Polaris: A Radiation Source Location Visualization System using Gamma-Geometry Calculation

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Nuclear energy is a source that can pose significant risks and hazards, therefore, mitigating the risks of radiation is just as important as the research on its application. This project presents the development of a radiation visualization system that can capture depth in gamma emissions. In conventional radiation imaging techniques, various prototypes have been proposed for capturing 2-dimensional images (x,y plane). While 2D detection has been developed, the quality/presence of depth has been compensated for shorter imaging times. A collimated CdTe detector was placed on a linear rail system and rotated, giving spatial information from the triangulation of gamma rays. Raw data was then processed using trigonometry and the aid of novel imaging algorithms, creating a pixel-by-pixel reconstruction of radioisotope location, as well as it's distance (Z-axis depth) in accordance with the detector system. The characterization of DOI (depth of interaction) creates ground for a low cost but effective 3-dimensional radiation imaging system, proving to be useful in many applications that involve the detection and visualization of radiation on a 3D plane.

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