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Implementation of the Nuclear Forensic Assessment Software for Nuclear Threat Detection and Material Out of Regulatory Control

Nuclear Forensic Assessment Software is developed to bolster nuclear threat detection and material control. The Nuclear Forensic Assessment Software aims to link objects collected from crime scenes to nuclear and other radioactive material signatures for further investigation. As a result, authorities can obtain more information about nuclear and radioactive materials to manage the crime scene event safely and securely. The software concept is to consolidate all vital data on safety, security, and safeguards to assist first responders, frontline officers, nuclear security networks, and nuclear forensics specialists in managing a nuclear security event more effectively. Am-241, Co-60, Cs-137, Ir-192, Pu, U-235, U-238, depleted uranium, and thorium have all been identified as potential targets for hostile action. The software architecture was designed to locate the five required data subjects: laws and regulations, safety and security measures, technical support, and contact information. Artificial intelligence (AI) was utilized to match photographs uploaded or selected from a database. The photograph of a questionable object will be combined with the information to generate an effective and timely response to nuclear security. The user will receive a prediction radionuclide with a confidential level that can be matched to the necessary data. Inputting more data, such as the name of the radionuclide and its spectrum, can improve the credibility of the information. The AI will match the radionuclide with the necessary data for managing the radioactive situation at the crime scene and other pertinent scenarios. The assessment software can provide the information required to respond to material that is not subject to regulatory control, such as answering questions about the types of nuclear and other radioactive materials, major radionuclides, category, and origin, including the possibility that the materials are illegally trafficked or violate the law. They also address the prospect of enemies engaging in illicit behavior. Threats include criminals or terrorists involved in malicious activity with nuclear explosive devices, nuclear material to construct an improvised nuclear explosive device (IND), radioactive material to construct a radiological dispersal device (RDD), and radioactive dispersal through sabotage of nuclear installations and other radioactive material discovered or transported. Furthermore, case studies of recent nuclear security incidents involving specific radionuclides will be summarized and presented in the program as a starting point for further inquiry. The program can simultaneously respond to illicit trafficking and nuclear terrorism. Since 2021, it has been implemented in Thai nuclear security networks through national training sessions attended by 334 individuals from 39 organizations. Participants have also transferred knowledge to their organizations by learning how to successfully use the program to respond to materials out of regulatory control.

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