KOSHA

Using Drones to Uncover the Risks of Falling from Roofs!

· **Launching a pilot project for industrial accident prevention by identifying dangers of cattle shed roof through digital twin simulations**

· **Moving forward, AI-powered risk assessment from drone images enables swift targeting of wide areas**

— Roof construction accidents at cattle sheds, factories, warehouses, and other sites resulted in 125 fatalities over the three-year period from 2020 to 2022. These fatal accidents are particularly prevalent in small-scale, extremely short-term projects that last just one to two days.

— The Korea Occupational Safety and Health Agency (KOSHA), a subsidiary of the Ministry of Employment and Labor, launched a pilot program from August to November 2023 to establish a roof construction accident prevention system utilizing digital twin* technology, with a specific focus on preventing roof collapses. This system enables the assessment of roof material, aging, and other risk factors through drone photography. As the project advances, specialized accident prevention measures for high-risk roof sites are expected to become feasible.

   * Digital twin: a virtual representation of real-world facilities or locations, implemented as a digital space for various applications

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— KOSHA has used its pilot program and developed digital maps for cattle sheds with limited access. Collaborating with Hapcheon-gun in Gyeongsangnam-do, 405 cattle sheds were selected for digital twin representations, and drone aerial photography (with a resolution of 5 cm/pixel) was conducted following community outreach.

— To assess the risk level of photographed cattle shed roofs, the agency collaborated with experts to derive risk assessment criteria. These criteria incorporate factors such as material, aging, damage, and skylights/solar panels/openings; and include area and quantity information. The finalized criteria were applied to the 405 cattle sheds, categorizing them into five risk levels (safe, caution, warning, severe, high risk).

— KOSHA has developed digital maps illustrating the locations of cattle sheds and their associated risk levels. These initiatives include offering direct technical support to high-risk cattle sheds, disseminating one-point sheet (OPS: a type of safety checklist used for conducting risk assessments) and other safety and health materials, collaborating on inspections and campaigns with local governments (Hapcheon-gun), and executing various activities to prevent industrial accidents.
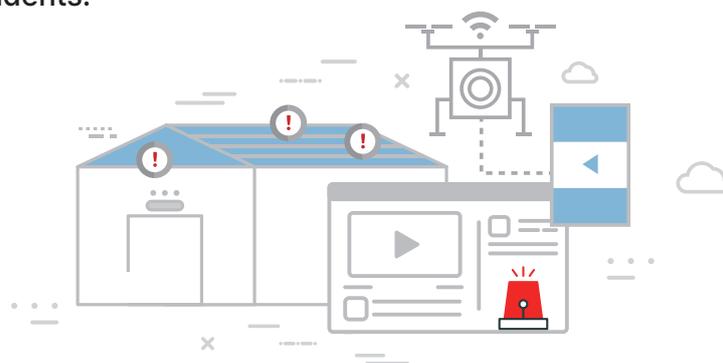
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— In the upcoming year, KOSHA will expand digital mapping to encompass not only cattle sheds but also factories and industrial complexes prone to roof construction risks. Plans are also in the works for developing an AI-powered automatic recognition system capable of identifying roof material types and risk factors. To this end, satellite and aerial photography data will be collected and associated dataset* will be established. Moreover, various pilot measures will be undertaken such as sensor installation (including displacement/access detection sensors, with future sensor types to be determined) to detect fall risks among roof construction workers.

* Data including objects, scope, risk information, etc., for AI learning

— The ultimate goal is to apply the developed system to industrial accident prevention projects in densely populated areas with roof construction risks. Rapid establishment of a roof risk database in vast areas where direct access are challenging will enable efficient industrial accident prevention activities such as fall risk zone management and close work progress monitoring.

— KOSHA President Ahn Jong-ju expressed optimism, stating: "We anticipate an efficient reduction in fatal accidents by establishing industrial accident prevention models using digital twin and other smart technologies. We will continue to explore various smart safety and health systems to take the lead in mitigating serious accidents."