

Research and Development of Artificial Intelligence (AI) Systems at Tadano



Takamatsu, Japan - Tadano Ltd. is engaging in the research and development of artificial intelligence (AI) systems for future lifting needs. The following explanation, as well as our AI Research and Development Video (link below), provide further details about this exciting development.

1. Background

The aim of the Tadano Group's AI research and development initiatives is to provide innovative solutions to current challenges in the lifting industry. For example, the declining number of skilled workers is becoming a severe problem in the global construction industry, and the market in Japan, where Tadano is headquartered, is facing the compounding challenge of a shrinking working-age population due to the country's demographic aging problem. As the number of skilled crane operators declines, Tadano is working on technological innovations that will simplify and partially automate crane operations. With the eventual goal of achieving autonomous crane operation, we aim to greatly improve the safety level at construction sites.

For this purpose, Tadano has teamed with DeepX, Inc. and, under the direction of Professor Yutaka Matsuo of Tokyo University (a leader in the field of AI research), we have been conducting joint research aimed at developing robust AI systems. Our current applications have already delivered good results in terms of reducing the load sway that can result from the difficulty in the concurrent slewing, boom elevation, and load hoisting that comprise the main operations of any crane lift.

2. Current Results

Slewing a boom with a suspended load results in a lag in the movement of the load, which trails the boom head in a slightly displaced position. When the boom stops above the target destination, the pendulum principle acts on the wire rope and the load, causing the load to overshoot the target position. This phenomenon is referred to as “load sway.”

Ordinarily, an operator utilizes multiple levers or controls and makes adjustments to prevent (or catch) load sway while observing the lifting conditions with his or her own eyes. The execution of safe lifts requires that crane operators have skilled technique and refined experience. In Tadano’s current research, we utilize data showing load weights and positions related to the crane’s operational status, and then we execute repeated virtual simulations to make the AI system engage in deep learning. Lifts executed with this AI system saw improved scores related to load sway reduction, and actual test cranes featuring the AI system smoothly were able to move real loads.

3. Toward the Future

AI technology will be effective not only in controlling suspended load sway, but it also can help operators to make operational decisions. For example, AI systems can help determine the optimal trajectory for moving a suspended load by sensing obstacles in the work environment. Tadano will continue to incorporate the deep know-how of our research partners and refine our lifting technologies in order to make safer crane operations a reality.

These developments are encompassed by the Tadano Vision of “Pursuing Further Excellence for the World and the Future.” Tadano contributes to improving the global environment as a part of the greater society, and we aim to achieve long-term growth as we step forward into our second century of operations. Our ongoing research and development of AI systems will help bridge the gap and someday lead to the development of actual cranes with built-in AI capabilities. With our Digital Transformation (DX) and Green Transformation (GX) initiatives, Tadano is leading the way to the future of lifting.

4. Tadano AI Research and Development Video

<https://youtu.be/ANc7V7RHKcM>



Reference: Overview of DeepX, Inc.

DeepX is an AI startup which has its roots in the Matsuo Laboratory at the University of Tokyo with the mission of “Automating Any Machine and Innovating Global Industries.” By automating any kind of machine and promoting automation of a wide range of manual work using various technologies including AI, DeepX aims to solve problems such as labor and skilled worker shortages as well as excessive staff workloads, which are significant challenges to many industries.

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Established: April 22, 2016

Representative: Kaoru Nasuno, Chief Executive Officer

Business: Support for automation of machinery and field operations, business development using AI technology, software development, and R&D

URL: <https://www.deepx.co.jp/>

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About the Tadano Group

Since Tadano developed Japan’s first hydraulic truck crane in 1955, the company has grown globally, while constantly striving to implement our Corporate Philosophy of Creation, Contribution, and Cooperation. The Tadano Group delivers our Core Values – Safety, Quality, and Efficiency Based on Compliance (C+SQE) – in each and every one of our products and services.