

Yokohama Rubber and dotData Begin Joint Development of an AI Agent for Manufacturing R&D

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The Yokohama Rubber Co., Ltd.

dotData, Inc.

The initiative will combine automated Signal Intelligence with generative AI to help engineers develop hypotheses, interpret findings, and make informed decisions through human-AI collaboration.

The Yokohama Rubber Co., Ltd. (Headquarters: Hiratsuka City, Kanagawa Prefecture; Chairman and CEO, Chairman of the Board: Masataka Yamaishi; “Yokohama Rubber”) and dotData, Inc. (Headquarters: California, USA; CEO: Ryohei Fujimaki; “dotData”) today announced the joint development of an AI agent designed to help engineers develop hypotheses, interpret findings, and make decisions in manufacturing research and development (R&D).

The initiative will validate the required capabilities and technical feasibility of the AI agent before its full-scale deployment in R&D operations.

The joint solution will combine information from technical documents, including design specifications and experimental reports, with engineers’ accumulated expertise and features derived from measurement data using dotData’s Signal Intelligence technology. The resulting system will provide engineers with information and insights relevant to the objectives, circumstances, and constraints of each R&D project.

The AI agent is not intended to produce a single “correct” answer. Instead, it will use a human-in-the-loop framework, in which engineers remain responsible for decisions, to present multiple possibilities, perspectives, and potential risks. This approach is designed to broaden engineers’ thinking and support their professional development through ongoing collaboration with AI.

Background

Manufacturing R&D generates diverse data through experiments, simulations, production, and evaluation. Developing new technical hypotheses from this data requires engineers to interpret the findings and make decisions informed by specialized knowledge and context, including R&D objectives, experimental conditions, technical constraints, and prior experience.

R&D focused on creating new technologies and products rarely has a single predetermined answer. Abductive reasoning, or forming multiple hypotheses based on observed phenomena and refining them iteratively, therefore plays an important role.

Human hypothesis development benefits from engineers' experience and expertise, but previous successes and established assumptions can sometimes narrow the range of possibilities considered. Yokohama Rubber and dotData believe AI can create new value in manufacturing R&D not by replacing human judgment, but by using data and organizational knowledge to broaden engineers' perspectives.

Vision for the AI Agent

The companies intend to develop a human-in-the-loop system that understands the objectives, targets, and constraints of a research project, finds and organizes relevant information, and supports engineers in four key areas.

Incorporating Design Information and Engineering Expertise

The AI agent will reference information recorded in technical documents, such as design specifications, experimental reports, and research summaries, as well as accumulated engineering knowledge. This information will support evaluations based on the background and historical context of each R&D project.

Presenting Data-Derived Features as Decision-Making Inputs

Using dotData's Signal Intelligence technology, the system will broadly explore patterns in measurement and experimental data without limiting its analysis to factors previously identified by engineers.

The resulting features will provide quantitative, data-driven insights. Combining these insights with design documents and expert knowledge may reveal relationships that would be difficult to identify through experience or existing hypotheses alone, providing a foundation for developing new hypotheses.

Providing Input and Identifying Risks from Multiple Perspectives

Rather than directing engineers toward a single conclusion, the AI agent will provide input from multiple professional perspectives, including materials, design, analysis, production, and evaluation. It will also introduce viewpoints that challenge existing hypotheses.

The agent will raise questions and identify potential risks to help engineers test their assumptions. Examples include: "Could this data support another interpretation?" and "Under what conditions would this relationship no longer hold?"

Keeping Final Interpretation and Decision-Making with Engineers

Engineers will develop hypotheses based on the information presented, test them through experiments or analysis, and incorporate the results into further discussions with the AI agent. This iterative process will support the full R&D cycle, from hypothesis development and validation to interpretation and decision-making.

Through dialogue with the AI agent, engineers will also be able to communicate their analytical objectives and areas of focus, helping guide the processes and settings used for Signal Intelligence. The goal is to create an environment in which engineers, not only data science specialists, can explore relevant features in their data as needed.

Evolving HAICoLab Practices Through AI Agents

Yokohama Rubber has been advancing HAICoLab*, an AI utilization framework designed to promote innovation in products, processes, and services while supporting employees' professional growth through human-AI collaboration.

Since establishing HAICoLab in 2020, Yokohama Rubber has used dotData as a foundational technology. Engineers have applied multiple interpretations to automatically generated features in tire design and rubber mixing processes, helping them develop new insights and hypotheses.

This joint development will expand those efforts through an AI agent. Rather than accepting the agent's suggested features or observations without question, engineers will interpret and evaluate them using their own specialized knowledge and experience.

By repeating this process, engineers can incorporate new perspectives and broaden the mental models they use for analysis and decision-making. The companies aim to achieve two complementary goals: transforming R&D processes and strengthening engineers' creativity and judgment. Through these efforts, they plan to establish a new model for human-AI collaboration in manufacturing R&D.

*HAICoLab is a framework for human-AI collaboration that creates a continuous cycle of innovation in products, processes, and services while supporting human development. The process begins by enhancing AI with data and knowledge accumulated within the company. Engineers then use metacognition to develop hypotheses and apply their expertise to interpret and evaluate the AI's findings.

Future Outlook

Yokohama Rubber

Yokohama Rubber will continue applying the HAICoLab framework by using AI agents in manufacturing R&D projects. The company aims to further advance its R&D processes by combining human creativity with data-driven insights.

dotData

dotData will continue developing technology that enables the use of quantitative context derived from automated Signal Intelligence with AI agents across manufacturing R&D.

By establishing a system that supports diverse research topics, data formats, and stages of development, dotData aims to expand human-AI collaboration across highly specialized business domains.

Comments from the Companies

Motoji Fujita

Officer, Head of Research & Advanced Development Div.
The Yokohama Rubber Co., Ltd.

“Since 2020, we have conducted research and development under the HAICoLab framework, drawing on the complementary strengths of people and AI to create a collaborative environment. We believe AI agents will give engineers access to perspectives beyond their own experience and enable them to evaluate hypotheses from multiple angles. Through this development initiative, we aim to advance our R&D capabilities while supporting the continued growth of our engineers.”

Ryohei Fujimaki

CEO

dotData, Inc.

“Success in manufacturing R&D depends heavily on an organization’s ability to connect its proprietary data and knowledge with AI. The quantitative context generated from data through automated Signal Intelligence provides a foundation for AI agents to engage engineers in practical, data-driven discussions. Together with Yokohama Rubber, which has many years of experience in advanced data utilization, we intend to establish standards for using AI in highly specialized business domains.”

Media Contacts

The Yokohama Rubber Co., Ltd.

Corporate Planning Department, Corporate Communications Section

Email: yinfo@y-yokohama.com

Company profile: <https://www.y-yokohama.com/global/profile/company/>

dotData, Inc.

dotData Inc., Marketing

Email: contact@dotdata.com

Company profile: <https://dotdata.com/our-company/>