



# Science and Technology

## TRANSPORTATION SECURITY & EXPLOSIVES CHARACTERIZATION

# ROBOTIC SYSTEM FOR SECURITY INSPECTIONS

**ENVISIONED AUTOMATIC INSPECTION SYSTEM THAT WOULD USE ROBOTICS AND MACHINE VISION TECHNOLOGY TO INCREASE SCREENING CAPACITY FOR EXPLOSIVES AND OTHER PROHIBITED ITEMS AND REDUCE OPERATOR ERROR.**

Security professionals physically pull flagged items from the screening line to manually inspect items flagged for secondary inspection. Once the item of interest is located in the bag, the security personnel swab and scan it for explosive residue and have to wait 10-15 seconds for a result. This entire procedure takes additional time and personnel and reduces overall screening capacity.

To address these challenges, the Science and Technology Directorate (S&T) envisions a robotic solution that would offer a fully automated inspection system, eliminating the need for security personnel to perform manual inspections of suspicious items. An item that triggers an alarm in the scanner would automatically be directed to the inspection area where a robotic system would open it, locate the suspect item, and swab the item with an explosives trace detector (ETD). This system would increase safety for security personnel while also increasing screening capacity and accuracy.

## KEY BENEFITS

- + Enhances operational efficiency
- + Speeds up inspections and screening lines
- + Standardizes inspections and reduces human error
- + Offers an automated solution to critical security tasks
- + Integrates with existing detection technologies

## STAGE OF DEVELOPMENT

Conceptual

## PARTNERSHIP SOUGHT

License or Collaborative Research & Development Agreement (CRADA)

## INVENTORS

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## DHS COMPONENT

Science and Technology Directorate

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The Technology Transfer and Commercialization Branch (T2C) within the Office of Industry Partnerships (OIP) of the Department of Homeland Security (DHS) Science and Technology Directorate (S&T) serves as the centralized point to manage technology transfer activities throughout DHS and the DHS laboratory network. [T2C@hq.dhs.gov](mailto:T2C@hq.dhs.gov)

## THE TECHNOLOGY

The technology includes an idea for an automated inspection system for baggage. Bags are placed in bins and examined in an X-ray or computed tomography scanner. If the bag triggers an alarm, the bin diverts from the main screening line to an inspection area featuring robotic arms. The system uses reference markers in the bin to guide the robotic arms to open the bag and locate the item of interest. Once located, the arms swab the item for explosive trace residues and the system notifies a security officer if a threat is detected.

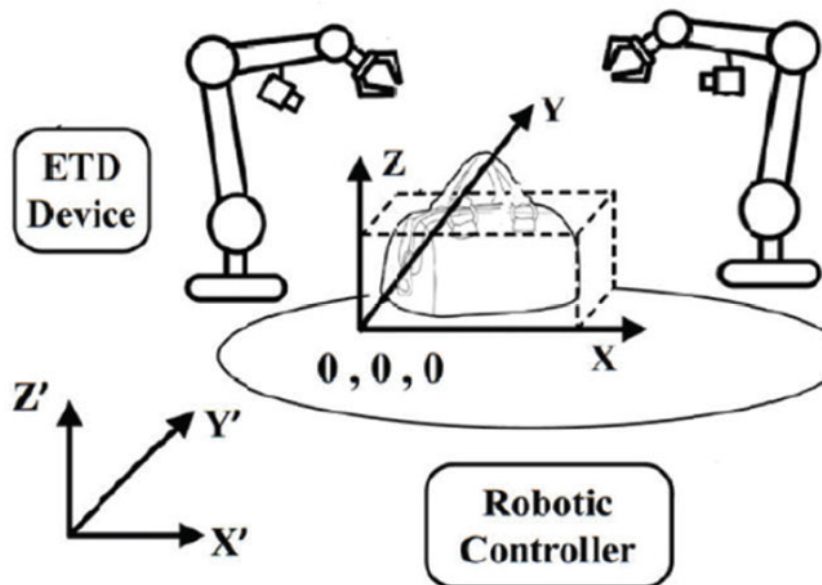


Diagram shows robotic arms positioned on either side of a luggage bag from Figure 1 of US Patent 11,254,011.

## APPLICATIONS

The technology has several potential end-users:

- + Transportation security: air, rail, and ship
- + Restricted access sites with high screening volume: schools, tourist attractions, concert venues, sports stadiums
- + Bomb squads

## PATENT INFORMATION

US Patent Numbers 11,254,011, 11,420,336 and 11,554,497



## CONTACT INFORMATION

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TECHNOLOGY SOLUTION