# Masao Horiba Awards
# 堀場雅夫賞

## 2019 Masao Horiba Award: Scope of the awards

## Advanced analytical and measurement technologies for efficient control system to maximize the performance of electric power and batteries usage

The Masao Horiba Award was established in 2003, to highlight innovative work in analytical measurement technologies. This information is critical to understanding many phenomena and, thus, forms the basis of new scientific research. These properties also form the foundation for the transition of materials to industrial production. For the product and process optimization, these analytical and measurement technologies are indispensable. I hope that the Masao Horiba Award, named after the founder of HORIBA, Ltd., will contribute to illuminating the achievement of researchers who are working hard in the field of analytical and measurement technology. We look forward to receiving many application for this year's award.

Atsushi Horiba
Chairman & Group CEO
HORIBA, Ltd.

### ●Eligible fields for 2019 Masao Horiba Awards:

**"Advanced analytical and measurement technologies for efficient control system to maximize the performance of electric power and batteries usage ", which will contribute to energy management in the coming decades.**

**1) Technology field 1: New measurement technologies that will attain the unified control over the mechanical, electrical, and chemical sections of the energy supply system, which will contribute to the effective and robust controls of electric vehicles and grid power supply. The proposed method is expected to include the following technological aspects:**

-New measurement methods to visualize an internal state of a battery as it is being used.
-New monitoring technologies for an entire electric power system from a bird's eye view to enable predicting power demand.
-New statistical methods to identify appropriate monitoring points within the energy network that represent the behavior of the whole system.

**2) Technology field 2: New analytical methods utilizing data science that will contribute to a range of energy management applications in future, such as effective and robust controls of a grid power supply including electric vehicles. The proposed method is expected to include the following technological aspects:**

-New approach of simulation modeling that does not employ only deductive, physical models, but also inductive, data driven models using statistical techniques.
-New technologies for precise estimation of the internal state and dynamics of a battery beyond impedance method.
-New modeling technologies for electrochemical reactions during battery charge/discharge process that can be integrated into mechanical, system level control.
-New inductive verification methods for identifying "interference faults" of a complex system such as automobile powertrain control system that conventionally employs "IF-THEN" control.
-Control technologies that will contribute to more stable and resilient grid energy supply network that could be far more distributed than it is today.

*These above two fields need to be used for industrial applications, and contribute to the reduction of time-to-market and energy efficiency.

### ●Eligibility of Applicant

**An applicant should be a researcher or an engineer at a university or a public research facility worldwide, engaged in research anddevelopment in the field described above. The applicant should fulfill one of the following criteria:**

- The applicant is expected to achieve outstanding academic or technological inventions or discoveries in research or development in a field eligible for this award.
- The applicant is expected to solve important academic or technological issues in the field eligible for this award. Potential of the applicant is highly evaluated rather than his/her current achievement. Applications from outside Japan must be made at the invitation from an employee of a HORIBA Group company.

### ●Incentive

A certificate of commendation will be presented to each recipient of the 2018 Masao Horiba Awards at the award ceremony.
A supplementary award will also be made. Research subsidy of JPY1,000,000 yen will be presented in the first year and the same amount JPY1,000,000 yen for the next year. The award and the supplementary award will be given on the condition that the winners accept the invitation to attend the award ceremony held in Kyoto on Oct. 17, 2019 and that the winners continue to meet the eligibility described above.

### ●Submission Deadline

Applicants must submit the above original application documents with 1 copy, and a CD-R or DVD to the HORIBA Group company employee who invited them to apply for the award by Friday, May 10, 2019.

### ●Judges for the 2019 Masao Horiba Awards

**Chairperson:**

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| Dr. Akira Yoshino | Chairman, Consortium for Lithium Ion Battery Technology and Evaluation Center (LIBTEC) |

**Judges:**

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| Dr. Scott Samuelsen | Professor, Mechanical and Aerospace Engineering, University of California, Irvine |
| Dr. Takashi Washio | Professor, The Institute of Scientific and Industrial Research, Osaka University |
| Dr. Kuniaki Tatsumi | Supervisory Innovation Coordinator, Technology Marketing Office, Research and Innovation Promotion Headquarters, National Institute of Advanced industrial Science and Technology (AIST) |
| Dr. Hidekazu Nishimura | Professor, Graduate School of System Design and Management, Keio University |
| Dr. Keijiro Iwao | Deputy Project Manager, Project Cell Zero, Research & Development Division, HORIBA, Ltd. |
| Ms. Sayaka Yoshimura | Custom Instruments R&D Department, Research & Development Division, HORIBA, Ltd. |

# 2019 Masao Horiba Awards

Masao Horiba Awards

The Masao Horiba Award was created to encourage researchers and engineers in universities or public laboratories worldwide who are contributing to the field of science and technology through their research related to analysis and measurement. We are now inviting entries for the 16th Masao Horiba Award in 2019 under the theme of "Advanced analytical and measurement technologies for efficient control system to maximize the performance of electric power and batteries usage"

The demand of vehicle using electric power in the automotive industry provides unique challenges. Combustion engine designers have been consistently focused on the same factors for decades and need to change them. They must consider new ways to design systems in electrified vehicles that simultaneously meet energy consumption, emission and cost targets under a range of variables and conditions such as acceleration profile, battery charge/discharge management, engine speed and torque, thermal energy balance and so on.

Multiplying the number of calibration parameters creates added demands for the battery as it charges and discharges energy. Autonomous vehicles are another example of an innovation currently being tested by many manufacturers to generate more desirable, high-quality automobiles.

Electric power generation by renewable energy is gaining momentum. That includes solar and wind power, and the development of electric cars with exponentially enhanced energy efficiency. There is also a strong movement towards energy security. These trends are directed by tough national policies and social interests designed to cut $CO_2$ emissions. Examples include fuel consumption regulations in Europe, policies to support the development and spread of electric cars in China, and technical developments for next-generation energy sources, such as the utilization of hydrogen to store renewable energy.

Renewable energy is also facing a critical stage due to factors outside of the operator's control. At a power plant in Kyushu, Japan, where renewable energy accounts for 20 percent or more, there was an occasion the output of solar power generation was halted due to the disproportionate balance between supply and demand. Natural occurrences can also create havoc when anomalies occur, such as a recent earthquake in Hokkaido, Japan. Due to the damage in one plant, a chain reaction occurred with the connecting power plants, resulting in a widespread shut-down.

Renewable energy demands also change due seasonal temperature fluctuations, daytime and nighttime temperature variations, and the disparity of wind and sunlight, based on weather conditions. It's becoming more urgent to control these fluctuations in response to these occurrences.

With the background described above, we are keen to support young researchers and engineers in academia who will lead the advancement of these technologies for the future society.

We look forward to learning as many promising ideas as possible in the 2019 Masao Horiba Awards.

Masayuki Adachi, Dr. Eng.
President & COO
HORIBA, Ltd.

For detailed information, please see our website.

Masao Horiba Awards website: http://www.mh-award.org/en/
Contact form for inquiry: https://www.horiba.com/contact-form/