

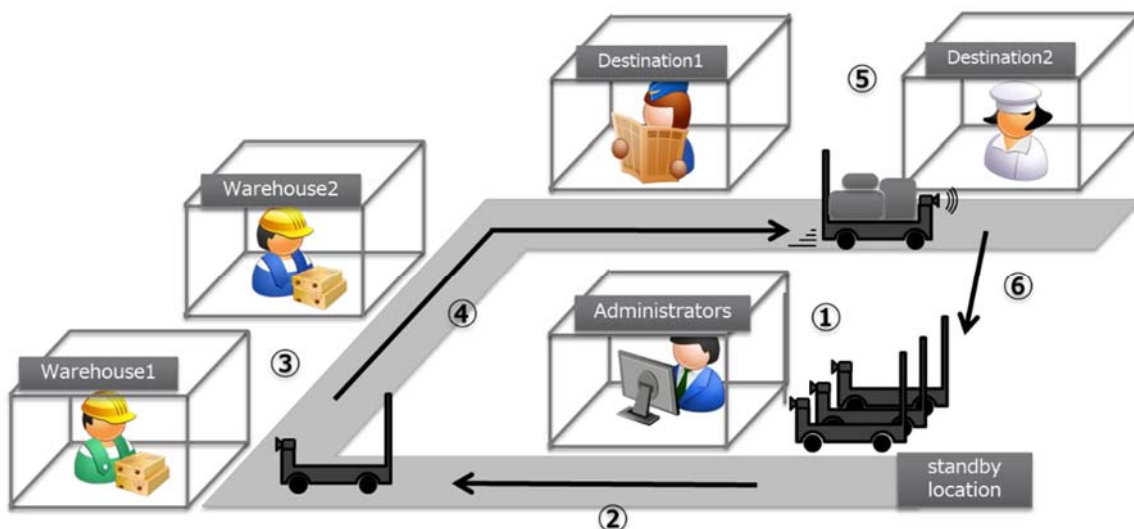
TIS to Implement PoC with the University of Aizu to Automate Transport Operations Using Autonomous Mobile Robots - Aiming for Standardization of Data Models for Autonomous Mobile Robots -

Tokyo, November 13, 2019 - TIS Inc. (Headquarters: Tokyo, Japan) and the University of Aizu announce the implementation of a Proof-of-Concept (PoC) consisting in further automation of a transportation operation through effective collaboration between Inventory management systems and autonomous mobile robots. The PoC will be conducted at LICTiA (Laboratory for leading-edge ICT in Aizu) in the University of Aizu, from November 26th to 28th, 2019.

The PoC experiment aims to verify the effective automation of last-mile transportation system using heterogeneous mobile robots developed by the University of Aizu and the RoboticBase system, developed by TIS based on FIWARE^{*1}. RoboticBase is a platform enabling management of real-time data from various robots, IoT sensors and open data. The platform uses this data to control and manage robots and their operations.

*1 FIWARE is the open source framework of reference for the creation of smart solutions and the transformation of organizations into smart organizations in multiple sectors. It is driving the definition of key standards required for the interoperability and replicability (portability) of smart solutions as well as the management, sharing and monetization of data by organizations participating in a Data Economy.

1. The Administrator directs the IMS (Inventory Management System) to prepare packages in Warehouse 1 to be transferred to Destination 2.
2. The autonomous mobile robot receives waypoints from the IMS to move Warehouse1.
3. A worker loads the package onto the transportation robot when it arrives at Warehouse1.
4. The robot moves to Destination 2 after the package loading completes.
5. A worker at Destination2 receives the package.
6. The robot returns to the standby area after the operation completed.



Through the PoC, TIS will verify the integration scheme between RoboticBase, various business systems and heterogeneous robots to be easily connected by means of standardizing their interfaces. TIS aims to introduce a business combining service robots and various business systems in the future.

The University of Aizu aims to contribute to the service robots installing new technologies such as flexible path planning to connect information systems.

TIS and the University of Aizu plan to conduct a new PoC in several areas in Fukushima prefecture, such as Aizu-Wakamatsu City and Minami-Soma City, targeted to solve social issues.

Overview of the PoC project

- Period: Nov. 26 - 29, 2019
- Location: LICTiA in the University of Aizu
- Outline: Conduct a PoC experiment for automating last-mile delivery using RoboticBase developed by TIS, Inventory Management System ("EVEN"^{*2}) and an inventory management service), and the autonomous mobile robots developed by the University of Aizu.

^{*2} EVEN: an inventory management system provided by TIS Nagano.
(<https://www.tis-n.co.jp/it-solution/even/>) (Japanese only)

<Verified concepts>

- Confirmation of collaboration between RoboticBase and ERP systems
- Confirmation of novel path planning method for autonomous mobile robots
- Confirmation of the data models for the interface among the RoboticBase system and autonomous mobile robots

Backgrounds

Use of service robots in human places is a promising approach to solve social issues caused by shortage in labors and an aging society. However, in conventional business systems, operation processes have been designed to connect people and IT systems, without considering connectivity to robots.

To create new business involving usage of service robots, the operation processes in such systems should be designed by clearly defining the roles of people and service robots.

TIS has been developing RoboticBase to enable the collaboration between service robots and business systems.

Future Plan

Through PoC experiments, TIS will work to enhance the RoboticBase's functions to manage robots in an integrated manner, including integrated management of robot operations, integrated management of robot works, management of robot tasks and coordination of robots with external systems. TIS aims to provide services that link

business systems and service robots in such operations as transportation and building management.

Expanding the outreach of the project in the field of service robots, TIS will push the standardization of data models used in the interface between the RoboticBase system and autonomous mobile robots, facilitating the connectivity. Furthermore, several actions are planned to validate and register the defined data models as FIWARE data models. This standardization effort will take place as part of the activities of the Robotics Tech Roadmap WG*³ under the coordination of the FIWARE Foundation.

*³ The Robotics Tech Roadmap WG discusses the FIWARE technology roadmap in the Robotics area. The working group is composed of FIWARE Foundation members, such as TIS, Fraunhofer IML, Atos, eProsima, and others.

About RoboticBase

The RoboticBase by TIS is a platform to achieve integrated management of service robots and IoT sensors based on FIWARE, which provides the fundamental framework of RoboticBase for IoT and Smart City applications. RoboticBase includes "RoboticBase-Core" for research and development and "RoboticBase" for customer use.

1)RoboticBase-Core

The RoboticBase-Core provides core components of RoboticBase for research and development. It is used in the latest PoC with the University of Aizu. TIS provides it as an open-source software, intended to accept feedbacks.

Available at <https://github.com/RoboticBase>

2)RoboticBase

The RoboticBase is a platform for commercial use based on RoboticBase-Core. It enables to integrate and manage heterogeneous robots which have different tasks such as security, cleaning, transportation and other tasks, supporting the collaboration of the robots with people and business systems. Going forward, TIS plans to add and release such functions as controlling drones.

About The University of Aizu

The University of Aizu, a university specialized in information technology, trains robot engineers and foster adoption of robotics technologies through activities such as research and development of robots for disaster response and robot software, development of robot networks and cloud robotics, and standardization of robot software in the robotics domain. For more information, please go to <https://www.u-aizu.ac.jp/en/>

About TIS Inc.

TIS Inc., a member of the TIS INTEC Group, provides several IT solution services

including development, data-center and cloud services. At the same time, TIS contributes to the growth of its customers business, by being their technology partner and offering global support. TIS has more than 3,000 customers in wide-spread of various industries, such as financial services, manufacturing, logistics/distribution, public services and telecommunications, with a presence mainly in China and the ASEAN region. For more information about TIS, please go to <http://www.tis.com/>

About the TIS INTEC Group

The TIS INTEC Group comprises 60 IT companies and 20,000 employees. Each company utilizes its field of expertise to provide IT services that support clients' businesses across many industries, including finance, manufacturing, services and public services, both inside Japan and overseas.

- * The company names and products named herein are trademarks or registered trademarks of the respective companies.
- * The information contained herein is current as of the announcement date. Please note that the content may differ from the latest information.

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