



## **MEDIA RELEASE FOR IMMEDIATE RELEASE**

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### **ROHM AND A\*STAR'S IME TO DEVELOP ARTIFICIAL INTELLIGENCE CHIP FOR PREDICTIVE MAINTENANCE IN SMART FACTORIES**

*The chip is expected to enable more efficient prediction of machine failures by processing and analyzing data gathered by sensors in real-time, paving the way for greater asset productivity and lower overall maintenance costs*

**Kyoto, Japan and Singapore** — ROHM Semiconductor, a leading semiconductor manufacturer, and A\*STAR's Institute of Microelectronics (IME), a world renowned research institute under the Agency for Science, Technology and Research (A\*STAR) today announced the joint development of an artificial intelligence (AI) chip to boost efficiency in predictive maintenance for smart factories.

The concept of 'Predictive Maintenance' has become widespread in the manufacturing industry as manufacturers begin to digitalize their production lines for increased productivity and competitiveness. Predictive maintenance forecasts machine failures, and it involves monitoring the function and health of machines, and identifying potential problems based on data received through device logs and sensors, and eventually taking counter-measures such as repairing or replacing the affected machine.

In order for any machine abnormality to be detected throughout a production line, diverse amounts of data gathered from multiple sensors are first transmitted over a wireless network to a central computer server for processing and analysis. However, as the number of sensors increases in the future, the wireless communication technology for Wireless Sensor Networks (WSNs)<sup>1</sup> would face bandwidth constraints, and be unable to expeditiously transmit the increasingly large sensor data to the computer server (Please refer to Figure 1 for illustration of wireless transmission of sensor data to computer server in Annex A).

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<sup>1</sup> A wireless sensor network is a wireless network which enables the collection of environmental and physical conditions by interlinking wireless devices with multiple sensors.

Powered by the Internet of Things (IoT), AI is becoming a key enabler for predictive maintenance and performance improvement, because of its cognitive abilities such as learning, reasoning and problem-solving. ROHM and IME will develop an AI chip that is capable of processing and analyzing data as soon as they are received by a sensor node. This drastically reduces the amount of sensor data to be transmitted wirelessly to a central computer server for them to be further processed and analyzed.

Leveraging ROHM's original AI analytical algorithms, and IME's capabilities in ultra-low power analog/digital integrated circuit and systems, as well as analog computation circuits developed by both parties, the research collaboration will enable the developed chip to filter volumes of data across multiple sensors, and analyze complex data patterns in real-time. (Please refer to Figure 2 for overview of chip with artificial intelligence algorithms in Annex A).

This novel AI chip is expected to perform significantly faster than the conventional method for predictive maintenance, as well as reduce power consumption, paving the way for greater asset productivity and lower overall maintenance costs. ROHM has plans for the AI chip to be compatible with wireless technologies such as Wi-SUN, and EnOcean<sup>2</sup>, and incorporate the chip to its proprietary sensor nodes and wireless modules.

"I'm exceptionally delighted that we have our first opportunity for cooperative research with A\*STAR's IME. Through the fusion of ROHM's sensor technology, analog low-power technology and AI architecture with IME's capabilities in low-power integrated circuit technology, we want to provide the optimum solutions for edge nodes", commented Mr Koji Taniuchi, Fundamental Research and Development Division, General Manager at ROHM.

"Over the years, IME has built up strong expertise and capabilities in integrated circuits and systems, as well as research design and process technologies. The factories of tomorrow will demand highly intelligent solutions for greater integration of their operations in a seamless network across the value chain. Our joint research with ROHM in developing an artificial intelligence chip is an important step towards achieving greater efficiency in data transmission and analysis necessary for predictive maintenance in the era of smart manufacturing", said Dr Tan Yong Tsong, Executive Director of IME.

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<sup>2</sup> EnOcean is a battery-free wireless communication standard that uses energy harvesting technologies to collect slight amounts of energy, such as from light, temperature, vibration and so on, and convert it into electrical energy.

**Enclosed:**

**ANNEX A** – Wireless Transmission of Sensor Data to Computer Server and Overview of Chip with Artificial Intelligence Algorithms

**ANNEX B** – Image of Mr Koji Taniuchi, Fundamental Research and Development Division, General Manager at ROHM and Dr Tan Yong Tsong, Executive Director of IME at a meeting at A\*STAR

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**About ROHM Semiconductor**

[ROHM Semiconductor](#) is an industry leader in system LSI, discrete components and module products, utilizing the latest in semiconductor technology. ROHM's proprietary production system, which includes some of the most advanced automation technology, is a major factor in keeping it at the forefront of the electronic component manufacturing industry. In addition to its development of electronic components, ROHM has also developed its own production system so that it can focus on specific aspects of customized product development. ROHM employs highly skilled engineers with expertise in all aspects of design, development and production. This allows ROHM the flexibility to take on a wide range of applications and projects and the capability to serve valuable clients in the automotive, telecommunication and computer sectors, as well as consumer OEMs. For more information, please visit <http://www.rohm.com/web/in/>.

### **About the A\*STAR Institute of Microelectronics (IME)**

The Institute of Microelectronics (IME) is a research institute of the Science and Engineering Research Council of the Agency for Science, Technology and Research (A\*STAR). Positioned to bridge the R&D between academia and industry, A\*STAR IME's mission is to add value to Singapore's semiconductor industry by developing strategic competencies, innovative technologies and intellectual property; enabling enterprises to be technologically competitive; and cultivating a technology talent pool to inject new knowledge to the industry. Its key research areas are in integrated circuits design, advanced packaging, bioelectronics and medical devices, MEMS, nanoelectronics, and photonics.

For more information on IME, please visit [www.ime.a-star.edu.sg](http://www.ime.a-star.edu.sg).

### **About the Agency for Science, Technology and Research (A\*STAR)**

The Agency for Science, Technology and Research (A\*STAR) is Singapore's lead public sector agency that spearheads economic oriented research to advance scientific discovery and develop innovative technology. Through open innovation, we collaborate with our partners in both the public and private sectors to benefit society.

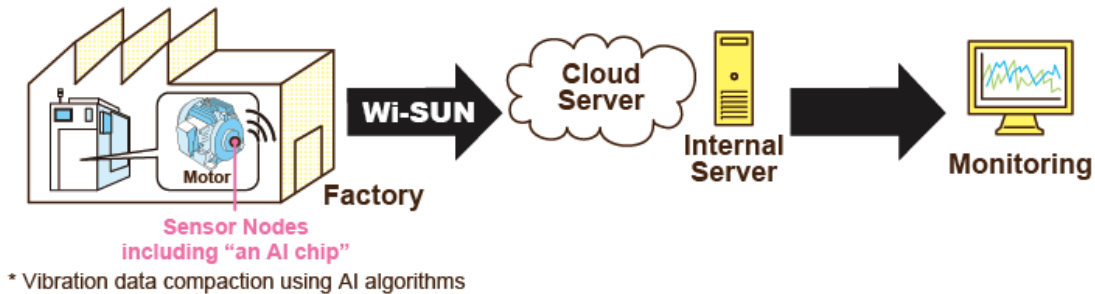
As a Science and Technology Organisation, A\*STAR bridges the gap between academia and industry. Our research creates economic growth and jobs for Singapore, and enhances lives by contributing to societal benefits such as improving outcomes in healthcare, urban living, and sustainability.

We play a key role in nurturing and developing a diversity of talent and leaders in our Agency and Research Institutes, the wider research community and industry. A\*STAR oversees 18 biomedical sciences and physical sciences and engineering research entities primarily located in Biopolis and Fusionopolis.

For more information on A\*STAR, please visit [www.a-star.edu.sg](http://www.a-star.edu.sg).

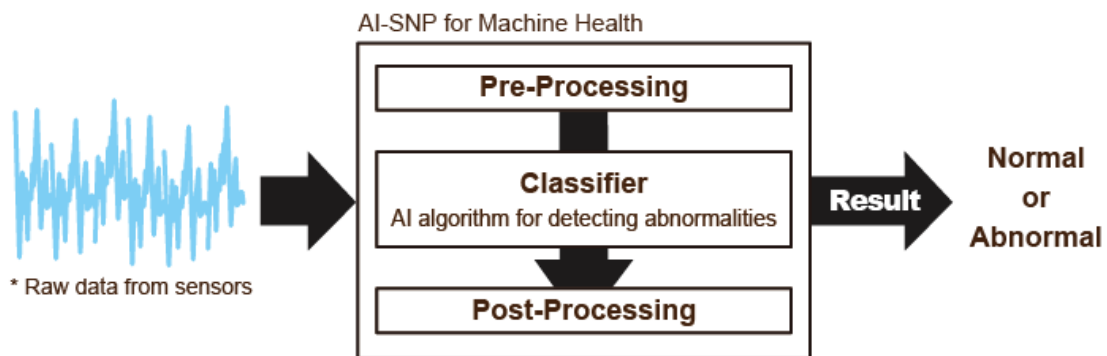
**WIRELESS TRANSMISSION OF SENSOR DATA TO COMPUTER SERVER AND OVERVIEW OF CHIP WITH ARTIFICIAL INTELLIGENCE ALGORITHMS**

**Figure 1**  
**Wireless transmission of sensor data to computer server**



*This is an example of communication with server when using Wi-SUN, typical vibration-sensor and machine to machine communications. Wi-SUN is a leading global industry alliance promoting interoperable wireless standards based solutions for the Internet of Things. It offers the advantages of long-distance communication using lower power than wireless LAN (Wi-Fi). Owing to its characteristics of superb energy efficiency and high reliability (high attainability with low RF interference), Wi-SUN is being used in an ever-widening range of IoT applications, such as smart meters for electricity, gas and water.*

**Figure 2**  
**Overview of chip with artificial intelligence algorithms**





*Mr Koji Taniuchi, Fundamental Research and Development Division, General Manager at ROHM (left) and Dr Tan Yong Tsong, Executive Director of IME, at a meeting at A\*STAR*