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 Mitsubishi Electric Corporation

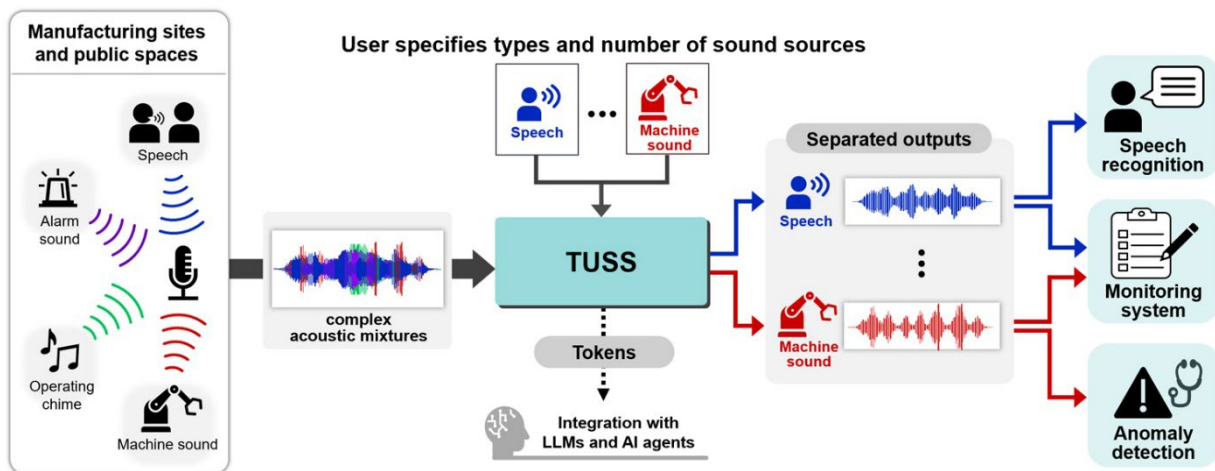
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Mitsubishi Electric Develops Task-Aware Unified Source Separation Technology

*Single AI model distinguishes diverse sounds in complex real-world environments
 to help enhance the reliability of physical AI systems*



Example of TUSS-based system

TOKYO, August 31, 2026 – [Mitsubishi Electric Corporation](https://www.mitsubishi-electric.com) (TOKYO: 6503) announced today the development of its Task-Aware Unified Source Separation (TUSS) technology, which enables a single AI model to separate and extract desired sounds from complex acoustic mixtures. Integrating the technology into physical AI systems in acoustically complex environments, such as manufacturing sites and public spaces, helps improve the reliability of these systems by enabling them to understand complex situations more accurately. Mitsubishi Electric developed the TUSS technology jointly with Mitsubishi Electric Research Laboratories, Inc. in Cambridge, Massachusetts, USA.

In various environments, tasks rely on sound for purposes such as voice-controlled equipment operation, anomaly detection and on-site situational awareness. However, these tasks can become difficult when target sounds from humans, machinery, etc. are masked by other sounds.

The TUSS technology uses prompts to specify the type and number of sound sources to be separated or extracted, enabling a single AI model to perform various sound-source separation tasks, including speech

separation, speech enhancement and environmental sound extraction. Unifying these tasks in a single model avoids the need to develop separate source separation models for different target sounds or applications, allowing the technology to adapt flexibly to varying acoustic environments and operational requirements. Linking the extracted sounds to AI applications, such as anomaly detection, speech recognition, voice-controlled equipment operation and operational recordkeeping, enables these systems to understand complex situations more accurately.

The technology will be exhibited under the title “Ear of Physical AI: Distinguishing Diverse Sounds, from Machine Anomalies to Human Voices” during CEATEC 2026 at Makuhari Messe, Japan from October 13 to 16. A live demonstration will process mixed audio captured at the venue, including sounds from machinery, musical instruments and speech from multiple speakers, and the technology will separate and extract prompt-specified individual sound sources for speech recognition and abnormal sound diagnosis.

Features

1) Separates and extracts prompt-specified sounds to meet specific on-site needs

- A single AI model performs various sound-source separation tasks, including speech separation, speech enhancement and machine sound separation.¹
- A new prompt-based approach specifies the type and number of sound sources to be separated. This enables sounds in specific situations, such as speech, abnormal machine sounds and alarms, to be extracted from complex acoustic environments containing human voices, machine sounds, environmental sounds and music.

2) Algorithm improved for faster processing and flexible implementation in diverse devices and systems

- A technique that reduces computational complexity² enables deployment on resource-constrained devices and systems, such as edge devices, robots, monitoring systems, and industrial equipment.
- An improved algorithm³ enables a single AI model to work with different numbers of microphones, allowing the technology to support a wide range of input devices.

3) Extracted sounds help enhance the reliability of physical AI systems

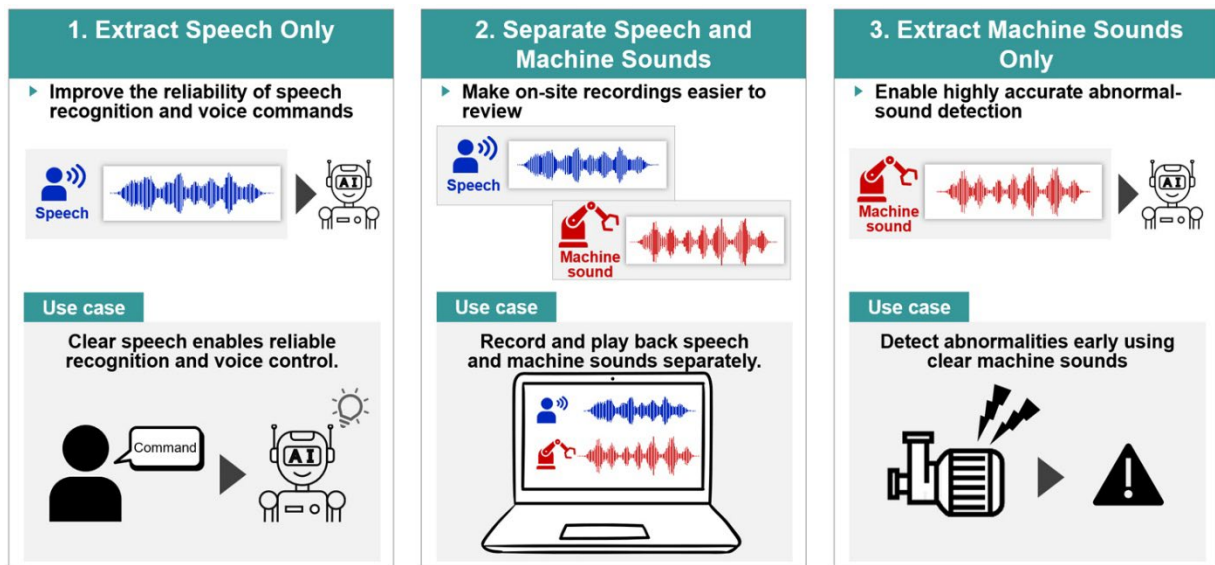
- Using extracted sounds in applications such as anomaly detection, speech recognition and operational recordkeeping helps physical AI systems understand on-site conditions more accurately.
- A newly developed source-aware codec technology⁴ encodes prompt-specified sound sources into discrete tokens for use as input for large language models, enabling AI agents to use auditory information for situational understanding and decision-making.

¹ Task-aware unified source separation technology that performs major separation tasks for speech, environmental sounds and music using a single AI model. Presented at IEEE ICASSP 2025.
<https://www.merl.com/publications/docs/TR2025-032.pdf>

² Technology that reduces the computational complexity of TUSS. Presented at WASPAA 2025.
<https://www.merl.com/publications/docs/TR2025-143.pdf>

³ Technology that performs source separation using a single AI model regardless of the number of microphones. Presented at IEEE ICASSP 2026.
<https://www.merl.com/publications/docs/TR2026-034.pdf>

⁴ Codec technology that estimates separate compressed representations for prompt-specified sound sources. Presented at IEEE ICASSP 2026.
<https://www.merl.com/publications/docs/TR2026-032.pdf>



Examples of applications using extracted sounds

Future development

Mitsubishi Electric plans to further improve the processing speed and accuracy of its technology and validate it in real-world settings, such as factories, office buildings, public facilities and other sites. The goal is to implement the technology in physical AI systems and apply it to other products during the fiscal year beginning in April 2027. The company will also leverage its Serendie™ digital platform to connect the technology with AI applications such as anomaly detection, speech recognition, voice-controlled equipment operation and operational recordkeeping, thereby promoting the use of sound data collected at worksites.

“Serendie” is a registered trademark or a trademark of Mitsubishi Electric Corporation in Japan and/or other countries.

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About Mitsubishi Electric Corporation

Guided by its [corporate philosophy](#), Mitsubishi Electric Corporation (TOKYO: 6503) places sustainability at the core of its operations and values stakeholder trust—encompassing society, customers, shareholders and employees. In pursuing profitability, capital efficiency and growth, Mitsubishi Electric works closely alongside customers to develop value-added solutions that address today’s complex challenges while enhancing the company’s sustainable corporate value.

Founded in 1921, Mitsubishi Electric has over a century of experience in delivering reliable, high-quality products and solutions. With over 200 group companies and approximately 150,000 employees worldwide, the company is a recognized global leader in manufacturing, marketing and selling electrical and electronic equipment and systems across a broad range of sectors, including public utility systems, energy systems, defense and space systems, factory automation systems, automotive equipment, building systems, air conditioning systems & home products, digital innovations, and semiconductor & devices.

Mitsubishi Electric recorded consolidated revenue of 5,894.7 billion yen (U.S.\$ 36.8 billion*) in the fiscal year that ended on March 31, 2026. For more information, please visit www.MitsubishiElectric.com

*JPY 160=USD 1, the approximate rate on the Tokyo Foreign Exchange Market on March 31, 2026