

# Applications of Robot Staff in Hotels

Cheuk Ying Ho  
Business School  
Bournemouth University  
Bournemouth, United Kingdom  
s4920015@bournemouth.ac.uk

**Abstract**— Service robots are being increasingly employed as hotel staff in the hotel industry. This study explored how hotels can better use and implement service robots for their operation. Four hotels using robots as their staff are chosen as examples for investigating what positions the robot staff do and the comments from customers. It was found that the acceptance of robots in delivering transfer services (eg. Carrying luggage, delivering room service, etc.) are higher than when they provide services at the front desk. These results demonstrated that customers have expectations in engaging with heartwarming interaction with staff when they stay in the hotel, which the robot staff are not providing such interaction in current technology. Therefore, it is suggested that the hotels can arrange the robot staff with the position that do not interact with customers in the current stage. The robot staff can assist the human staff in providing service until they can develop a sophisticated system in two-way interaction.

**Keywords**—Services robots; Hotels; Technology; Hospitality

## I. INTRODUCTION

The hotel industry is one of the sectors that increase the technology interactions, such as using robot staff for service delivery. More hotels employed service robots as part of their staff to improve the efficiency for servicing customers, reducing the labour cost of the hotel [1]. Hotel staff usually have long working hours and need to work in shifts. Robots can work 24/7 without suffering exhaustion which could help to improve productivity, as well as eliminate human errors [2]. Some of the hotels apply robot staff under the pandemic of COVID-19 to reduce the frequency of contact between customers and human staff [3].

However, it can also be seen that hotels need to face different difficulties in implementing robot staff in their operation. Henn na Hotel, the first hotel that applies robot staff in the world, unemployed 243 robots, which cut down half of the robot staff in the hotel in 2019. As they received different complaints from customers and the robot staff increased the workload of the human staff in the hotel [4].

This paper aimed to help the hotels have a better understanding of how or where the best place to apply robots might be, to have better usage of the

robot staff and to further attain the competitive advantages of using robots in the hospitality industry. Therefore, to identify the gap between the aim of employing robot staff and the reaction of customers and staff when robots in practical hotel situation, this paper is organised as (1) types of robots (2) the current applications of robot staff in hotels, and (3) customers' expectations from hotels.

## II. TYPES OF ROBOTS

It is common to see that robots are machines capable of performing complex tasks commanded by people. Robots can also have autonomous decision-making to solve problems by adapting the data to the actual situation or scenario [5]. There are various types of robots, and they can be categorised by the field of where does the robot apply or working with. By separating as industrial or non-industrial environments, robots can be divided into two groups by categorising as industrial robots and servicing robots. [6]. Industrial robots are designed for manufacturing, and industrial robots are designed to complete typical tasks such as painting, welding, material handling, etc. [6]. While service robots are designed to assist humans, they are designed to serve and interact with humans; not only human-like robots are service robots, but cleaning robots are also classified as service robots. Therefore, it is not categorised by appearance but the function [7].

Hence, service robots have been developed and used to facilitate and assist people daily tasks and those robots providing useful tasks, interacting and delivering services to people are categorised as service robots [8]. According to J. Wirtz [9], service robots are automated and equipped with a system-based interface, which is able to interact and deliver services to an organisation, or customers. The “robot staff” in this paper are defined as service robots, the applications of services robots are spreading and increasing within the hotel industry, the next part will introduce some of the examples in current hotels.

## III. THE CURRENT APPLICATIONS OF ROBOT STAFF IN HOTELS

#### *A. Henn na Hotel in Nagasaki, Japan*

The Henn na Hotel is the first hotel to implement service robots in the world. They started hiring robot staff in 2015. The concept of the hotel is to introduce “the art of technology”. Therefore, using different types of robots for servicing customers is the main feature of the hotel. The robot staff are covering from the front office to the housekeeping [10]. For example, human-like robots are applied as front desk agents and concierges to assist customers to process the check-in process by giving instructions and guides to the guests to use the check-in machine. The robots at the front desk support four languages: English, Chinese, Korean, and Japanese. The Henn na hotel also employed other types of robots, such as car-like robots as a bellboys, for transporting luggage and guiding customers to the guestroom right after finishing the check-in process. The car-like robot staff would introduce the events taking place on the way. Customers can also use the robot-operated cloakroom for storing their luggage and bags after they have checked out. Robot cleaners are applied in the hotel for cleaning floors and windows as the housekeeper. Moreover, there is an in-room assistant in every guestroom, called Churi-chan, which can tell customers the weather, provide morning call services, and control the lighting system in the room; customers can ask Churi-chan for the services by using voice control [10]. However, Henn na Hotel received numbers of complaints regarding their robot staff and led to the unemployment of 243 robots in the 2019 [11]. For example, guests complained the robot staff are not smart enough that they always not understand what the guest saying, digital front desk are not efficient as it cannot scan the passport that the guest need to keep re-scan the passport, the Churi-chan can only speak in Japanese, the guest needs to use the note sheet provided by the hotel for pronouncing Japanese for controlling Churi-chan, which the robot staff did not help the guests to have a smooth and convenient user experience.

#### *B. Hilton Worldwide (McLean hotel in Virginia)*

Hilton Worldwide has an experimental robot staff called Connie and works as the concierge at the McLean hotel in Virginia since 2016 [12]. Connie is approximately 60 cm tall, and the main responsibility of Connie is answering guests’ questions. As Connie is still in the experiment stage, she is not able to answer too many difficult questions. She can solve simple questions, such as suggesting attractions or spots nearby, hotel facilities and information, restaurants close to the hotel, etc. Therefore, Connie can only assist with some of the questions but cannot replace the human concierge.

#### *C. L Hotel in Hong Kong*

Under the pandemic of COVID-19, the L Hotel in Hong Kong applied the robot staff in April 2020. The aim of using robot staff is for delivering room services, especially for those guests who are quarantined in the hotel. L Hotel aimed to reduce contact between customers and staff during the process of transferring food to guests and to lower the opportunity for both the guests and staff for transmitting COVID in between [3]. The robot staff job duty is to carry food and beverages with their compartment to guestrooms, and understanding guests might have a safety concern, in case others could open the robots can take out the stuff in the compartment, one time PIN is required when opening the compartment. The service is highly recommended by the guests during the quarantine period. Human staff will only put the food and goods customer need outside the guestroom; there is no human interaction with the guest during the 21 days. Guests comment that the service robots make them feel they are having interaction with people when they receive the goods from the robot staff [3].

#### *D. YOTEL in Boston*

YOTEL in Boston, United States employed “Vi-YO” as one of their hotel staff in September 2020. Unlike other hotels, YOTEL not only employed Vi-YO for single job tile, such as concierge, bellboy, cleaner but aimed Vi-YO to have multiple job functions. For example, Vi-YO includes self-check-in kiosks, customers can check-in wherever they see Vi-YO. Vi-YO also has the function for being a staff member that transfers different room amenities, but at the same time, Vi-YO could also be a housekeeper, as VI-YO is equipped with the UVC light, so it can disinfect both air and surface wherever it passes by [13].

## IV. CUSTOMER’S EXPECTATION FROM HOTELS

Hotels are symbols representing hospitality, which is usually linked up to “people business”, which is the business providing “high touch” services by human staff to the human customers, which involves lots of interaction in between [11]. Traditionally, the hotel industry is a labour-intensive industry, as there are lots of different guest in the hotels, as every single guest have their own characteristic, personality, and emotion. The complexity of human guests requests hotel staff to make different judgements and also need to interpret information when they respond or handle guests’ problems, which there is flexibility when dealing with the guests [14]. There is not a model answer or formula that is suit all customers; therefore, the human staff is an important

component for services delivery in the traditional hotel industry.

Moreover, the services customers expect from the hotels are not limited by the environment, facilities, or amenities provided only. Heart-warming interactions are also one of the aspects that customers would like to have during their stay in the hotel [15]. For example, the service staff's attitude, can be reflected by if staff is patient and polite, is the staff explaining hotel facilities or answering questions clearly and detailly; does the staff creating a warm and welcoming atmosphere to the guests, which this can be measured by as simply as a smile or the tone of voice when having a conversation with the guests [16].

With the advance of technology, the "high-tech" component, such as the services robots, are implemented in the hotel for enhancing the quality of services provided. However, the perception of high-touch services is having strong interaction between humans and humans. Therefore, one of the possible challenges hotels need to face when applying robot staff would be the acceptance of the customers.

## V. CONCLUSION AND RECOMMENDATIONS

From the examples from Henn na Hotel in Nagasaki, Japan, Hilton Worldwide (McLean hotel in Virginia), L Hotel in Hong Kong, and YOTEL in Boston, it the customer acceptance of robot staff is getting higher. Guests feel fresh and sometimes feel more comfortable with robot staff under the pandemic. The service robot also offered customers more choices of service delivery when they stayed in the hotels. For example, they can choose to use the self-check-in kiosk or the traditional check-in counter. Offering choices for the customers also improve the experience of their stay in hotels. On the other hand, it can be seen that the robot staff has more positive comments when they provide one-way interaction than two-way interaction. This is because there are still limitations when robot staff deliver two-way interaction. In which robot staff can complete the instruction that is included in their system, for example, Vi-YO can clean the hotel areas but only in the specific route that is inserted in the program.

Two-way interaction is the equal and mutual understanding between two individuals [7]. Customers have different preferences and emotions which there is no model answer when handling the guests, which increase the difficulties when robot staff interact with them. This causes the problem that many times the robot staff does not understand what the customers need and cannot deliver the service they want and lower the guest satisfaction

and affect the guest's hotel experience. Therefore, in the current stage, it can be seen that the robot staff are still cannot replace human staff as the heart-warming interaction is still irreplaceable in the current stage, and it suggested that the hotel can arrange the robot staff in the positions that are more in one-way communication to reduce the misunderstood or not understanding the guests' requires, for example, luggage delivery, cleaner, etc. The hotels can apply the robot staff that need more two-way communication when the technology is more mature and ready for services. Otherwise, it might bring complaints like Henn na Hotel when the robot staff cannot answer or understand the guests. It is also suggested that boutique hotels, micro hotels, transit hotels can apply robot staff in the hotel, as the customers in those hotels are more care about efficiency while the customer of luxury hotels are more aimed for prestige and personalise experiences, which employing too many robot staff in a luxury hotel is not suitable for the guest experience.

There are lots of advantages to employing the robot staff, and the potential use of robots in the future can be predicted that will be broader. The hotel operators need to follow the technology trends and develop more seamless and all-around services by the robot staff in the future. The hotels also need to pay attention to cybersecurity to ensure the robot staff are under control and not raise a privacy disclosure crisis, as most of the robots are connected to the internet for function.

## REFERENCES

- [1] L. Zhong, S. Sun, R. Law, and X. Zhang, "Impact of robot hotel service on consumers' purchase intention: a control experiment," *Asia Pacific Journal of Tourism Research*, vol. 25, no. 7, pp. 780-798, Jul 2020, doi: 10.1080/10941665.2020.1726421.
- [2] J. Anderson and L. Rainie. "Artificial Intelligence and the Future of Humans." Pew Research Center <https://www.pewresearch.org/internet/2018/12/10/artificial-intelligence-and-the-future-of-humans/> (accessed 10 October 2021).
- [3] K. S. Lam, "Hong Kong developer Chinachem's hotels unit brings in robots to beat coronavirus slump," in *South China Morning Post*, ed, 2020.
- [4] S. Ivanov, F. Seyitoglu, and M. Markova, "Hotel managers' perceptions towards the use of robots: a mixed-methods approach," *Information Technology & Tourism*, vol. 22, no. 4, pp. 505-535, Dec 2020, doi: 10.1007/s40558-020-00187-x.
- [5] A. Tuomi, I. P. Tussyadiah, and J. Stienmetz, "Applications and Implications of Service Robots in Hospitality," *Cornell Hospitality Quarterly*, vol. 62, no. 2, pp. 232-247, 2021, doi: 10.1177/1938965520923961.
- [6] L. Yang, T. L. Henthorne, and B. George, *Artificial Intelligence and Robotics Technology in the Hospitality Industry: Current Applications and Future Trends*. Palgrave Macmillan, Cham., 2020.
- [7] L. N. Zhong, L. Y. Yang, J. Rong, and X. N. Li, "A Complexity Analysis of User Interaction with Hotel Robots," *Complexity*, vol. 2020, May 2020, Art no. 4537152, doi: 10.1155/2020/4537152.

- [8] J. W. Jia, N. Chung, and J. Hwang, "Assessing the hotel service robot interaction on tourists' behaviour: the role of anthropomorphism," *Industrial Management & Data Systems*, vol. 121, no. 6, pp. 1457-1478, Jun 2021, doi: 10.1108/imds-11-2020-0664.
- [9] J. Wirtz *et al.*, "Brave new world: service robots in the frontline," *Journal of Service Management*, vol. 29, no. 5, pp. 907-931, 2018, doi: 10.1108/josm-04-2018-0119.
- [10] Henn-naHotel. "Brand Concept." <https://www.h-n-h.jp/en/concept> (accessed 9 October 2021).
- [11] S. Ivanov and C. Webster, *Robots, artificial intelligence and service automation in travel, tourism and hospitality*. United Kingdom: Emerald Publishing, 2019.
- [12] Hilton. "Hilton And IBM Pilot "Connie," The World's First Watson -Enabled Hotel Concierge." Hilton Press Center. (accessed 16 Oct 2021).
- [13] YOTEL. "YOTEL Boston X Robots Partnership." <https://www.yotel.com/en/press/yotel-boston-x-uvd-robots-partnership> (accessed 16 Oct 2021).
- [14] S. Kim, J. Kim, F. Badu-Baiden, M. Giroux, and Y. Choi, "Preference for robot service or human service in hotels? Impacts of the COVID-19 pandemic," *International Journal of Hospitality Management*, vol. 93, Feb 2021, Art no. 102795, doi: 10.1016/j.ijhm.2020.102795.
- [15] J. Nakanishi, I. Kuramoto, J. Baba, K. Ogawa, Y. Yoshikawa, and H. Ishiguro, "Continuous Hospitality with Social Robots at a hotel," *Sn Applied Sciences*, vol. 2, no. 3, Mar 2020, Art no. 452, doi: 10.1007/s42452-020-2192-7.
- [16] X. Q. Lu, B. N. Zhuang, and Y. L. Li, "Service Experience in High-end Hotels," in *8th Annual China Marketing International Conference (CMIC)*, Electr Network, Jun 20-30 2020, in Proceedings of China Marketing International Conference, 2020, pp. 1373-1390. [Online]. Available: <Go to ISI>://WOS:000684378100123