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Security, Privacy and Reliability of Smart Buildings

J.UCS Special Issue

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Smart buildings are automated buildings that deliver essential services to the modern society. These buildings reduce the energy consumption of homes, increase the safety of inhabitants, increase the comfort for employees and reduce operating cost by automatically operating elevators, heating, ventilation, and air-conditioning, and perform essential services within large infrastructure buildings, e.g. smart video surveillance on airport terminals. Today's smart buildings are equipped with a steadily increasing number of features while providing rather limited security features. Hurdles to increase the security of smart buildings are rooted in several reasons. For instance, new buildings are usually required to be compatible to older components integrated decades ago, which do not provide any security features. The patchability of controller software is another unsolved problem, and the integration of state-of-the-art security features into these old operating environments is difficult due to limited computing power and memory of legacy systems.

The special issue targeted all types of automated buildings, being it commercial, public, or residential buildings, their network infrastructure and all operating environments. Research papers were allowed to address organizational aspects of smart building security, hardware-level security, network-level security and usability.

The call for papers for this special issue was distributed over relevant mailing lists, call-for-paper distribution websites, personal and university websites, and on the homepage of the journal. In addition to submissions of new articles, extended versions of accepted papers from the Workshop on Security, Privacy and Reliability of Smart Buildings have been invited for submission under the condition of providing at least 50% new content. The submissions were peer-reviewed by experts in the domain. Based on the reviews and our own judgment, three articles were selected for publication in this special issue.

In the first contribution, entitled “Machine learning methods for anomaly detection in BACnet networks”, Jernej Tonejc, Sabrina Güttes, Alexandra Kobekova and Jaspreet Kaur introduce a framework which allows the detection of anomalies and attacks in BACnet network traffic using unsupervised machine learning algorithms, BACnet being one of the more prominent building automation network stacks.

In the second paper, entitled "A comprehensive dependability approach for building automation networks", Lukas Krammer, Wolfgang Kastner and Thilo Sauter provide a generic concept for reliability, safety and security in the area of building automation systems. To this end, they introduce a so-called Generic Dependability Layer that is integrated into the communication architecture of smart buildings.

In contribution number three, entitled "Secure control applications in smart homes and buildings", Friedrich Praus, Wolfgang Kastner and Peter Palensky present an architecture for distributed control applications in both, smart buildings and smart homes. Their solution addresses the security problem of software that is running on different device classes.

We would like to express our thanks to Christian Gütl (Managing Editor) and Dana Kaiser (Head of Editorial Team) for permitting us to organize this special issue under the umbrella of the Journal of Universal Computer Science. We also like to thank all reviewers who facilitated the review process, namely François-Xavier Aguessy, Luca Caviglione, Bernhard Fechner, Amir Houmansadr, Wolfgang Kastner, Jean-Francois Lalande, Masood Masoodian, Wojciech Mazurczyk, Delphine Reinhardt, Thomas Rist, Peter Schartner, Jernej Tonejc, Tao Yue and Sebastian Zander. Last but not least, we like to thank all authors for submitting their work to this special issue.

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