

Graduate School of Science and Technology Master's Thesis Abstract

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Thesis title	Human-Robot Interactive System in Retail Stores for Non-Expert Users Using Behavior Trees 小売店におけるビヘイビアツリーを用いたユーザ向けのヒューマンロボットインタラクションシステム		
Abstract			
Using robots in the convenience store to help staff doing tasks and provide service to customers is becoming popular. The robot requires programming to do the correct task, but the service's cost is too high to do it frequently. As a non-expert user such as a store manager does not have the experience and knowledge about robot programming, a simple and understandable system is necessary. Through the more straightforward and understandable system, non-expert users can handle the robot programming by themselves, even in more flexible operating situations. This research proposed the system to program and use the service robot by using Behavior Tree with Graphical User Interface (GUI) in a convenience store. Using the Behavior Tree and GUI, staff can create an appropriate robot behavior that corresponds to each store's rules and environment. The proposed system has detection nodes and reaction nodes prepared by experts, so non-expert users can easily implement robot behaviors without any coding-style programming. The detection node contains the input condition to check for the situation to provide the proper robot reaction. The reaction node contains the robot's output to the customer to provide when the condition contained in the condition node is satisfied. The proposed system is focused on an easier way of robot behavior programming to have the proper reaction of a robot for the customer detected poses. The proposed system was compared with the conventional system used in the Future Convenience Store Challenge Stock and Disposal Task of the World Robot Challenge (WRC) 2019 to show the proposed system's flexibility to interact with a customer. The proposed system also shows the flexibility of the detection range modification that users can define a various range of detection. By using human pose detection, the robot can perform four general customer poses detection in the range. Moreover, the proposed system allows users to modify the robot's reaction to a customer after it is detected customer pose. The proposed system also shows the different difficulty between coding-style programming and GUI-style programming.			