

What Can Consumer Technologies Contribute to the Future Society?

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■ **HAPPY NEW YEAR** 2022 to all the readers. I welcome you to the first 2022 issue, the January 2022 issue, of the *IEEE Consumer Electronics Magazine* (MCE)**.

With the year 2021 over, MCE carved a history of 10 years. I extend my sincere congratulations on the 10th anniversary of publication. I would like to express my deepest gratitude to all the contributors, the reviewers, the editorial board members, the Consumer Technology Society board of governors, and you who read this now. I am hopeful that MCE will further excel in all aspects, including quality of articles, and broadening author/reader base in the next 10 years as well.

At the beginning of the new 10 years, let us consider the future society we should aim for. Not a day passes without hearing about SDGs, carbon neutrality, and well-being. While writing this article, the COP26 concluded with the adoption of the outcome document, which states that the COP26 will pursue efforts to limit the increase in global average temperature to 1.5 °C, and phase down coal-fired power generation. For this agreement, some give certain appreciation, others express disappointment. I recognize the difficulty of this world-wide issue again and hope this step seems small but a great leap to make for the future. The future society demands multifaceted development from not only economic prosperity and convenience but also safety, security, and sustainability.

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What can consumer technologies contribute to the future society? Our society has developed and evolved by technologies, but its center must be human. Consumer technologies have enriched human lives. And from now, as familiar to human, they continue to take a central role to build the future society. I chose secure and sustainable technologies as the cover theme for this issue. I hope you find a clue of consumer technologies to build the future society in this issue.

FEATURE ARTICLES

Securing Fuzzy Vault Enabled Authentication in Body Area Networks Based Smart Healthcare: This article focuses on authentication service for body area network sensors and proposes an original scheme named Rotational Assisted Fuzzy Vaults (RAFVs) to harden the security of any authentication solution using the fuzzy vault construction approach. The evaluation results have shown that RAFV can successfully conceal the secret of the vault even if the locking elements are known to the adversary and may improve upon communication overhead.

Generation of Panoramic Images by Two Hemispherical Cameras Independent of Installation Location: This article proposes a method for generating spherical images by stitching together images from two cameras. This work is expected to contribute to expanding the range of applications for omnidirectional imaging.

Multi-Factor Pattern Implicit Authentication: This article proposes an operational grid (OP-Grid) technique, which is an implicit graphical

authentication scheme having different patterns on every login session. OP-Grid is implemented on Android cell phones and resists different attacks, such as shoulder-surfing attacks, guessing attacks, and smudge attacks.

Towards a Secure and Resilient All-Renewable Energy Grid for Smart Cities: This article describes how the future electric energy system with 100% electricity supply from renewable energy sources requires the “birth of security and resiliency” incorporated with its ecosystem. An electric energy system immune to adverse events, both cyber and physical risks, and able to support the integration of renewable sources will drive a transformational development approach for future smart cities.

Randomness of Symmetric Encryption for Consumer Privacy Using Metaheuristic-Based Framework: This article proposes a novel metaheuristic-based key generation framework for symmetric encryption. This provides a faster and relatively secure encryption method for the consumer electronics industry, especially in the field of IoTs, such as smart home and smart city.

SPECIAL SECTIONS

This issue includes two special sections. One is dedicated to smart cities and the other is dedicated to electronic systems. Each consists of three articles.

Special Sections: Security and Sustainability Technologies for Smart Cities

Adiabatic Logic Based Energy-Efficient Security for Smart Consumer Electronics: This article introduces a two-phase clocking scheme implementation, 2-EE-SPFAL, of an adiabatic logic, which can reduce energy consumption and be correlation power analysis resistant. 2-EE-SPFAL is expected as one of the promising solutions for energy-efficient secure electronics.

Reverse Engineering Controller Area Network Messages Using Unsupervised Machine Learning: This article describes an approach to help reduce the complexity of security analyses by leveraging unsupervised machine learning to learn clusters of messages passed between ECUs.

FinderX: A Bluetooth Beacon Based System for Designing Sustainable Green Smart Cities: This article presents FinderX, a Bluetooth beacon-

based system to search for the nearest services and amenities. The system does not require Internet or other communication infrastructure and can function where the GPS signal is inaccessible.

Special Section: Secure and High-Speed Electronic Systems

Task Scheduling Strategy of Heterogeneous Multicore Processor Based on Genetic Algorithm: This article proposes a swarm intelligence task-scheduling strategy based on the genetic algorithm (GA) for high-performance heterogeneous multicore processors. This technique enables us to execute various types of tasks on heterogeneous processing cores for optimal performance.

High-Performance Password Recovery Hardware Going From GPU to Hybrid CPU-FPGA Platform: This article provides a comprehensive survey of password-recovery systems, including the basic concepts of password recovery, the popular hardware platforms, the password-guessing methods, and the acceleration techniques applicable to crack various password-encryption algorithms.

Approximate Adiabatic Logic for Low-Power and Secure Edge Computing: This article introduces two approximate adders to illustrate the benefits of approximate computation combined with adiabatic logic. They leverage the dual-rail property of adiabatic logic to minimize the overall size and further decrease energy consumption while increasing its protection against the side-channel attacks.

LOOKING FORWARD

MCE will continue the trend of covering more themes for enthusiastic and dedicated readers in future issues on the current topics and emerging topics with the active support from the editorial board members, reviewers, and authors around the world.

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