EDC-8 Initiative: UAS 2.0: Innovative Infrastructure Management

Presented by Kimbrali Davis, David Nevil, Jake Basantis

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NEW JERSEY DEPARTMENT OF TRANSPORTATION

UAS 2.0: Innovative Infrastructure Management

- NJDOT UAS Program started in 2016
- Became “Institutionalized” through the EDC-5: UAS Initiative (2019 – 2020)
- Managed by the Bureau of Aeronautics
- Purpose: to save time, save money, increase efficiency and/or increase safety

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Aeronautical Facility Inspections

NTSB Investigation Support

Structural Evaluation

Geotechnical Engineering

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Project Monitoring

Traffic Monitoring

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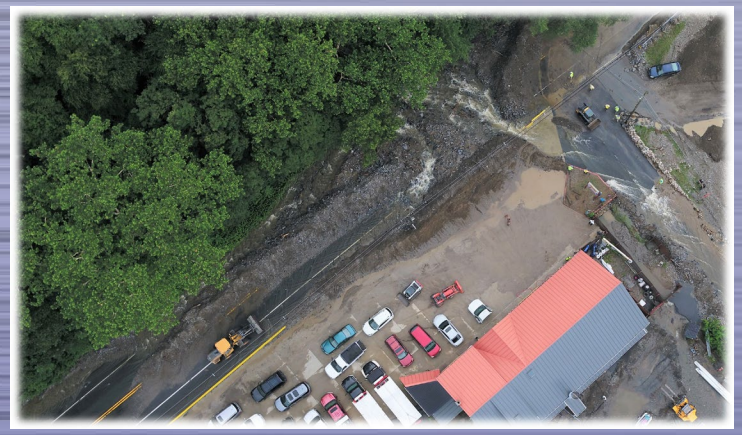
Emergency Response Management



Traffic Monitoring

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Revolutionizing infrastructure inspection with advanced Unmanned Aircraft Systems (UAS)

- UAS, sometimes referred to as drones, are multi-use aircraft controlled from a licensed remote pilot on the ground.
- The benefits of UAS are wide ranging and impact nearly all aspects of highway transportation-replacing boots on the ground, increasing accuracy, speeding up data collection, and providing access to hard-to-reach locations.
- Federal Highway Administration (FHWA) is incentivizing state DOTs to move beyond isolated drone flights toward mature, repeatable, autonomous, and remotely deployable drone operations.

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What Does That Mean?

- The objective is to further reduce employee risk and agency cost, while improving the speed and consistency of decisions.
- Drone programs are no longer viewed as experimental tools; they are becoming part of how agencies operate with the focus on consistency and scale.
- Encourages DOTs to mature beyond basic flight capability to build programs that deliver standardized data, safer workflows, dependable data pipelines, and operating models that can expand across regions without depending on individual operators.

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NJDOT key focus during the EDC-8 - UAS 2.0: Innovative Infrastructure Management

Infrastructure Construction Project Management

UAS Fleet Management

Mobile Dock-Based Operations

Data Collection and Warehousing

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Infrastructure Construction Project Management

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UAS Fleet Management

Implementing a fleet management system for a New Jersey Department of Transportation (NJDOT) drone program delivers significant operational, financial, and compliance benefits.

- Operational Efficiency
- Regulatory Compliance and Safety
- Cost Management and Accountability

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UAS Fleet Management

A fleet management system transforms a collection of individual drones into a coordinated, accountable, and efficient operation. For a transportation agency, it ensures regulatory compliance, maximizes safety

- Maintenance Management
- Data and Asset Tracking
- Infrastructure Inspection Support (DOT-Specific)
- Scalability and Future-Proofing

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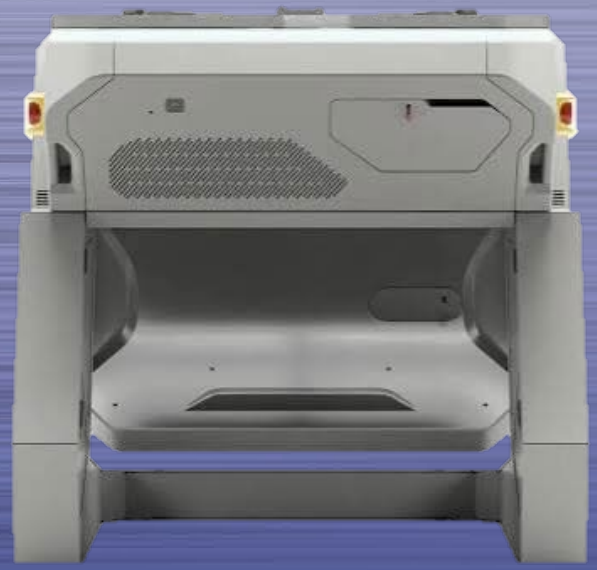
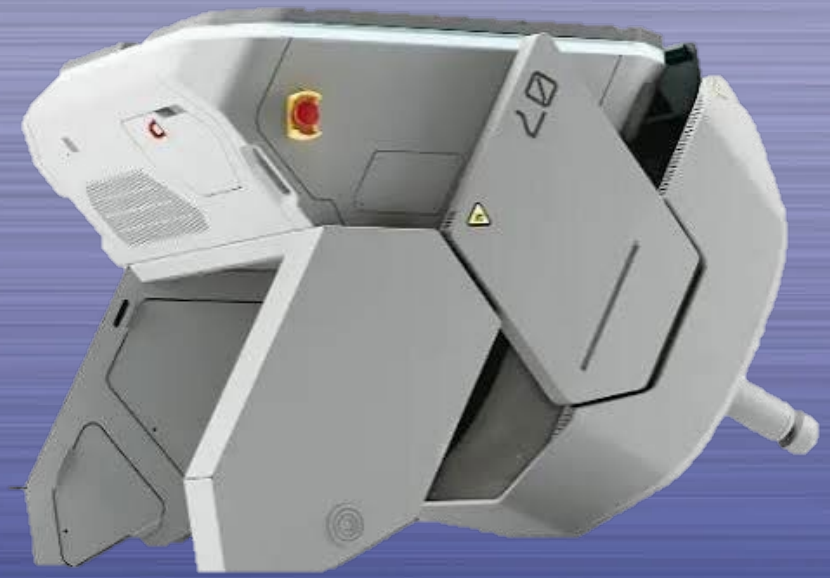
Dock-Based Operations





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Mobile Dock-Based Operations

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Data Collection Systems

Onboard Sensors

- Optical/RGB Cameras – High-resolution imagery for visual inspection and mapping
- Multispectral/Hyperspectral Sensors – Agriculture, vegetation health, mineral detection
- LiDAR – 3D point cloud generation for terrain modeling and structural analysis
- Thermal/Infrared Imaging – Heat signatures for inspections
- GNSS/GPS Receivers – Positional metadata and geotagging
- IMU (Inertial Measurement Units)

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Data Collection Systems

- Telemetry and Flight Data
  - Real-time altitude, speed, battery status, and heading
  - Flight logs and health monitoring metrics
  - Command and control (C2) link data

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Data Transmission

- Real-time streaming via radio frequency, cellular (4G/5G), or satellite links
- Store-and-forward models where data is cached onboard and offloaded after landing
- Edge processing to reduce bandwidth by filtering/compressing data before transmission
- Latency and bandwidth considerations for beyond-visual-line-of-sight (BVLOS) operations

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Data Warehousing Architecture

- Ingestion Layer
- Storage Solutions
- Metadata Management