

# Layout Group RoboCup@Home Education 2021 Video Description Paper

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**Abstract.** This paper illustrates intelligent supermarket guide robot(pepper) from Layout Group for the 2021 RoboCup@Home Education. The supermarket guide robot is designed to be an autonomous robot in the supermarket environment, capable of meeting various needs of the commodity information inquiry and location navigation with friendly interaction. This paper gives the technical description of the commodity information searching and location navigation system and operation.

## 1 Introduction

The purpose of this system is to help release the huge economic pressure of hiring a large number of supermarket assistants, and minimize the possibility of virus transmission between employees and customers considering the the pandemic of coronavirus. This system proposes to use Pepper robot as a carrier and to integrate multiple artificial intelligence technologies, including navigation, speech recognition, intelligent human-machine interaction and software technologies which are based on Model-View-Controller (MVC) programming framework. Besides, our intelligent supermarket guide robot can help improve the customer's shopping experience. Customers can interact with the robots with pleasure while getting accurate information about the supermarket and products.

## 2 Installation and operation

Commodity information searching and location navigation system needs to use Choregraphe to connect to Pepper robot, upload the engineering file and thereby execute the program.

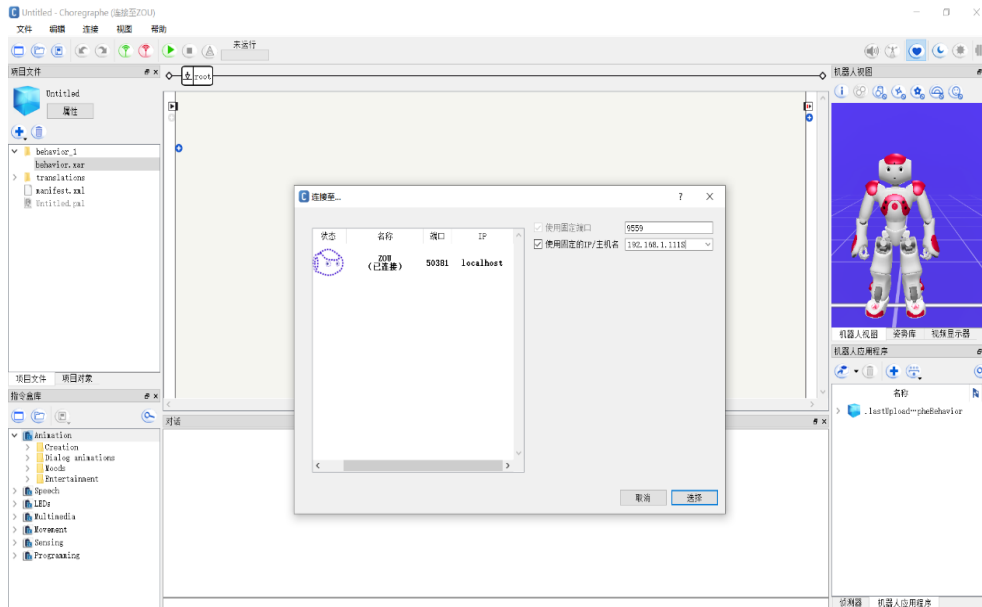


Fig. 1: Choregraphe operation interface image

### 3 Work effect

The User Interface of the information searching and location navigation system contains 5 modules in total: Supermarket Introduction, System Introduction, Supermarket Map, Commodity Classification and Searching, Product specific information and navigation.

#### Representative Functions:

#### Supermarket Introduction Module



Fig. 2: Supermarket Introduction Module interface

In the Supermarket Introduction Module, customer can get a brief overview of the supermarket, and occasional discounts and promotions are displayed here.

### System Introduction Module

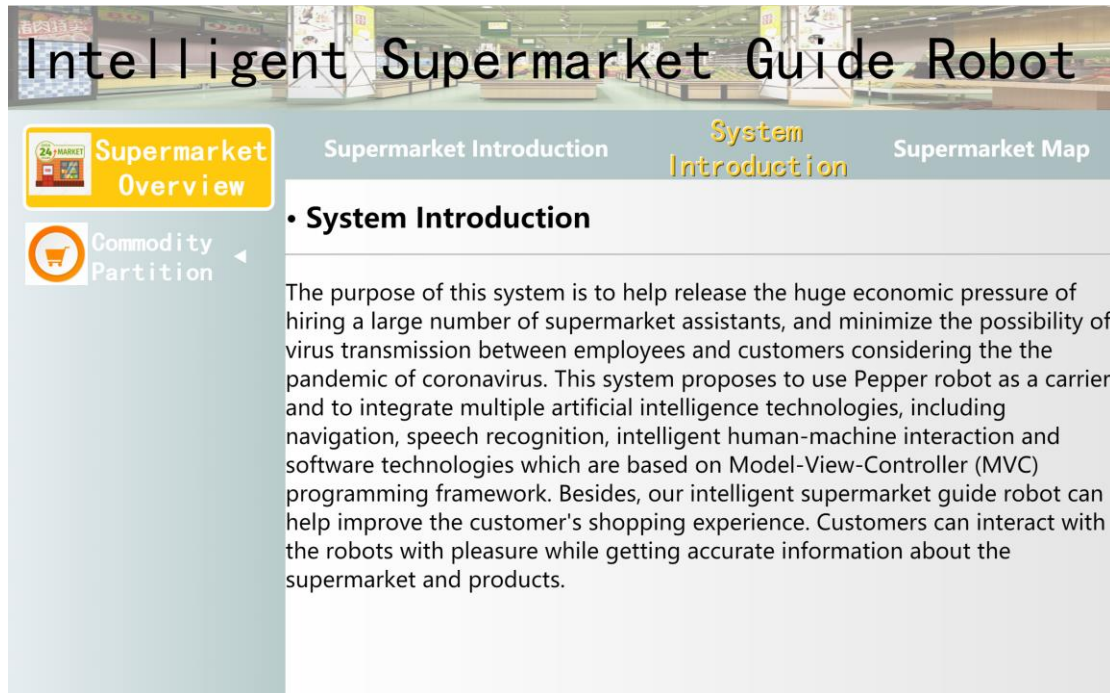


Fig. 3: System Introduction Modul Module interface

In the Supermarket Introduction Module, customer can get a brief overview of the information searching and location navigation system.

## Supermarket Map

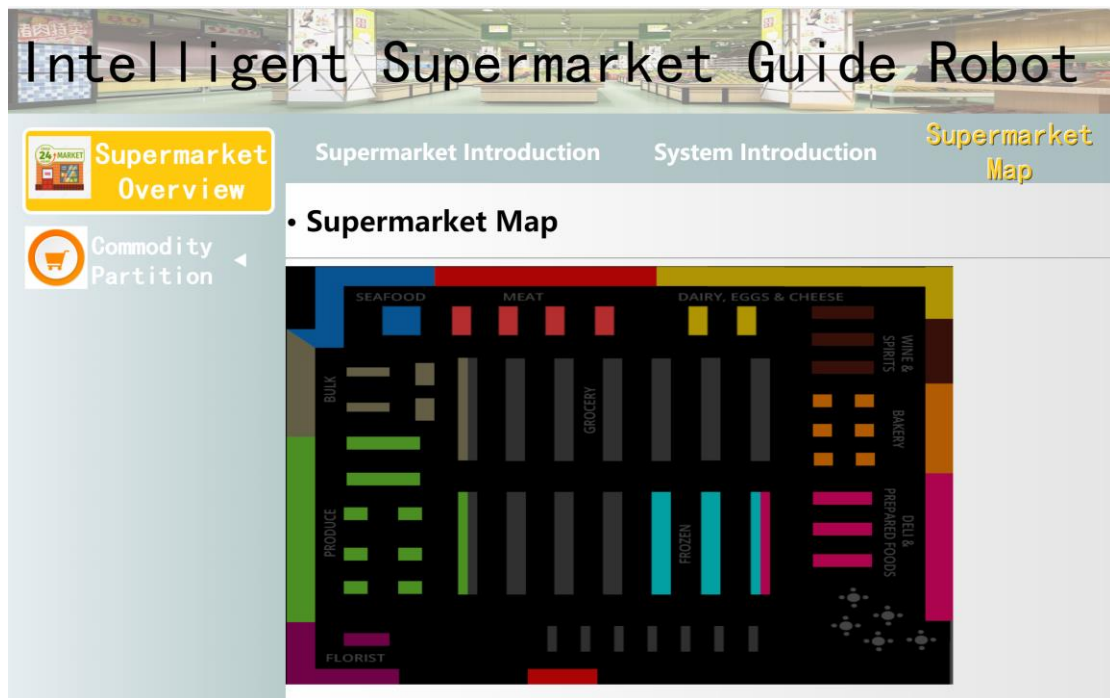


Fig. 4: Supermarket Map interface

In the Supermarket Map Module, customers can actively search for a product section through the supermarket map.

## Classification and Searching

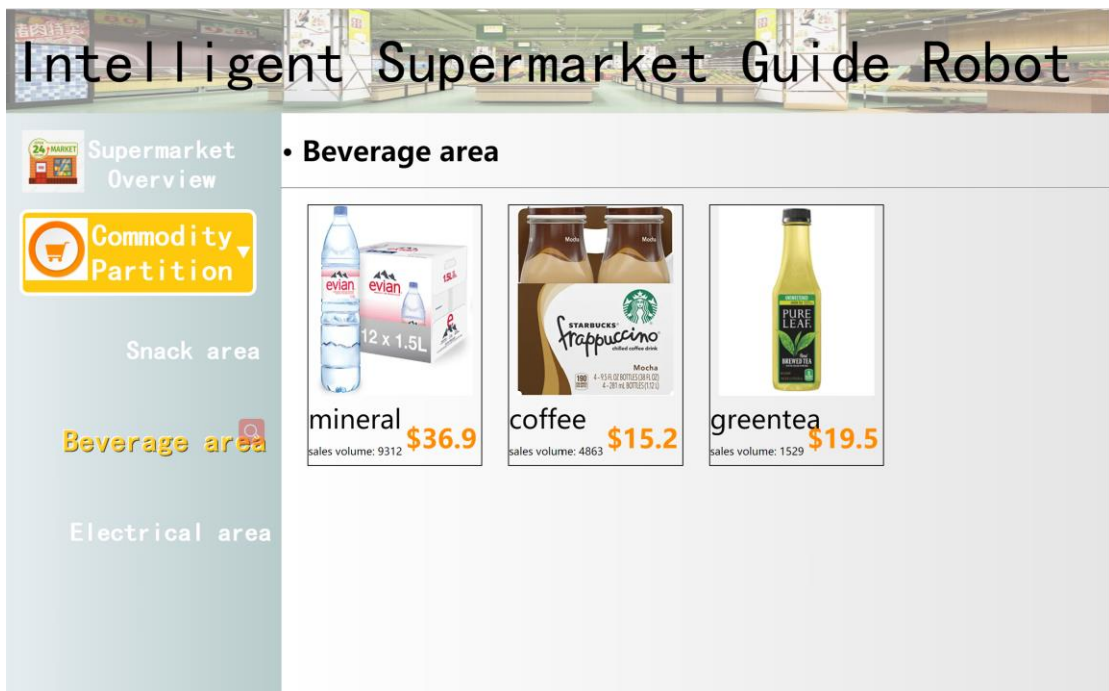


Fig. 5: Introduction to the Division

## Product specific information and navigation

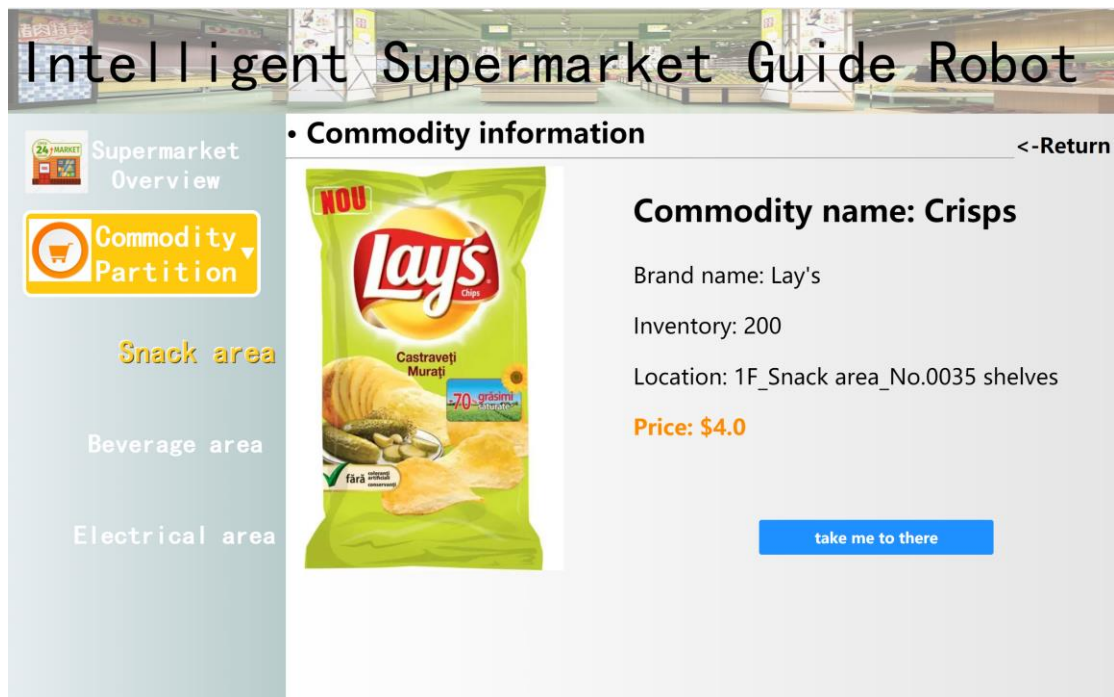


Fig. 6: Introduction to the Division

## 4 Technical description

### Intelligent voice design and implementation

1. Prepare the Python2.7 development environment and Naoqi Python SDK.
2. When Pepper is turned on, press and hold the chest button once, and Pepper will speak out its IP address, then Pepper has access to Choregraphe.
3. Prepare relevant Python packages: Packages prepared include speech\_recognition (speech recognition package), pyaudio (recording interface), wave (open recording file and set audio parameters), pyttsx3 (TTS), json (parse json string), requests (get/post), baid\_aip (aip for voice recognition).
4. Prepare API: Log in API, open speech recognition, read technical documents of speech recognition, and focus on API documentation and Python SDK.
5. The key to the realization of intelligent question-answering function is the call of various APIs.

Key APIs: voice production audio files (speech\_recognition package, wave and pyaudio package), audio files are converted to text STT (call API, language recognition Python-SDK is used Convert audio files to text STT), intelligent question answering system interaction (when replying to text content, display the text on the display screen, and use Pyttsx package to convert the text into speech and output).

## **5 Conclusion**

Our intelligent supermarket shopping guide robot has great adaptability. It can import different commodity information and map information according to different supermarkets work environment. After the robot grasps these key information, it can be well qualified for the work in different environments. The basic interactive function also works well for most of the situation. In the future, we hope to further encapsulate information and navigation systems to make it easier to import relative data. We will also continue to make efforts to enrich the interactive functions of robots, so that shopping malls can improve the shopping experience of customers while reducing the commission charges. We also consider that in the case of coronavirus pandemic, doing such an intelligent supermarket shopping guide robot is a good attempt.