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Robotization of service with goods and products via automatic cabinet

Abstract

Recently, the world has become interested in robotization in the service sector. Night tours of the London Tate gallery were driven by robots. Rather, only humanoids moved around the halls of the museum, and viewers could consider works of art and listen to the explanations of smart guides on the screens of computers. We went even further in South Korea. At the Daegu National Museum, robots collect entire groups of excursionists and conduct them on permanent display. Robots have already tried on the aprons of waiters, stood behind the racks in hotels and settled at airports. BagBot is the first, but not the only, system to automate airport baggage handling. There are others, such as BAGLOAD, using solutions offered by Grenzebach (Germany), which combine classical transport technology with modern robotics. In addition, part of BAGLOAD is the integration system developed by Vanderlande (Netherlands), designed to provide airports, airlines and cargo handling companies with the necessary level of automation of these processes. Automated baggage handling systems developed by Vanderlande move 3.7 billion baggage units per year (or 10.1 million per day) worldwide. These systems operate at 600 airports, including 13 of the top 20 in the world. One example is Schiphol Airport in Amsterdam, where the amount of processed luggage grows year by year and in the near future will reach 17 million units per year. In order to cope with this task, a new automated system was introduced here, part of which is robotic manipulators.

Keywords: smart robot, customer, automatic machine, plastic card

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Evgeny Bryndin
Scientific Department, Research Center Natural Informatics, Russia

Correspondence: Evgeny Bryndin, Scientific Department, Research Center Natural Informatics, Novosibirsk, Russia, Email bryndin15@yandex.ru

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Automated shop and cafe

A smart robot begins to issue goods and products in the store with imitative thinking and adaptive behavior through machines Figure 1. The robot communicates with customers through an order receiving system. The buyer through the electronic money reader is calculated by a plastic card. The buyer informs the robot of the list of goods and products the order. The robot, through the receiving system and the software multidisciplinary controller, activates trays of goods and products according to the order. The customer inserts the plastic card into the electronic money reader, when the order is formed by the machine the robot reads the electronic money from the plastic card of the customer, at the prices of the goods. The buyer receives a set of goods the order from the machine and picks up a settlement plastic card. The smart robot controls behavior through a multifunctional hierarchical system of controllers. Behavior occurs under the influence of the need of the visitor, which causes orientation in the situation according to models of the environment and behavior. The orientation is completed by selecting the appropriate program of the hierarchical controller system, the execution of which leads to the implementation of the behavior. The robot has devices for interacting with the environment. They receive information from the environment through sensors: phototransistor, microphone, contact sensor.[1]

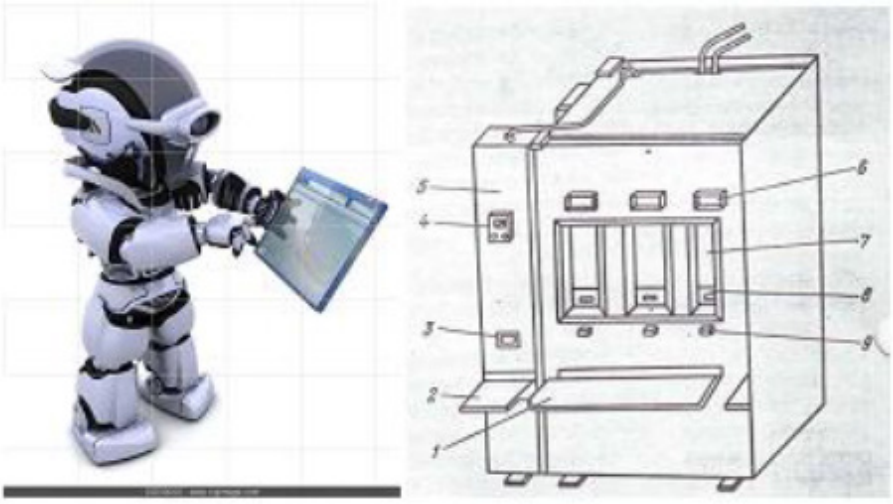

Figure 1 Robotization of service.

A hierarchical approach allows you to formalize the requirements for mobility of robot behavior and develop all possible algorithms for responding to changes in the state of the environment. For example, when moving on the street, using satellite navigation technology, and surrounding objects, detecting using cameras, rangefinders and spectroscopic vision. That is, the approach allows autonomous robotic systems to be designed for the implementation of many social spheres of life. The smart cognitive architecture of the robot, using the criterion for improving functional activity, is capable of recurring self-improvement. Cognitive architecture includes artificial neural networks, machine learning algorithms, the smart big data cognitive system, and a high-quality selection system. The smart cognitive architecture of the robot determines step by step how best to achieve the given goals and realize preferences through the actions of the utility function based on high-quality selection. Self-improvement is carried out by machine retraining according to the preference criterion on the basis of extensive statistics of high-quality selection of skills and competencies. Intelligent cognitive architecture of robot strives for development by machine retraining based on accumulated professional and behavioral skills.[2–4]

The use of robots in an automated store does not require registrations, code scans and other manipulations. All that is necessary to make purchases is to install the application on smartphone. After that, you can safely go to the store, choose goods, fold them as convenient and where convenient. Everything-after taking the necessary, the customer simply leaves the store, without visiting special zones, frames or scanners. Money is automatically debited from the card, and the receipt instantly comes to the owner's smartphone. But, of course, in reality, not everything is as rosy as in theory and advertising. Already on the first day of work, it turned out that artificial intelligence could count customers by counting them goods that they decided not to take; does not always recognize theft and may not take into account the purchase if the visitor takes the goods too quickly. The store's artificial intelligence system uses the required number of cameras and special algorithms. They record the speed, movement, gaze and pitch length of visitors to understand exactly what the buyer is going to take, as well as to calculate a potential thief. At the same time, they do not collect and store biometric data of customers. Microsoft has developed a universal intelligent system that will allow companies to independently open automated supermarkets without personnel. Through the introduction of modern deep learning methods, they improved the experience of retail. Getting rid of slow, bulky lines of machine sales.

Electronic stores with multi-agent systems appear.[5] An electronic multi-agent store is a community of electronic store agents (sellers, managers, cashiers, security) and customers who can communicate and exchange information through electronic means of communication in the absence (or minimum) of personal direct contact. A store virtual agent is a representative office implemented by creating a Web server on the Internet to sell goods and services to other users of the Internet. He must provide the customer with information about the goods (service) and receive an order for the goods (service) from the customer. The cashier agent receives payment when using online payment systems. The agent manager will ship the paid item if the buyer does not pick up the item himself. The robot agent consultant greets customers in the store, helps them find a specific product on the entire sales window, and answers general questions. An electronic agent security guard monitors store customers through a review system. In case of violation, he blocks the door until the police arrive, which serves the store? A robot consultant appeared in the Tokyo department store Mitsukoshi in April 2015. Outwardly, the humanoid, developed by Toshiba, looks like a real girl: dark hair, light skin, a pink jacket for the color of lipstick.

In addition, she knows how to nod, move her lips and talk. True, only in Japanese. The robot was given the name Aiko Chihira. By contacting the consultant, you can find out about available goods, special promotions and sales. Robot waiters are introduced in restaurants around the world. Artificial intelligence serves visitors at Bangkok's Hajime Robot Restaurant. A humanoid with a height of a person, dressed in national armor, is separated from the guests of the institution by a glass partition. On the tables in the restaurant hall there are tablets on which customers order. He goes to the robot, which collects dishes on a tray and takes it to visitors. Along the way, he sings songs and winks friendly.

Robotic hotels

In mid-July 2015, the first hotel opened in Japan, a significant part of whose employees are robots Figure 2. In a hotel called Henn-na in Nagasaki Prefecture, four humanoid doormen, three receptionists, two maids and one dressmaker carry watch. The rest of the employees are living people, but gradually they will yield jobs to robots.

Figure 2 Japanese robotic hotel.

Humanoids from the Henn-na Hotel were developed by Koroko. Engineers gave them a human appearance. So, inanimate reception employees look like cute young Japanese women. They know how to breathe, blink and make eye contact. And they speak four languages: English, Japanese, Chinese and Korean. In addition to service personnel with artificial intelligence, the hotel is "stuffed" with numerous high-tech devices. For example, a facial recognition system works at the entrance to the rooms, so someone else will definitely not pass. And in the rooms themselves there is a system for determining the body temperature of people, knowing which you can set the desired degree in the room. Living among robots is a pleasure quite affordable. The cost of a night in the hotel starts from $60 for a single room and reaches $150 per room for three.

In the Hotel Aloft in American Cupertino, a robot employee appeared even earlier than in the Japanese hotel Henn-na. A humanoid named Botlr joined the butler service in the summer of 2014. Outwardly, it resembles a R2R2 robot from Star Wars. Botlr is able to travel along the corridors of the hotel at a speed of up to 6 km/h and not collide with guests or luggage. The robot will fulfill any customer wishes. For example, deliver a sandwich, fresh towel or new toothbrush to the room. In the social service sector, robots occupy more and more jobs.[5–10]

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Conflicts of interest

The author declares that there is no conflict of interest.

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