World Academy of Science, Engineering and Technology
International Journal of Computer and Information Engineering
Vol:15, No:06, 2021

A Medical Vulnerability Scoring System Incorporating Health and Data Sensitivity Metrics

Authors : Nadir A. Carreon, Christa Sonderer, Aakarsh Rao, Roman Lysecky

Abstract : With the advent of complex software and increased connectivity, the security of life-critical medical devices is becoming an increasing concern, particularly with their direct impact on human safety. Security is essential, but it is impossible to develop completely secure and impenetrable systems at design time. Therefore, it is important to assess the potential impact on the security and safety of exploiting a vulnerability in such critical medical systems. The common vulnerability scoring system (CVSS) calculates the severity of exploitable vulnerabilities. However, for medical devices it does not consider the unique challenges of impacts to human health and privacy. Thus, the scoring of a medical device on which human life depends (e.g., pacemakers, insulin pumps) can score very low, while a system on which human life does not depend (e.g., hospital archiving systems) might score very high. In this paper, we propose a medical vulnerability scoring system (MVSS) that extends CVSS to address the health and privacy concerns of medical devices. We propose incorporating two new parameters, namely health impact, and sensitivity impact. Sensitivity refers to the type of information that can be stolen from the device, and health represents the impact on the safety of the patient if the vulnerability is exploited (e.g., potential harm, life-threatening). We evaluate fifteen different known vulnerabilities in medical devices and compare MVSS against two state-of-the-art medical device-oriented vulnerability scoring systems and the foundational CVSS.

Keywords : common vulnerability system, medical devices, medical device security, vulnerabilities
Conference Title : ICMINS 2021 : International Conference on Multimedia Information Networking and Security
Conference Location : Oslo, Norway
Conference Dates : June 24-25, 2021