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Machine Learning Solutions for Enhanced Security in Small Modular Reactors (SMRs): A Comprehensive Approach

In the realm of Small Modular Reactors (SMRs), ensuring robust security measures is imperative to safeguard against potential threats to both physical infrastructure and computer systems.
This article presents a thorough investigation into machine learning (ML) solutions to fortify security measures within SMRs. It begins with a detailed analysis of the multifaceted security considerations, encompassing physical infrastructure and cyber systems, essential for the safe operation of SMRs. Having described the foundation of SMR, different ML algorithms are offered as a solution to strengthen the security measures. Namely, anomaly detection algorithms, such as Isolation Forest and tree-based classification algorithms, such as Random Forest, all tailored for real-time monitoring and early detection of potential security breaches. Clustering algorithms such as K-Means and DBSCAN are examined for their ability to identify and analyze patterns within security incident data, aiding in the development of targeted security protocols.
By integrating these diverse ML solutions, this article contributes to the advancement of security measures in SMRs, offering valuable insights for practitioners and researchers involved in nuclear energy security and safety.

Country OR International Organization

Azerbaijan

Email address

gunay.abdiyeva@isi.az

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Author: Dr ABDIYEVA-ALIYEVA, Gunay (Institute of Control Systems of the Ministry of Science and Education of the Republic of Azerbaijan)

Presenter: Dr ABDIYEVA-ALIYEVA, Gunay (Institute of Control Systems of the Ministry of Science and Education of the Republic of Azerbaijan)

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