



Contribution ID: 99

Type: POSTER

## Identify a radioactive contaminated target among moving objects using machine vision methods

Radioactive materials out of regulatory control (MORC) are threats to the peace and security of the world. The growth in the use of radioactive materials in industry and medicine rises the concern about theft, neglect, or improper disposal of radioactive materials. In this research, the goal is to find a contaminated object such as a bag, person, or car in crowded places by data fusion between camera images and radioactive data. Using surveillance cameras and detection systems (i.e., Geiger–Müller) simultaneously improves the detection of threats by extracting correlated information. As a proof of concept, three ground robots that were the same in size, shape, and color were moving while a radioactive source was placed on one of these robots. A camera and a radioactive detector (NaI) were placed on top of the test bed. An algorithm was developed to identify and extract paths of each mobile robot using vision-based methods, then to find the contaminated target by data fusion between paths and a gamma-ray count graph. The promising results showed detection system detects contamination with high accuracy. This system can be scaled up by equipping surveillance cameras with radioactive detectors to continuously monitor a large area and find MORC without a human assistant.

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**Track Classification:** Track 6 - Building capacity for ensuring safety and enabling sustainability