NIPPON STEEL ENGINEERING CO., LTD.

Advanced safety management system for manufacturing and construction site workers by using image sensing AI

Object of the project

THAI NIPPON STEEL ENGINEERING & CONSTRUCTION CORPORATION LTD ("TNS"), a subsidiary in Thailand, manufactures and constructs offshore facilities for natural gas production in ASEAN countries. Machine-learning AI based on information from CCTV cameras detects unsafe behavior of workers and immediately provides feedback to reduce the risk of accidents, which is also used for safety education. We aim to help resolve issues facing not only our Group but also Thailand and the industry.

Cooperation with local companies/governments

AI AND ROBOTICS VENTURES COMPANY LIMITED. (“ARV”) has knowledge of the industry and experience of similar AI development. TNS is outsourcing the development of image-sensing AI and AI operation system to ARV. In the development process, the two companies worked together to understand TNS's safety management standards, collect AI training data, and examine the necessary IT infrastructure. TNS and ARV are also considering technology exchange and intellectual property management of their proprietary AI with a view of future expansion and commercialization. Both companies believe that collaboration outside of this business is possible and plan to continue discussions.

Targeted economic/social issues

In ASEAN countries, "safety and health" awareness is on the rise, and the realization of safe working environment in manufacturing and construction industries has become a social requirement. In addition, a shortage of workers is becoming apparent in Thailand due to the country's declining birthrate and aging population. Under such circumstances, 70% or more of the total number of accidents are occurring in the manufacturing and construction industries. The development and practical application of this advanced safety management system protects the lives and health of workers in these industries, and creating a safe, secure, and comfortable working environment also leads to higher productivity. This project will verify technical issues and conduct trials at actual sites for practical use. TNS, which belongs to the manufacturing/construction sector, has two large-scale fabrication yards in Thailand for the manufacture and construction of offshore facilities for natural gas production. TNS has 300 employees and 3,000 fabrication subcontractor’s workers in the fabrication yards and strive to manage safe operations continuously. In the manufacture and construction of important national facilities, it is essential to maintain business continuity through stable and safe operations as well as high quality control. TNS has a high level of safety management knowhow since it started operations in 1987. TNS hopes to help improve the productivity in the industry as a whole by digitizing TNS’s safety management knowledge, and sharing it with related companies.

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Details of demonstration

This project to recognize and resolve technical issues and confirm their practicality as follows in order to achieve the final objective.

A. Development of original image sensing AI
- Detection accuracy of 80% or higher for detection target items.

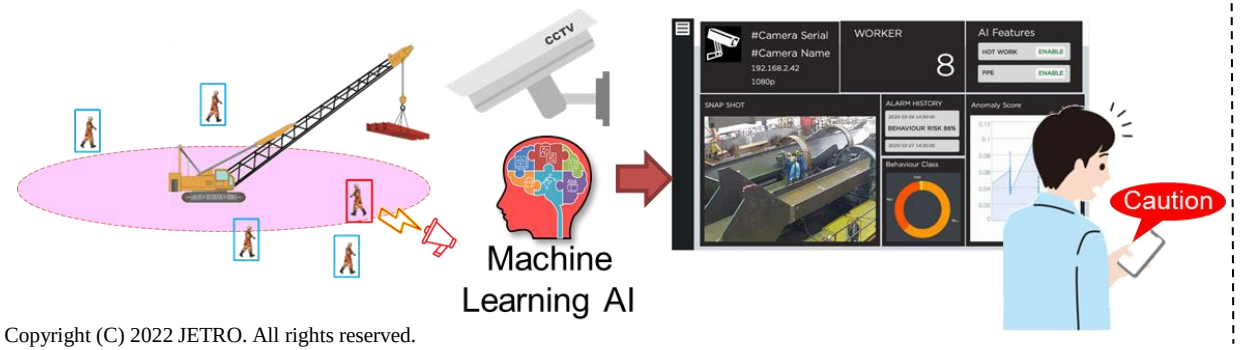
B. AI operation system development
- Highly practical operability, analysis and visualization of data

C. Expansion of image acquisition devices
- Use of versatile devices (regular CCTV)

D. IT infrastructure for AI operation
- Simultaneous processing capacity of about 30 CCTV images

E. Notification of detection results to the workplace
- Immediate alert of unsafe behavior detection results

F. Practical use of detection results
- High efficiency of safety management, advanced utilization of the data



Project outcome / Future plans

We have a prospect of achieving the targets for the demonstration items.
In terms of technology, we have developed a machine-learning AI, and have achieved a detection accuracy of 80% through learning. For further versatility, we were able to confirm that commercially available video devices and computers could be used, also a high-performance virtual computer and enhanced IT infrastructure are required for further implementation.
In terms of implementation, we will continue to work with users and discuss the expansion of detection items, methods of analyzing/utilizing detection results.
In addition, we are also training employees who can maintain and upgrade the system.
We would like to share this with potential users, and continue to research their needs, and consider intellectual property management for future commercialization.