

Using Robotics in an Industrial Environment

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WE POWER LIFESM

River Bend Station



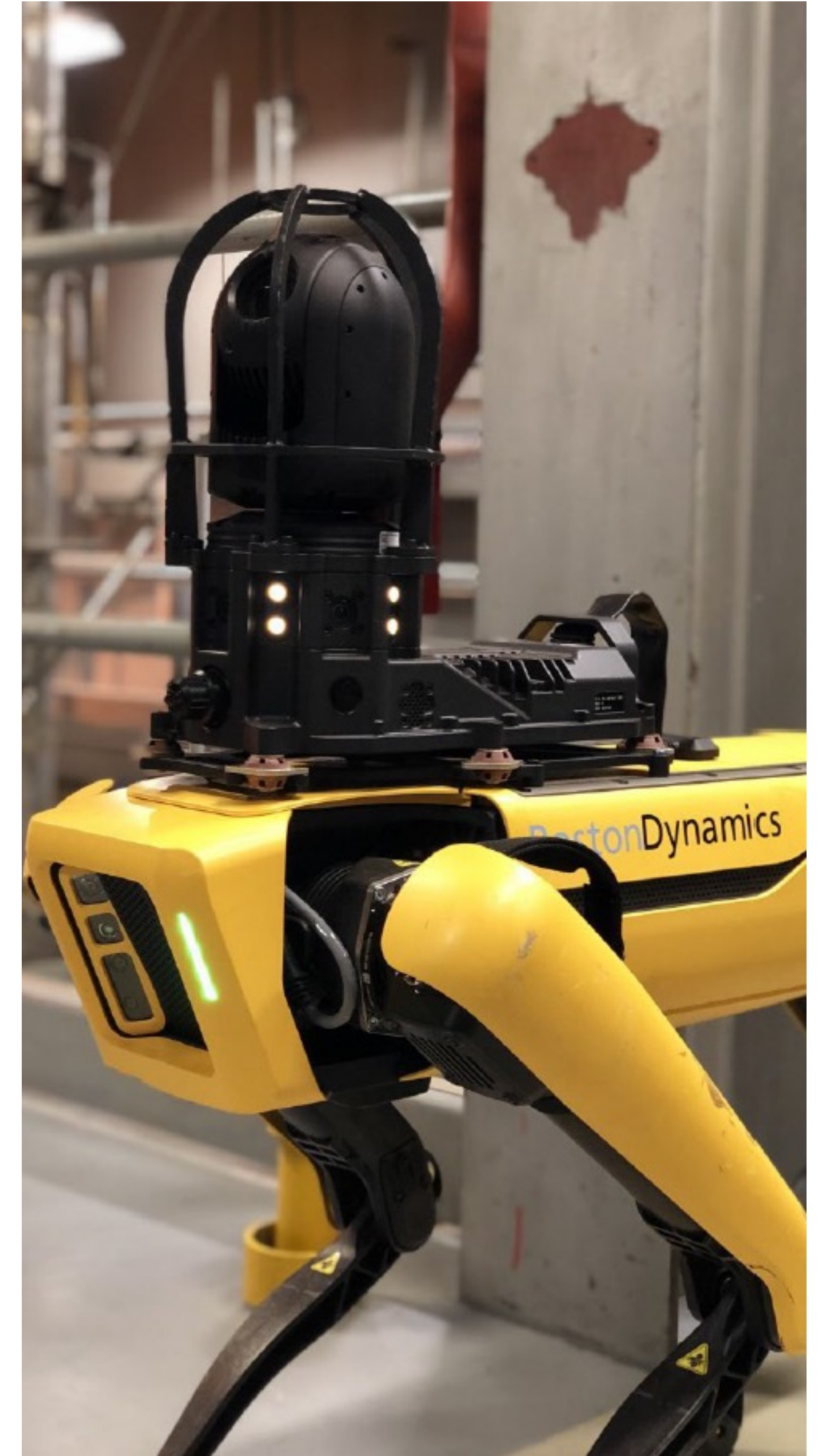
- River Bend is a BWR 6 with General Electric turbines and mechanical draft cooling towers with make-up water from the Mississippi River.
- The station began commercial operation June 16, 1986 and celebrated 35 years of safe and reliable operations in June.
- At 1040 megawatts, River Bend produces approximately 10 percent of the total energy demand of Louisiana.

“Robotics and other combinations will make the world pretty fantastic compared with today.”

-Bill Gates

An Unmanned Solution for Every Task

- Javelin VTOL for EPLAN
- IISD drone for Indoor Inspections and dose rates
- SPOT for RP, ALARA and Maintenance
- Station is evaluating the Baron for future implementation



Why Unmanned Solutions?

- Performing Engineering Evaluations in High Dose or Hazardous Areas
- ALARA evaluations. Performing Surveys, Contamination Surveys, Shielding Evaluations
- Routine Surveillance – Security Rounds, Fire Watch
- Emergency Planning – quickly identify boundary dose rates that are normally inaccessible.



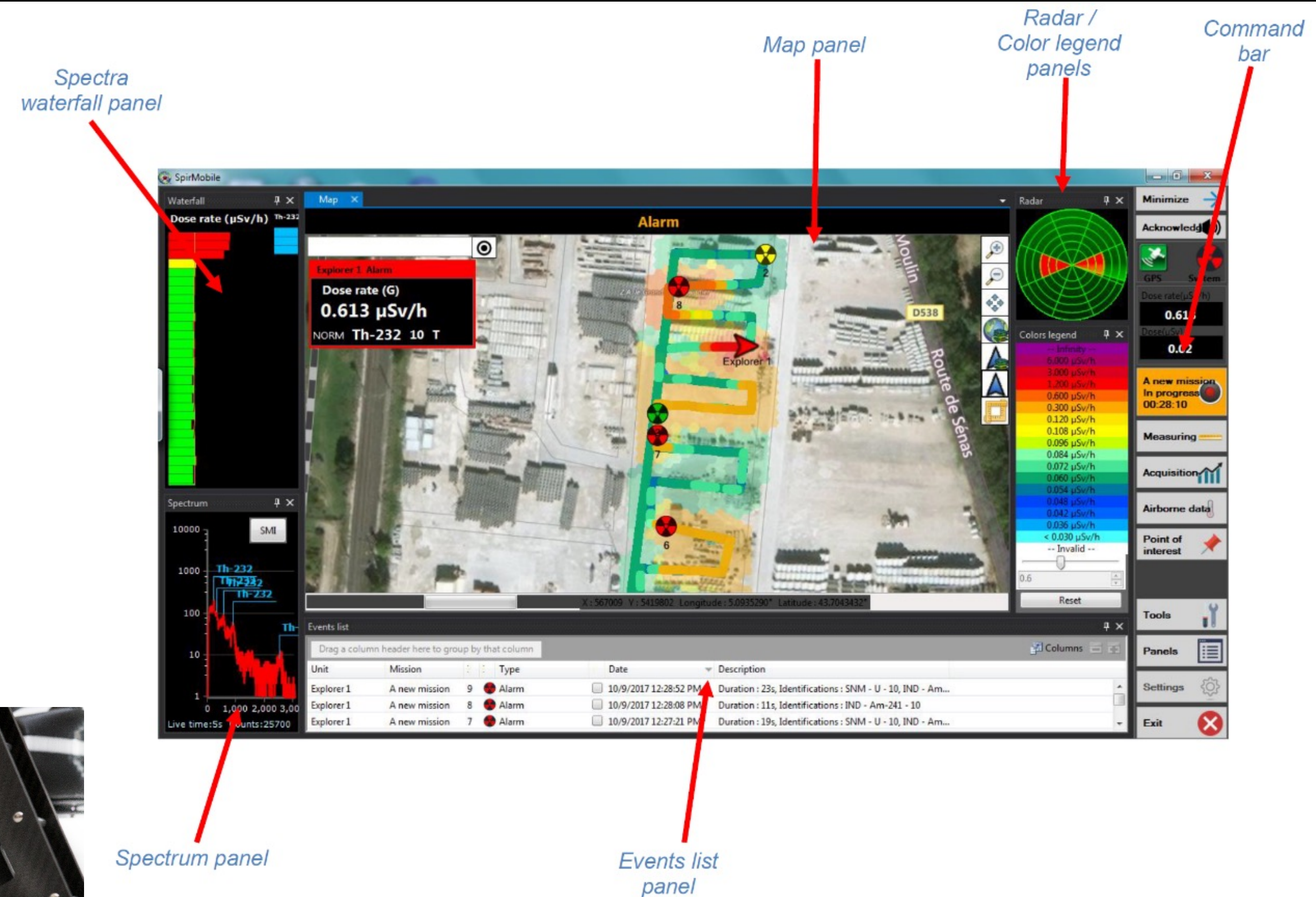
Javelin VTOL

- Wingspan: 9.5 Feet (2750mm)
- Weight: Under 55 lbs for nuclear and non-nuclear applications
- Motors: Four hover motors with 24 Inch props and One Thrust motor w/ 20 Inch Prop
- Range: 40 Mile range
- Speed: Cruising speed 55mph, hover 0 mph
- SPIR Explorer Detector and Air Sampler



Javelin – SPIR Explorer

- SPIR Explorer Integration
- Allows for easy integration, live time update of radiological information
- Validation of Plume Models
- Information is transmitted live time to Emergency Management Team



IISD Inspection Drone



- Collision Tolerant Inspection Quad Drone
- Rugged carbon fiber frame
- Rapid-on deployment
- Thermal and HD Camera on Tilt Gimbal – live video feed for both palettes
- Integrated RDS-31

Benefits of an Inspection Drone



- Potentially reduce critical path time due to overhead inspections for scaffold builds.
- Quickly identify leaks
- Boron identification
- Telemetry backbone installed in most plants
- Pre-Outage planning to identify components, ALARA projections

Spot

- 1.5 hour Battery Life
- Manual and Autonomous Operation
- 30X PTZ and IR Camera for Inspections and Steam Leaks
- Manipulation Arm for smears, valves, opening doors and Firewatch tasks



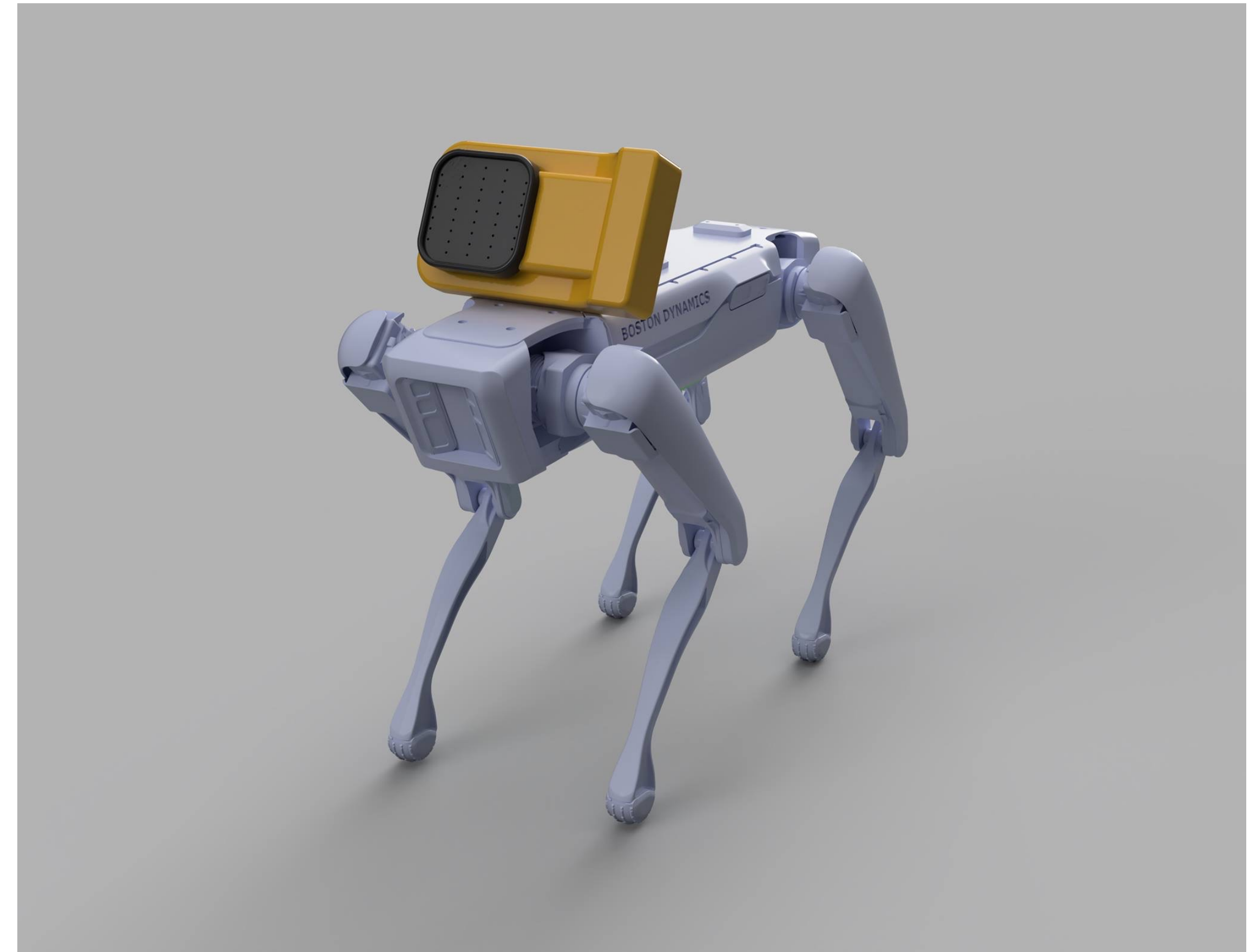
Detector Options



- RDS-31/32 (WRM2 / Telemetry integrated at most NPP
- CSP Probes, i.e., NaI, PiPs, GM, etc.
- GMP-Probes – GMP 12 GMSD High Range
- SPIR Explorer for isotope identification
- SN-D-2 REM Ball
- Personal Air Sampler
- Oxygen Sensors
- Methane

Fluke ii900 and Spot

- Enables station personnel to quickly and accurately locate steam and vacuum leaks
- Uses 64 digital MEMS microphones
- Detection discrimination using frequency bands



West Feliciana High School Drone Program

- Entergy sponsors drone program at local high school
- Over the past two years, the station has donated over \$30,000 to improve the high school's program
- Upon finishing the course, students receive their FAA Part 107 license



QUESTIONS?