

Security Analytics Quest Robot: Enabling Intelligent and Sustainable Industrial Security Operations through Big Data Analytics

Ghaidaa Al Kuhaili

Industrial Security, Arabian American Oil Company

Abstract

Industrial security environments generate vast volumes of high-velocity and heterogeneous data from multiple operational sources, including surveillance systems, access control logs, sensor networks, and incident reporting platforms. However, many organizations face challenges in transforming this raw data into actionable intelligence that supports timely and effective decision-making.

This paper introduces the **Security Analytics Quest Robot**, a scalable and data-driven framework designed to enhance industrial security operations through advanced big data analytics. The framework is inspired by *industrial security principles such as ISO/IEC c2443 and is aligned with Big Data reference architectures (ISO/IEC 20547)*, ensuring a structured and robust approach to data management and analytics. It leverages a multi-server architecture that supports continuous data ingestion, large-scale data pre-processing, and real-time analytics across distributed industrial environments.

Through well-designed data pipelines, the framework performs data cleaning, transformation, and aggregation to ensure high-quality inputs for downstream analytical processes. A key innovation lies in the integration of predictive analytics and automated anomaly detection, enabling early identification of potential operational risks before they escalate into critical incidents. In addition, an intelligent alerting mechanism is implemented, where urgent or high-risk events trigger immediate notifications to relevant stakeholders, ensuring rapid response and mitigation.

The system also generates structured, data-driven reports that are shared with senior management on a daily basis, providing comprehensive insights into operational performance across different organizational units. This approach places effective decision-making at management's fingertips, empowering leadership with timely, accurate, and actionable intelligence.

The proposed framework enhances organizational resilience and supports long-term sustainability by optimizing resource utilization, minimizing operational risks, and enabling proactive decision-making. Its ultimate objective is to enhance and sustain high-performance Industrial Automation and Control Systems (IACS) by leveraging advanced big data analytics.