SPOT I Autonomous Mobile Inspector applied to the Pharmaceutical sector

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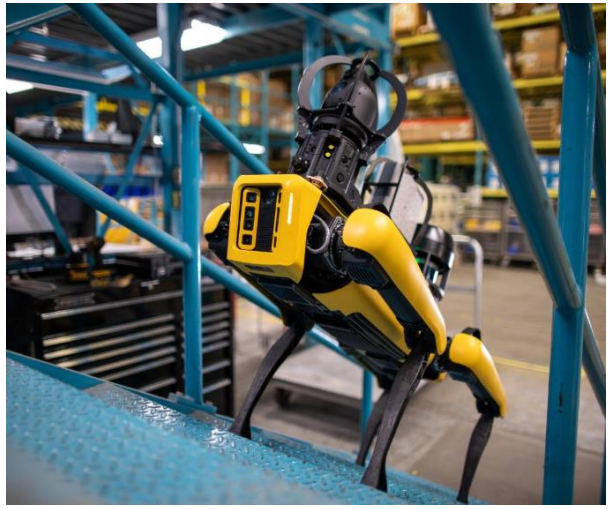
RAYA 2025 Finalist Event

Meet SPOT

Agile mobile robot from *Boston Dynamics* used for automated sensing & inspection

- Advanced autonomy & 360° perception
- Navigates diverse terrains & avoids obstacles
- Performs thermal & visual inspections
- Supports remote operations



The need for SPOT in Lessines

Context:

- Takeda's 3rd largest manufacturing site
- Multiple buildings with regular inspection needs
- Private 5G network enabling new solutions
- Potential for mobile robotic & smart inspections

Challenges addressed:

- Manual inspections = time-consuming
- Technicians diverted from core troubleshooting
- Some inspections not cost-effective for IoT sensors
- Leak detection requires more frequent follow-up
- Electric motor monitoring needs better coverage

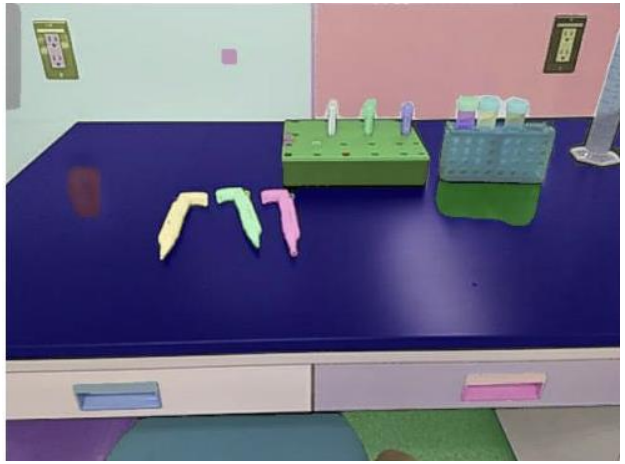
Takeda's proof-of-concept project in R&D

Preliminary feasibility study:

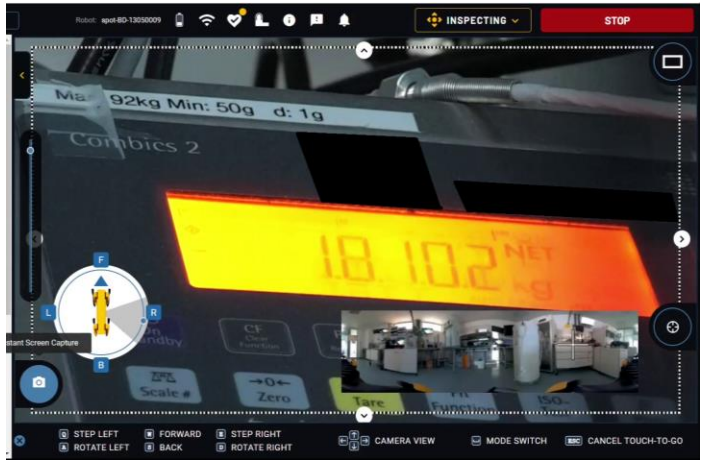
- Conducted in three of our pharmaceutical sciences laboratories, worldwide - *Vienna (AT), Lexington, (MA, USA), Shonan (JP)*
- Focusing on remote monitoring and anomaly detection
- Supporting on-call duty personnel
- Utilizing the pan-tilt-zoom camera with a Vision Foundation Model (VFM)
- And the manipulator arm to open doors

Spot during the lab monitoring process.

Spot with PTZ-camera and Spot with manipulator arm



Anomaly detection with the Segment Anything Model



Readout of instrument display

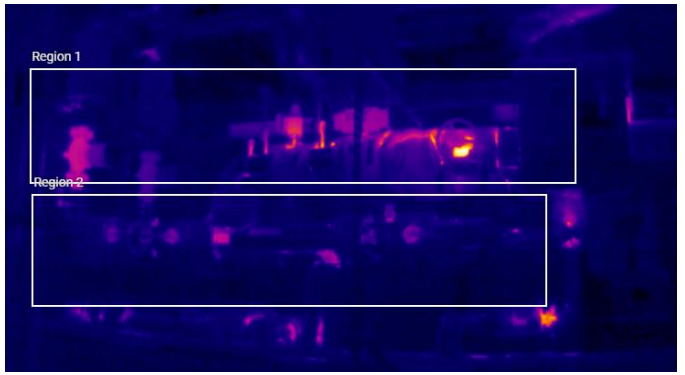
System Overview - Hardware

SPOT + Payloads installed

- IR Camera
- PTZ Camera (30x Zoom)
- Positioning LIDAR Computational
- 5G communication

What Inspections can he do?

Thermal Inspections



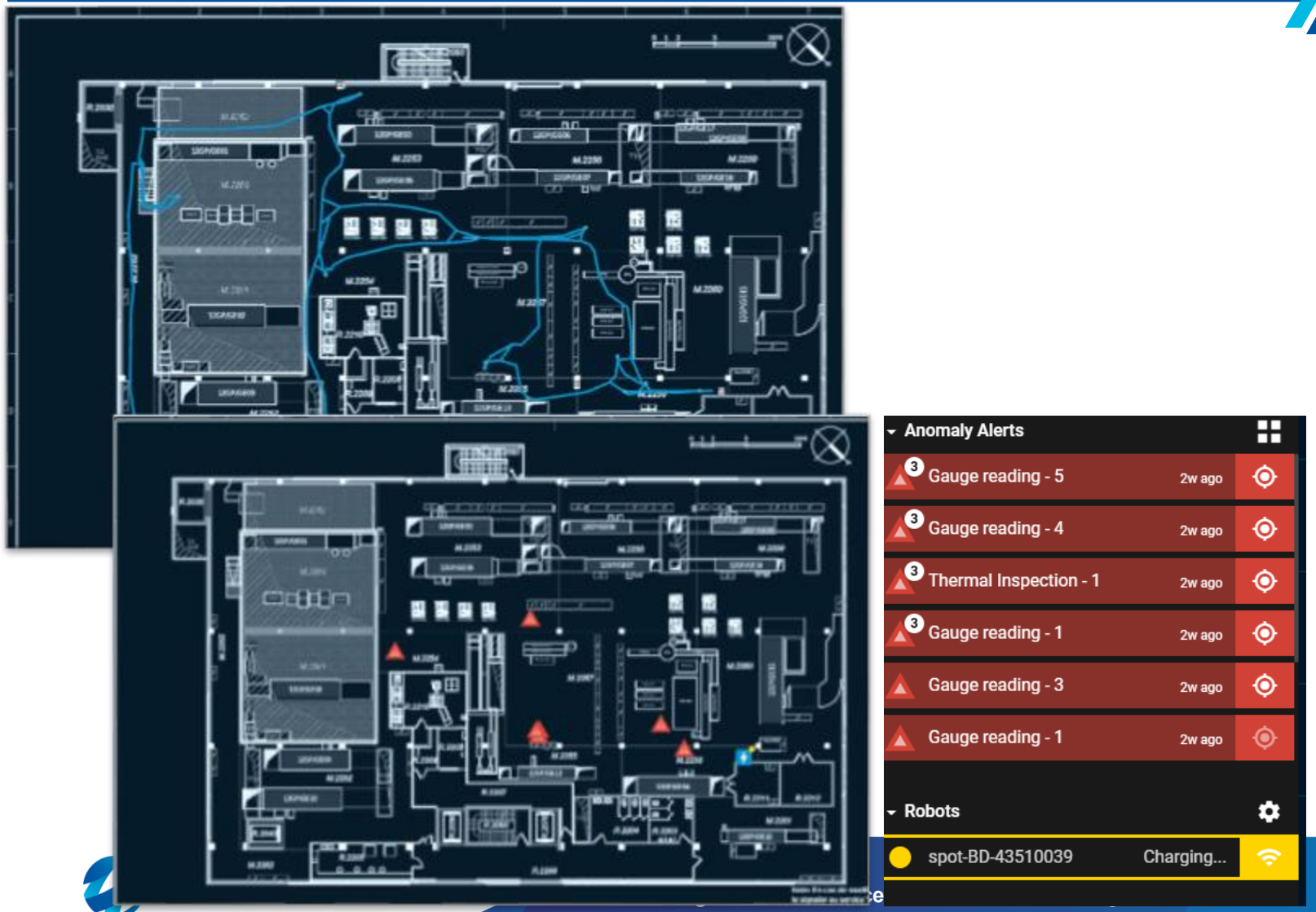
Manometer Inspections

Visual Inspections

And more…

System Overview - Software

Alpha-1 building – Level 2 – Technical Area (Orbit Map)



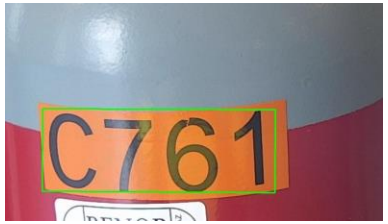
Key outcomes

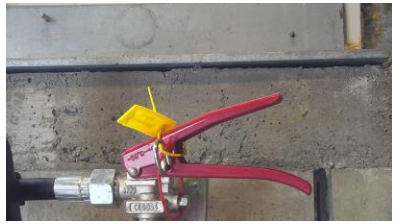
Predictable Autonomous Inspections

- ✓ Site Maps
- ✓ Mission Scheduling & Review
- ✓ Alerts & Notifications (Reports)
- ✓ Remote Operations

Current use cases for SPOT

Inspections currently in use





Inspection use cases:

- Technical areas (automated)
- Fire extinguishers
- Absorbent blanket boxes
- First Aid kits
- Flamco system
- Safety showers

New Preventive Inspections:

- Thermal inspection of electrical motors, steam leaks, etc.
- Manometer readings in technical areas
- Compressed air & gas leak detection

Key benefits

- Free up highly skilled technical teams from low-value tasks
- Improve equipment reliability
- Enable predictive maintenance with AI through richer data collection

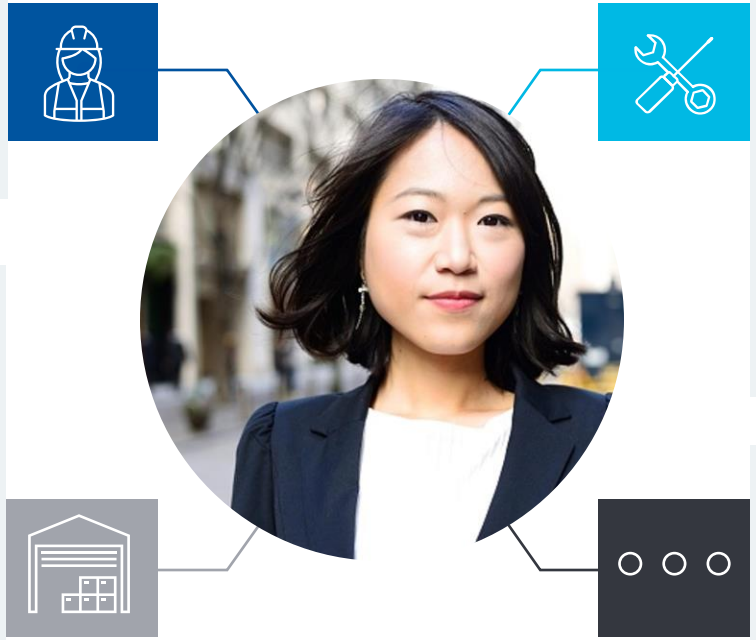
Next steps and future use cases

SAFETY

- Site security checks (indoor & outdoor intrusions)
- Pest control system monitoring

WAREHOUSE

- Inventory checks in manual stocking areas
- Clearance of corridors & passageways
- Collaboration with AGVs for mission planning



FACILITIES

- Electrical cabinet alarms (red light)
- Roof & rainwater sewers
- Small load transport
- Emergency lights (technical areas & offices)

OTHER

- Verify actual occupancy vs. bookings of meeting rooms (detect no-shows, free up rooms)