Guest Editorial Special Issue on Self-Powered Sensors: Architectures, Applications, and Challenges

At present, the sustainability of a sensor becomes a hindrance due to energy storage's limited lifetime. In this case, self-powered sensors are proposed to solve this issue. While self-powered sensors are promising, there are still some challenges to overcome before they can be deployed on a large scale. Therefore, this Special Issue aims to solicit original papers with discussions on self-powered sensors, as well as their architectures, applications, and challenges.

Therefore, this Special Issue has provided a forum for the research community to share advances and new ideas in self-powered sensors. Based on the reviewers' feedback, as well as the evaluations of editors, some papers are selected in this Special Issue from 190 submissions. We are very thankful to all authors who have contributed to this Special Issue. A variety of topics are proposed and discussed in this Special Issue through its accepted papers. Due to the limitation of the editorial space, only three papers will be introduced here.

In [A1], Wright et al. stated that self-powered sensors are expected to enable new large-scale deployment and location access capabilities for sensor systems. Energy harvesting from power line infrastructure offers an architecture for addressing some challenges in self-powered sensors. In this article, an inductive power line harvester concept is presented, based on a flux concentration approach adapted to a closed-loop core geometry. The experimental results show this performance is adequate for enabling self-powered wireless sensor networks installed along power distribution lines.

The article by Javaid et al. [A2] described the current literature lacks a comprehensive review on state-of-the-art design solutions for self-powered sensors and their implementation challenges. To address the limitations, the authors have reviewed state-of-the-art architectures of self-powered sensors and their applications in various domains. Moreover, the authors discuss the implementation challenges of self-powered sensors that affect their long-term operations, and some possible solutions.

In [A3], Qiu et al. stated that self-powered sensors solve the most shackling issue in the current sensing field, thus enabling many previously unattainable application scenarios. In this paper, a variable-length continuum manipulator with self-powered sensors is designed, and an adaptive capture control scheme based on deep-learning prediction is proposed for the envelope grasp of a fixed cylinder target and the hook grasp of a ring target moving in a small range. The experimental results on a prototype reveal that the generated parameters highly match the targets. The accuracy is higher than that of some baselines.

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SHAHID MUMTAZ, *Guest Editor*
Silesian University of Technology, Poland
Nottingham Trent University, U.K.
e-mail: dr.shahid.mumtaz@ieee.org

MEHMET YUCE, *Guest Editor*
Monash University, Australia
e-mail: mehmet.yuce@monash.edu

JUN CHEN, *Guest Editor*
University of California at Los Angeles, USA
e-mail: jun.chen@ucla.edu

SUBHAS MUKHOPADHYAY, *Guest Editor*
Macquarie University, Australia
e-mail: subhas.mukhopadhyay@mq.edu.au

EDWARD SAZONOV, *Guest Editor*
The University of Alabama, USA
e-mail: esazonov@eng.ua.edu

JOEL J. P. C. RODRIGUES, *Guest Editor*
Instituto de Telecomunicações, Portugal
e-mail: joeljr@ieee.org

CHUNSHENG ZHU, *Guest Editor* Southern University of Science and Technology, China
e-mail: chunsheng.tom.zhu@gmail.com

IKRAM ASHRAF, *Guest Editor*
Nokia Bell Labs, Finland
e-mail: ikram.ashraf@nokia-bell-labs.com

APPENDIX: RELATED WORKS

[A1] S. W. Wright, M. E. Kiziroglou, and E. M. Yeatman, "Inductive power line harvester with flux guidance for self-powered sensors," *IEEE Sensors J.*, vol. 23, no. 18, pp. 20474–20482, Sep. 15, 2023.

[A2] S. Javaid, H. Fahim, S. Zeadally, and B. He, "Self-powered sensors: Applications, challenges, and solutions," *IEEE Sensors J.*, vol. 23, no. 18, pp. 20483–20509, Sep. 15, 2023.

[A3] X. Qiu, Z. Cai, and H. Peng, "Adaptive capture control of a continuum manipulator with self-powered sensors," *IEEE Sensors J.*, vol. 23, no. 18, pp. 20510–20518, Sep. 15, 2023.

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