



KOREA INSTITUTE OF
MACHINERY & MATERIALS

PRESS RELEASE

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to bring a better future
based on innovation
in mechanical technology

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Dispatching KIMM AI Firefighters for Initial Response in Extinguishing Fires

- KIMM succeeds in developing an autonomous fire suppression system for initial response -
- Established a system that can accurately recognize fires and spray directly at the fire source -

- For the first time in Korea, the Korea Institute of Machinery and Materials (President Dr. Sang Jin Park, hereinafter referred to as KIMM), an institute under the jurisdiction of the Ministry of Science and ICT, has developed a technology that can extinguish fires by recognizing fire incidents at their onset and automatically spraying firefighting materials (water & foams) at the source of fire.
- Principal Researcher Dr. Jung-Hoon Chung and his research team at the Department of System Dynamics, part of the Mechanical Systems Safety Research Division at KIMM, have developed an autonomous fire suppression system that can quickly extinguish fires in their early stages.

- This autonomous fire suppression system, which is designed for initial response in fighting fires, is a new-concept technology that can supplement the shortcomings of conventional fire extinguishing equipment. With this technology, at the onset of fire incidents, fire extinguishing materials is autonomously aimed and sprayed toward the fire source to extinguish the fire when it is still small. In this way, it is possible to fundamentally prevent the fire from spreading within the golden time, thus minimizing damage caused to surrounding equipment and facilities.
- Sprinklers and other conventional fire extinguishing equipment installed on ships and buildings for fire suppression are designed to spray fire extinguishing materials entirely over a given space when a fire is detected. When a false alarm sounds, such equipment is set off unnecessarily, thus resulting in extensive damage. As such, they were often set to operate manually.
- However, by learning to distinguish between fire and non-fire incidents using artificial intelligence (AI), the new autonomous fire suppression system developed by KIMM is designed to activate only in response to actual fires. Rather than spraying fire extinguishing materials over a given space entirely, it is designed to directly aim and spray at the fire source, just as a firefighter puts out a fire. As a result, minimal damage is caused to areas outside the source of the fire.
- KIMM's newly developed autonomous fire suppression system for initial response in extinguishing fires is composed of a fire detection sensor; a fire extinguishing monitor; and an analysis and control device that uses AI to determine whether an incident is an actual fire incident, estimates the location of the fire, and controls the fire extinguishing monitor. The KIMM research team's design recognized fire incidents with a detection accuracy of 98% or more, and fire extinguishing water and foams can be sprayed up to 65 meters and 38 meters, respectively. Furthermore, test using the ship motion simulator and simulations using 3D Unity software and reinforced learning algorithm demonstrated that the newly designed fire suppression system operates normally even in sea state conditions of level 3 or higher, thus confirming that the system can be installed on ships as well.

- This newly developed technology can be used for ammunition depots, munitions depots, aircraft hangars, logistics depots, and for various ships. By autonomously suppressing multiple fires in their early stages through, this technology will be especially useful in the instances when fires occur simultaneously in multiple compartments of a ship as a result of being hit in combat. As such, it is very helpful in maintaining combat power and improving survivability.

- Dr. Jung-Hoon Chung, principal researcher at KIMM, stated that the newly developed autonomous fire suppression system is not only capable of reducing fires damage to human lives and properties, but is also important in providing effective countermeasures for the increasing decline in crew members of ships. He also added that, in addition to the military sector, the technology can also be installed in vehicle carriers, cargo ships, passenger ships, offshore plants, and high-rise apartments where fire ladders cannot be used.

[List of Attachments]

- Attachment 1: Research-related photos (Photos)

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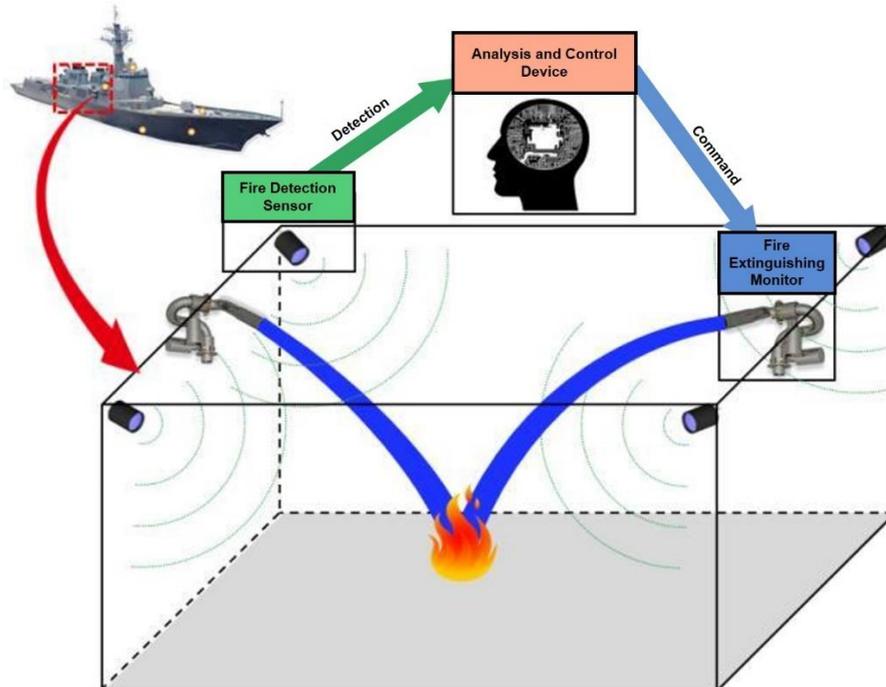
The Korea Institute of Machinery and Materials (KIMM) is a non-profit government-funded research institute under the Ministry of Science and ICT. Since its foundation in 1976, KIMM is contributing to economic growth of the nation by performing R&D on key technologies in machinery and materials, conducting reliability test evaluation, and commercializing the developed products and technologies.

The research for this technology was conducted as a “Civil-Military Technology Development Project” implemented by the Institute of Civil Military Technology Cooperation (Director Ahn Hyogeun) of the Agency for Defense Development. Participants in this project included the Korea Institute of Civil Engineering and Building Technology, Chungnam National University, Super Century Co., Ltd., and the Korea Military Academy.

Credit: The Korea Institute of Machinery and Materials (KIMM)

Usage Restrictions of Multimedia (Attachment File): The sources of photos and research results from KIMM must be specified.

- Attachment 1: Photos of research results (Photos)



Description: A Conceptual diagram of the autonomous fire suppression system



Description: A fire extinguishing experiment conducted using the autonomous fire suppression system and the ship motion simulator developed by the research team of Dr. Jung-Hoon Chung, a principal researcher at KIMM. The fire extinguishing water is aimed and sprayed from the fire extinguishing monitor on the upper-left to the fire source on the lower-right.



Description: (Left) A photo of Dr. Jung-Hoon Chung, Principal Researcher, KIMM
(Right) KIMM Principal Researcher Dr. Jung-Hoon Chung (second from the left)
examines the fire analysis and control devices with other members of the research team.