



# GPS Antennas

## *Installed Across Entire Fleet*

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- Updated with train position, speed, and heading every 2 seconds



# Push notifications

Be the first to know

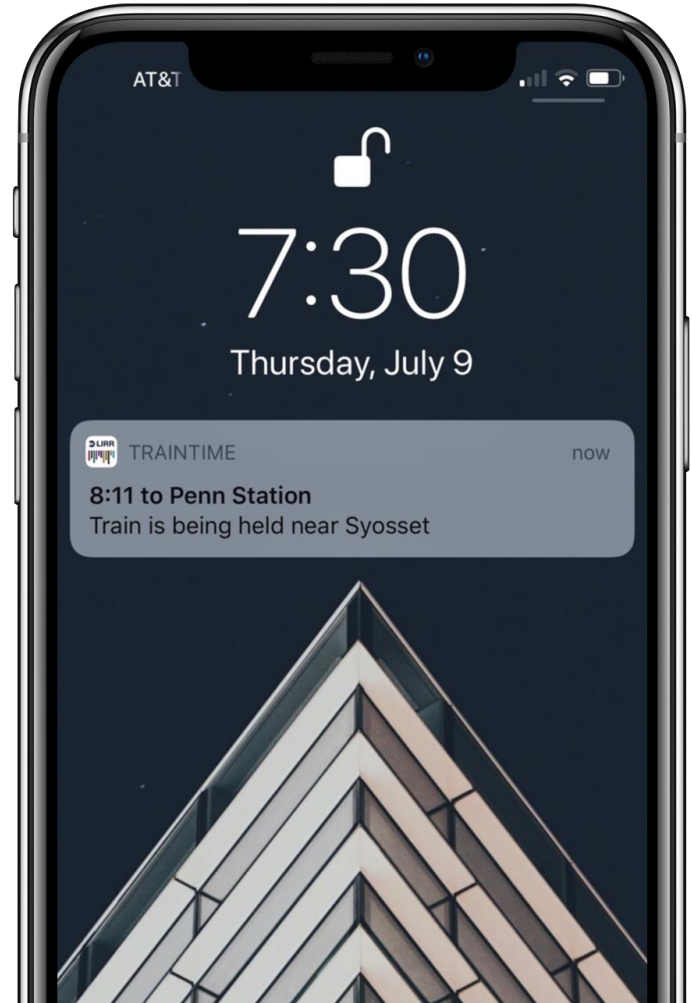
- Track postings at Penn Station
- Last-minute track changes
- Train held by dispatcher
- ETA to your stop



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# Crowding Technology

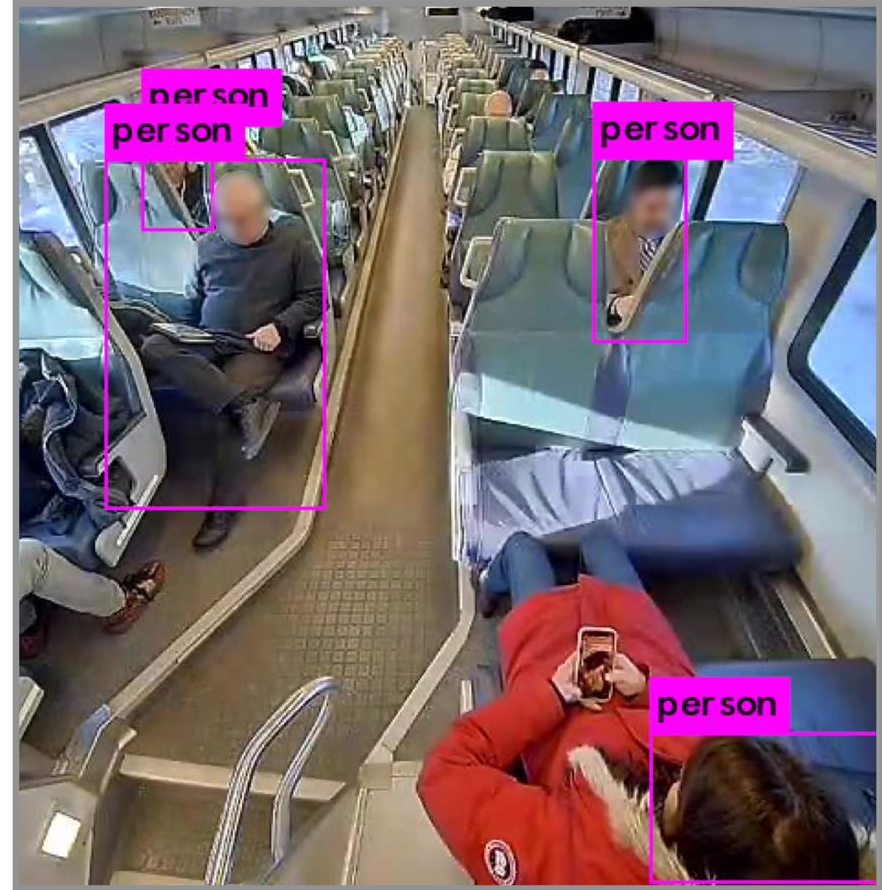
## 1. Loadweigh - Pressure sensors from cars



# Crowding Technology

## Three different technologies

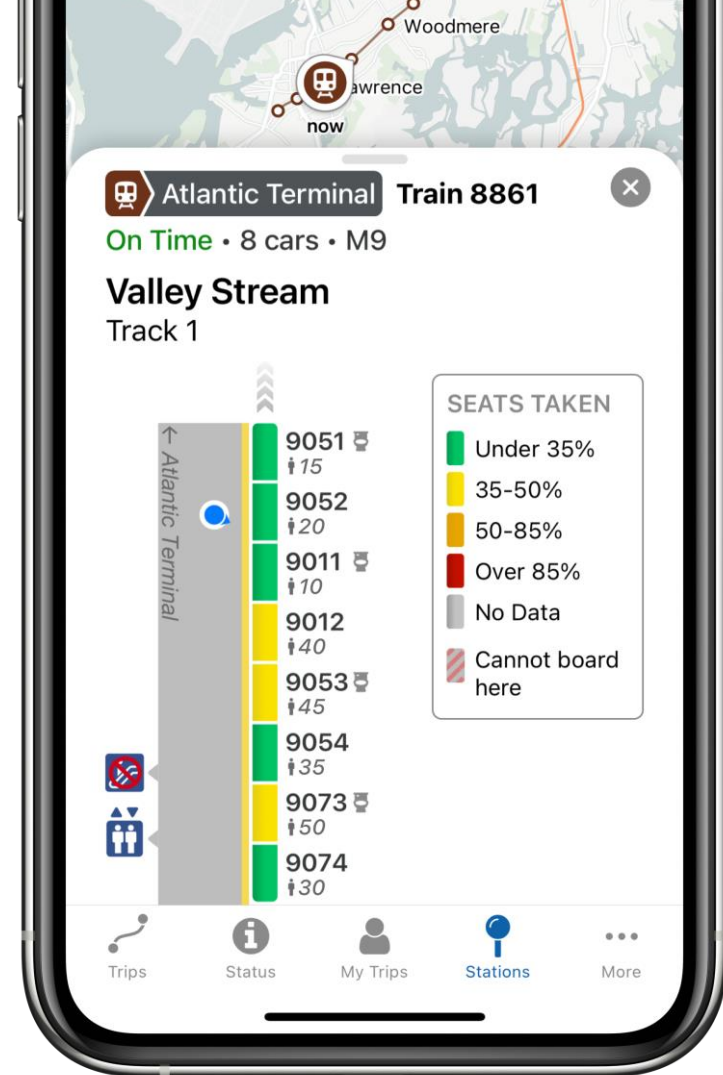
1. Pressure sensors from car
2. Infrared sensors above doorways
3. Object recognition, machine learning



# Realtime crowding

## First in North America

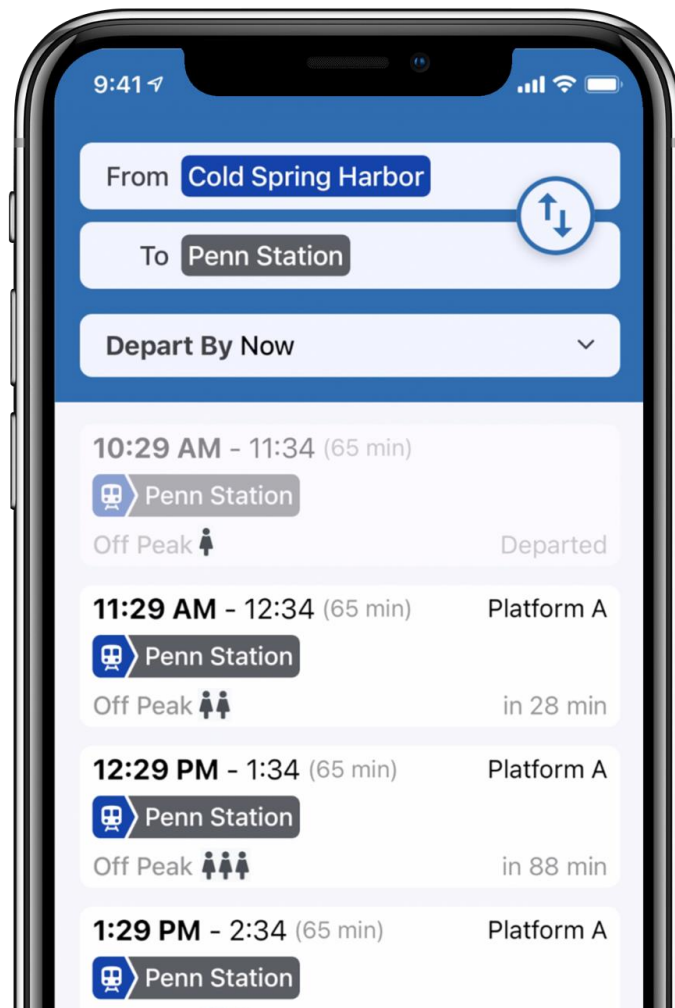
- Realtime data updated every 10 seconds
- Bucketed into 5 levels



# Historical crowding

## Based on real-time data

- Help customers pick a train that is less crowded



# In-station signage

## State of the art

- Crowding
- Down to the second
- Location

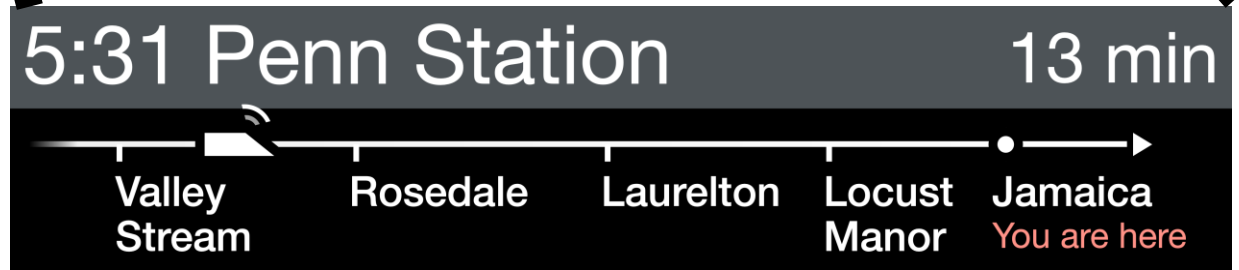




# In-station signage

## State of the art

- Crowding
- Down to the second
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**Lasers used to burn slippery  
residue off the tracks.**

**Laser Train: World-Wide First**



**Increasing our wheel truing capacity to maintain fleet safety and reliability...**

# Mitigating Bridge Strikes and Delays

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Bridge replacements

Structural assessments

Cameras





**And Nassau Boulevard Bridge.**





## North Main and Accabonac Bridges





They help prevent delays from bridge strikes and damage to our critical infrastructure.



# Implementation Plan

- Complete a process workshop to agree how the bridges will be assessed and a process to how the relevant actions will be carried out against each category following a strike.
- Complete the categorization assessment for the top ten most struck bridges.
- Complete the categorization of underlying bridges.
- Agree a plan of assessment for remaining bridges.
- Make sure bridges are easily identifiable so the appropriate action can be taken to the correct bridges.



**Installing bridge strike sensors and cameras on 6 different low grade bridge crossings.**





**Using Technology to Overcome Unprecedented Challenges  
with COVID-19**

# HVAC



Existing HVAC



Continuously recycling  
fresh air every five  
minutes (12x/hour)

# Track Infrastructure

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1. Track Circuits

2. Continuous welded rail

3. Switch Replacements

4. Hardening/ Protecting Switches

5. Track surfacing

6. Rail Grinding

7. Enhanced testing

8. Repairs, replacement, concrete ties



**Welding  
thousands  
of rail  
joints.**





**Installing new track infrastructure to harden our assets,  
such as snow switch covers and new switch rods and  
insulations.**



Performing rail grinding on over 160 miles of revenue service tracks.





Squats – Rail Head Defects

# Squat Stats

Squats were first  
detected on LIRR in  
2018

Limited history of  
squats in U.S.

LIRR partnered with  
Sperry to use data  
differently to identify  
squats before they  
become critical defects

In 2020: 221 of the 367  
defects (60%) detected  
by Sperry testing were  
squats.

LIRR is 2nd in the US  
to use this new system

Allows proactive  
maintenance before  
squats develop

LIRR recognized by FRA  
for this initiative



- Eddy current
- Find defects before failure
- Grindable vs rail replacement
- Proactive
- Save money, safety = reliability



# Broken Rails

Preventative efforts  
have helped decrease  
broken rails affecting  
service by 45%  
from 2019

69 in 2019 vs 38 in 2020

This has changed how  
we operate and makes  
the railroad safer and  
more reliable



# Long Island Rail Road Diesel Regions



# Battery technology



IMPROVED, SMALLER = LIGHTER,  
LONGER LASTING FASTER  
CHARGING (7-10 MINUTES),



UP TO 60 MILES DISTANCES IN  
EUROPE

# Feasibility Study



Develop overall BEMU  
network wide operating  
scenarios



Conduct a BEMU  
vehicle safety  
assessment



Perform simulations

# Technical Specifications

| Parameter                      | Assumption  |
|--------------------------------|---|
| On-board High Power Management | Will require to design and build a high power management box (bi-directional DC-DC chopper with input/output filters)                   |
| Battery System                 | Use BT Gen 1.0 battery units (874 V, 37 kWh) – to be confirmed  |
| Charging Voltage and Power     | 650 VDC, 1600 kW, from 3 <sup>rd</sup> rail through existing M7 collector shoes   |
| Electric Operation Scenario    | Capable of operating in electrified territory with 3 <sup>rd</sup> rail power, and under battery-only power, with automatic switch over |
| Operational Compatibility      | BEMU can be operated with standard M7 in electrified territory only<br>Mixed train operation not possible in non-electrified territory  |
| HVAC                           | Can be removed, shutdown or minimized performance   |
| Degree of modification work    | Will require as much effort to return to original state as it took to modify  |
| Motorized Axles                | 2 of 4 per car. One propulsion system will be removed in each car   |
| Battery Installation           | Under car and/or inside the passenger area  |
| Rescue                         | BEMU can be rescued by diesel loco (always available during test period)  |





# LIRR: Bringing the Future Forward with Technology Innovation





1. What innovative method did LIRR utilize to set new bridge spans into position? Self-Propelled Modular Transporter

2. What is a squat defect?

- a. rail head defect caused by metal fatigue
- b. a flat wheel caused by low adhesion
- c. a track circuit failure caused by idling trains
- d. inability for a Battery- Electric train to charge

3. Name 3 techniques to improve track infrastructure reliability

- 1. Track Circuits
- 2. Continuous welded rail
- 3. Switch Replacements
- 4. Hardening/ Protecting Switches
- 5. Track surfacing
- 6. Rail Grinding
- 7. Enhanced testing
- 8. Repairs replacement concrete ties