

SPECIAL ISSUE ON UNIVERSAL POWER SUPPLY TECHNOLOGIES FOR ERA OF TRILLION SENSORS

PREFACE



By the 2030s, trillions of sensors will have been installed in our surroundings and intelligent edge nodes will communicate with each other to improve productivity, enhance value-added services, and increase the quality of our lives. One of the main obstacles to realizing this vision is powering the sensors. Since it is impractical to deploy powerlines to all the sensors or to change their batteries periodically, alternative power supply technologies are needed. Although many types of energy harvesting technology have been developed such as photovoltaic, piezoelectric, and thermoelectric technologies, with some of them meeting specific market needs, more universal technologies will be focused on to some extent in the coming decades.

This special issue focuses on state-of-the-art energy harvesting/storage technologies and their applications. This issue does not include papers on wireless power transfer technologies or disposable batteries, but it should be pointed out that these are also important power supply technologies in the era of trillion sensors.

This special issue contains five papers categorized into “Related Technologies” and “Sensor Applications”. The first three papers relate to vibration energy harvesting. The first paper presents an attempt to drastically increase the power generation performance by introducing a gyro structure, and the other two describe attempts to improve the power generation performance by devising the shape of smart materials. The latter two are more application-oriented. One is related to efficient power storage technology, and the other is an ambitious study of energy harvesting for railways applications.

I would like to thank all authors, reviewers, and others who have helped in the editorial process. I particularly thank Ms. Misako Sakano, the leader of the Editorial Department, for her great help and encouragement and Professor Kohji Mitsubayashi, one of the associate editors, for inviting me to edit this special issue.

Keiji Takeuchi
NTT Data Institute of Management Consulting, Inc.
Japan