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SAFECARE: Integrated Cyber-Physical Security Solution for Healthcare Critical Infrastructure

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Abstract : Modern societies strongly depend on Critical Infrastructures (CI). Hospitals, power supplies, water supplies, telecommunications are just few examples of CIs that provide vital functions to societies. CIs like hospitals are very complex environments, characterized by a huge number of cyber and physical systems that are becoming increasingly integrated. Ensuring a high level of security within such critical infrastructure requires a deep knowledge of vulnerabilities, threats, and potential attacks that may occur, as well as defence and prevention or mitigation strategies. The possibility to remotely monitor and control almost everything is pushing the adoption of network-connected devices. This implicitly introduces new threats and potential vulnerabilities, posing a risk, especially to those devices connected to the Internet. Modern medical devices used in hospitals are not an exception and are more and more being connected to enhance their functionalities and easing the management. Moreover, hospitals are environments with high flows of people, that are difficult to monitor and can somehow easily have access to the same places used by the staff, potentially creating damages. It is therefore clear that physical and cyber threats should be considered, analysed, and treated together as cyber-physical threats. This means that an integrated approach is required. SAFECARE, an integrated cyber-physical security solution, tries to respond to the presented issues within healthcare infrastructures. The challenge is to bring together the most advanced technologies from the physical and cyber security spheres, to achieve a global optimum for systemic security and for the management of combined cyber and physical threats and incidents and their interconnections. Moreover, potential impacts and cascading effects are evaluated through impact propagation models that rely on modular ontologies and a rule-based engine. Indeed, SAFECARE architecture foresees i) a macroblock related to cyber security field, where innovative tools are deployed to monitor network traffic, systems and medical devices; ii) a physical security macroblock, where video management systems are coupled with access control management, building management systems and innovative AI algorithms to detect behavior anomalies; iii) an integration system that collects all the incoming incidents, simulating their potential cascading effects, providing alerts and updated information regarding assets availability.

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