



PROJECT TITLE | **Smart Manufacturing by Linking Medium and Small Sized Companies**

COMPANY NAME | **Digital Solutions Inc.**

## Creating a Usable IoT That Can Easily Be Introduced to Medium and Small Sized Companies Which Can Then Become a Foundation for Further Development in Hiroshima Prefecture

Smart factories, a facility in which all the data is digitized and production is organized by smart manufacturing, has become a hot topic in the world today. However, a lot of medium and small sized companies have not yet introduced any smart systems because of reasons like costs. The following project by Digital Solutions Inc. connects in-house systems and unifies data management to reduce human errors caused by manual operation and the inefficient use of facilities. They are developing a platform that visualizes a factory's operational status. First, data is collected from all the IoT devices and analyzed. Then a prognosis is made about potential failures, and solutions are developed to optimize production. Their ultimate goal of this project is to reform the entire manufacturing industry of Hiroshima prefecture.



## The Rise of Large Smart Companies, Smaller Unchanging Ones

The impact of Industry 4.0, which is a part of the Fourth Industrial Revolution and was defined by the German government in 2011, has affected the world's industries. A lot of companies in Japan have also introduced IoT devices. These devices digitize the process of manufacturing by linking all of a factory's machines over a network, thus enabling radical business improvements. However, while big companies and enterprises are rapidly shifting to these new "smart factories," medium and small sized companies, who do not necessarily have the financial backing that large companies do, have not introduced even IT tools and devices yet. They have equipped their factories with machines and established their own manufacturing know-how, but they have not had enough time and money to implement new technologies. While big companies consistently drive digitalization forward in manufacturing, medium and small sized companies, which support those big companies' business from the bottom, can't keep up with the times. The Society for Neuro Business Research from the Japan Medium and Small Enterprise Consultant Association (J-SMECA) has been studying this problem.

The necessity of developing low-cost IoT systems that are easier for medium and small sized companies to introduce has been their topic of discussion in recent years. When they learned about the Hiroshima Sandbox Project, they saw it as a great opportunity. Since joining the Hiroshima Sandbox Project, they have grown their own personal consortium to include, TSUDA Co., Ltd., Komatsu Kinzoku CO., LTD., Koryo Hatsujo CO., LTD., Kondo Manufacturing, ApstoWeb Ltd., J-SMECA, and Digital Solutions Inc. Professor Ryuji Tanizaki, an expert in factory optimization from Kindai University, also joined the team.

## Frequently Changed Production Plans, Unpredictable Production Lines—How Can Medium and Small Sized Companies Solve These Problems with IoT?

Kota Hashizume, assistant manager of the software department of Digital Solutions Inc., worked for a small manufacturing company six years ago. "I was surprised to see the present situation of small manufacturing factories. AI, IoT and recent technologies like these are a kind of trend these days but the factory floor had not changed at all since I started working," he said. He once visited a factory which manufactured prototypes for big companies. They ran a jobbing foundry that produced either many models in small quantities or one prototype model. They could not set prices because they were a subcontract factory.

Furthermore, short delivery and design changes tend to be requested during the prototyping process. Once it is decided that a design is to be changed, manufacturing is discontinued and processing machineries being used are left on standby until the renewed design has come. However, the stop in the production line influences the whole production process of the factory, and it can result in a decrease in sales. Mr. Hashizume was especially shocked by this talk because of his experience with IoT's ability to overcome these kinds of issues. "I soon felt that their problem was worse than I expected. I know IoT won't solve everything at once, but still, I want to alleviate the sufferings of those small factories with our technology."

## IoT Visualizes All the Data in Factories, AI Predicts Machinery Troubles

The project's goal is to encourage medium and small sized companies that have been operating manually with analog devices to digitize and optimize effectively. One of the first steps is to visualize the operation situation. In medium and small sized manufacturing industries, frequent design change is a common occurrence and every time it happens, the person in charge must replan the manufacturing schedule. However, that means that if he/she is out of the office, sometimes nobody can renew the schedule, and the whole process must be suspended. Digital Solution's project sets IoT sensors and lamps like patrol car lamps. These are synchronized to monitor each machine. These sensors can measure the progress of individual machines and determine which machines are used the most. This data is then stored in the cloud. This data can be shown on displays at factories or smartphones as visualized operation statuses. This system makes planning the manufacture of a product easier and more efficient. By analyzing accumulated data sets, they can then proceed to the next step: the development of software that can optimize the manufacturing process by setting the order of machine use automatically.

Digital Solutions is planning to introduce IoT for machinery troubles that cause changes to the manufacturing schedule. For example, a gear pump in a factory is equipped with sensors for measuring pressure, temperature, flow and vibration. Digital Solutions is also developing a system for predicting machinery troubles by collecting data about the durability of the machines which is then analyzed by an AI. In response to demand from companies, they started visualization demonstrations of the tools and devices used in the factories. They were told about actual situations where numerous tools and devices used in factories were lost because workers did not put them back in the right places due to their oppressive schedules resulting from the time intensive nature of manual manufacturing. The project is now trying to solve this simple but unavoidable problem by digitizing tool usage information and by attaching IC tags. They are also exploring ways to share less frequently used tools and devices among different factories.

## A Native Hiroshima System That Is Always Ready to Assist

Currently, these systems are only utilized at factories belonging to consortium members; however, they are planning to spread their system to the whole manufacturing industry of Hiroshima as an IoT system that can be easily introduced. "I know there may be systems similar to ours," Mr. Hashizume says. "But I believe that it is worth it because our system was born in Hiroshima. This means we, the developers, can quickly hurry to assist a local company anytime we are needed."



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