

Design and Optimization of Radiation Detection System.

Tuesday, 14 November 2023 10:00 (5 minutes)

Radiation detection systems are essential for upholding nuclear security and safety. The main objective of this study is to design and develop a new radiation detection system that can locate the position of a radioactive source using Geiger-Muller (GM) detectors. Three GM detectors are utilized in this system, and their relative angles are known. The detectors collect data on radiation exposure levels in the immediate area surrounding the detectors and send it to a Raspberry Pi 4 processor. After that, a MATLAB algorithm analyzes the data using Curve Similarity techniques to determine the source's position. To provide a user-friendly experience when using the system, a graphical user interface (GUI) was designed. The benefit of the Curve Similarity technique is that it offers great accuracy, rapid response, and low cost. It can be applied in fields like environmental monitoring, homeland security, and nuclear power plant safety, including locating lost radioactive materials and other radiation security and safety concerns.

Gate simulation modeling was used to simulate the system to test the Curve Similarity method in locating the source. A Cs-137 point source was used to study the system response. The results show that the system can detect a point source accurately within a few centimeters. Following the simulation process, an experimental setup is prepared to test the radiation detection system in a laboratory environment using the methods that were developed.

Speaker Bio

Primary authors: Mr ALSHEBROMI, Fares (King Abdulaziz University); Mr ALBARAKATI, Maan (King Abdulaziz University)

Co-authors: Dr ALHAWSAWI, Abdulsalam (King Abdulaziz University); TAHA, Eslam (King Abdulaziz University)

Presenter: Mr ALSHEBROMI, Fares (King Abdulaziz University)

Session Classification: Day 2- Research Pitch Competition - I

Track Classification: Student competition