

ESTD

Engineering Science &  
Technology Division

## National Security

### X-ray Baggage Imagery Analysis

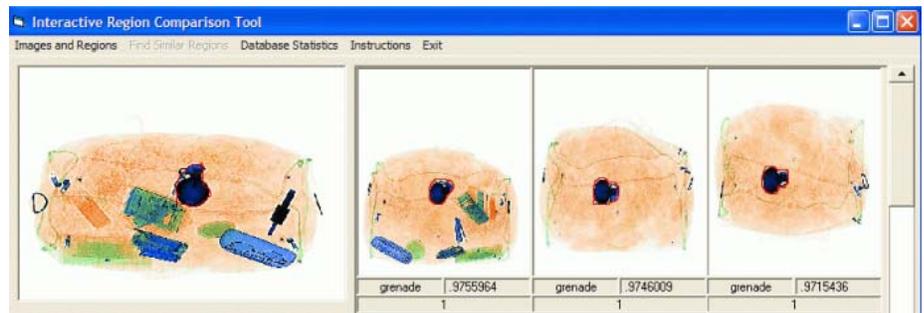
#### Airport Carry-on Baggage Checkpoints

With increased security needs for vigilance, efficiency, and accuracy in detecting potential threat items in carry-on baggage, there has been a dramatic increase in the quantity of x-ray systems deployed in airports nationwide. Coupled with this is a renewed national interest in the exploration of new technologies for operator training and assistance. Researchers at ORNL have been exploring computer vision techniques for assisting x-ray screeners in identifying potential threat items in carry-on baggage.

#### Base Technology

Methods for creating a searchable image database for queries based on image content that were developed for the semiconductor industry were modified and adapted to the problem of identifying and recognizing parts of threat items found in x-ray baggage imagery. These threats can include conventional weapons such as guns or knives as well as improvised explosive devices. The ORNL technology is built around a database of image characteristics of regions identified to be threats along with regions

known to contain common, harmless carry-on items. By comparing a suspect area in an image to a database of known and labeled regions, an improved analysis of the threat-potential for this item can be performed.



*Identified region and 3 best matches in database by virtue of image characteristics.*

#### Features

- Method for operator assistance in identifying potential conventional threats in x-ray imagery
- Use of imagery characteristics in dual energy images to confirm or deny that a suspicious organic material is an explosive
- Windows software aide to familiarize screeners with the appearance of threat items in a variety of poses and in the presence of clutter

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