

Development of an X-ray backscatter Imaging System for Cargo Inspection

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In general, the principle of the X-ray transmission imaging system used for container inspection involves irradiating an object with high-energy X-rays and measuring the extent to which the rays penetrate through the object.

However, due to their high penetration capability, high-energy X-rays encounter difficulties in detecting low-density substances such as narcotics (powder) and explosives. In this study, we propose developing an X-ray backscatter imaging system to inspect low-density hazardous materials within containers.

The development system utilizes X-rays with an energy of 225 keV and rotates a wheel collimator to scan the container's three sides (top, left, right) with a point beam.

The image detector, which consists of 12 scintillation detectors, uses the synchronization signal from the rotating wheel collimator to simultaneously collect backscattered X-rays produced by the Compton effect, thereby generating line images.

Finally, each generated line image is displayed as a composite image.

We constructed a gantry-type inspection system with X-ray backscatter imaging technology applied within a testbed and performed scans of actual vehicles to generate backscatter images.

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