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Real time identification and tracking of radioactive materials carried by humans

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The widespread availability of nuclear and radioactive materials, commonly used in industrial and medical applications, poses a significant risk of misuse in the form of radiological dispersal devices (RDDs) or "dirty bombs." If detonated in densely populated or strategically important locations, such devices could cause widespread panic and necessitate large-scale evacuation and cleanup operations. To mitigate this threat, effective screening for radioactive materials is essential. Deploying distributed detector nodes in urban areas with high traffic or near strategic targets offers a practical solution for identifying and intercepting materials trafficked with malicious intent. Such systems, employing scintillator-based gamma-ray spectrometers, can continuously monitor, detect, and localize nuclear and radioactive threats in real time. These spectrometers provide energy spectra of detected radiation, enabling the identification of materials, which is required to distinguish them from benign sources, such as medical isotopes and naturally occurring radioactive materials. This project focuses on optimizing analysis of data from these spectrometers, such that radioactive material can be detected and identified in real-time. Additionally, it investigates the complex variations in background radiation spectra observed in urban environments, influenced by factors such as human activity, weather, and temperature. The findings will help to inform improvements to existing systems being tested in the UK and will facilitate the localisation of radioactive threats, helping to inform emergency response strategies.

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