

Utilisation of Service Robots to Assist Human Workers in Completing Tasks Such in Retail, Hospitality, Healthcare, and Logistics Businesses

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Abstract

The proposed study has been developed to explore utilization of service robots in hospitality, logistics, retail, healthcare to assist humans. Service robots are capable of accelerating the movement of activities from these industries. Advanced techniques such as artificial intelligence, information technology and IoT are equipped in these robots. This equipment has increased physical strength and ability to perform better in these industries. Increasing capability helps to increase performance of the robots and for this reason firms from these industries get opportunities to improve customer service. In the healthcare sector, service robots are used to monitor elderly people to detect sudden actions such as falling down. This kind of detection helps to assist nurses to take necessary treatment for the patients.

The discussion of this study found that in many cases service robots such as mobile healthcare robots work as medical experts and even as exercise coaches. In the other industries such as logistics and retail, firms use service robots as heavyweight lifters to assist human workers. However, for arranging products in warehouses, service robots are also used. The usages provide smooth customer service that helps to promote overall growth of the firms. In the hospitality and tourism industry, service robots are used as waiters, attendants of housekeeping, cooks, and hosts to improve customer service quality. Utilization of these kinds of robots help to improve service quality that plays an important role for financial growth of the hospitality industry. These facts have been discussed in this proposed study. Secondary qualitative data have been used in this study to make discussion. Online journals and articles have been approached to collect data or information related to utilization of service robots in hospitality, logistics, retail and healthcare to assist humans.

Keywords

Artificial intelligence, Healthcare, IoT, Logistics, Service robots.

INTRODUCTION

Worldwide demand of consumers is emerging rapidly for products and for fulfilling these emerging demands, rapid production is necessary. In this rapid demand for products many times industries face the issue of labor shortage that affects the overall production. On the other hand, shortage of labor is the reason for interrupting the supply chain. However, consumer trends are also changing immensely and for this changing labor shortage is happening. Modern technology such as robots are used to fulfill the shortage of human workers as per the requirements in different kinds of industries. Robots are used in different kinds of industries such as the service industry and manufacturing industry. As per the working capabilities robots are classified into two divisions such as service robots and industrial robots.

In manufacturing units' industrial robots are used to boost manufacturing and for improving quality of manufacturing. Service robots are the automatic devices which are used to assist humans for better customer experience. In research it is found that semi or fully autonomous robots can interact with people and for this reason in the service industry these kinds of robots are largely used. Most industries use robots to boost productivity and maintain the quality of products. Supply chain is an important pillar of industries and robots are used in industries to operate the supply chain smoothly. In

warehouse and manufacturing unit's robotics technology is widely used to ensure mass production. Robotic technology is also used for assisting human workers in the service-related task to provide superior customer experience. In this study, utilization of robotic service in retail, healthcare, hospitality and logistics business to assist human workers have been discussed.

LITERATURE REVIEW

Usages of robotic service in hospitality, retail, healthcare and logistic business

Service robots are used in different kinds of industries such as retail, healthcare, hospitality and logistics. Robots are used in these industries for assisting human workers in multiple works. In the retail industry, increasing customer service is an important aspect and robots are capable of providing smooth service to customers. Customers get a smooth experience due to the assistance of robots in the retail industry. Development of modern technology has made it possible to increase usability of service robots in different kinds of industries. Artificial intelligence systems and Internet of things are the technologies which have improved the utilization of robotics in retail, hospitality and logistics industries. The advanced technologies such as AI and IoT have made the service robots smart and for this smartness these kinds of robots are largely

used in the hospitality industry [1]. Ability of service robots is increasing and for this reason the usability of the robot has increased.

Powe, memory and physical strength have been improved by the service robots and this kind of improvement helps to increase capabilities of it. This development plays an important role in operating retail stores, hotels and logistics with quick manner and these kinds of improvements in these industries helps to increase productivity. However, quality of service is also improved due to utilization of this kind of robots in these industries. Autonomous industry is increasing immensely through service robot's implementation [2]. Different kinds of service robots such as heterogeneity, intangibility, indivisibility and perishability. In recent times it is found that the service robots are used to increase participation of customers. Involvement of robots is increasing in different kinds of work. Mostly service robots are used in automate menial, complex, dangerous and dirty and in time consuming tasks. Time consumption is the issue which has much more impact on affecting customer experience.

In the present time, consumers are more conscious about time consumption and delaying service affects customer experience. Service robots are capable of providing services quickly and for this reason less time is consumed [3]. This reduction of time consumption helps to improve customer experience that helps to attract customers. This kind of quick service is necessary in retail, hospitality. Logistics industry delivery of logistics quickly is essential to reach the product to customers for fulfilling demands. Service robots are capable of accelerating the logistics supply quickly and for this reason the logistics industry get boost. This improved logistics industry helps to reach products quickly to consumers. On the other hand, more time consumption increases transportation costs of logistics supply and for this reason overall pricing of products is increased.

Enhancing pricing affects customer experience that has a huge bad impact on overall sales of products. However, utilization of service robots in the logistics industry helps to accelerate the entire process and as a result transportation costs of logistics supply is reduced. Pricing of products has become competitive due to reduction of cost in transportation. Competitive pricing helps to provide competitive benefit to the companies that is the reason most logistics companies use service robots in logistics to accelerate the entire process [4]. Firms from retail and hospitality industries try to get more competitive advantage in the existing market. Utilization of service robots helps to increase service quality of hospitality and retail industry that helps to provide more competitive advantage to the firms.

Growth of firms depends on customer attraction and getting more competitive advantage plays an important role to provide competitive advantage to the firms. Different kinds of dimensions are involved in customer service, for example many consumers wish to get quick and accurate service and few customers desire a friendly and smooth

experience during service. Service robots are capable of fulfilling the expectations of the customer [5]. Technical capabilities of service robots help to accelerate service for consumers that helps to improve customer experience. This improvement plays an important role for getting more competitive advantages to the firms. In recent times, domination of the service industry is increasing and for this reason service robots are getting more priority to improve customer experience.

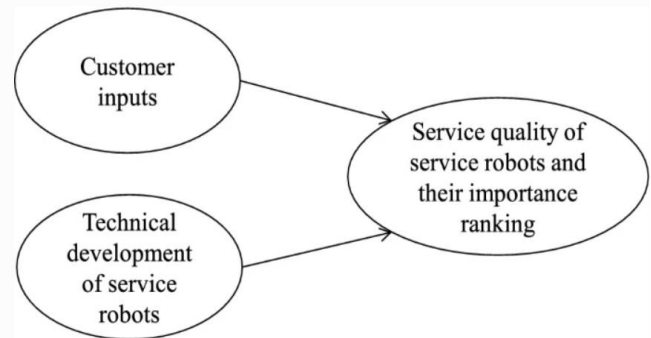


Figure 1: Involvement of service robots
(Source: [1])

Trends of using service robots

Service robots are operated by information and databases and for this reason more advanced technology implementation is necessary. Robots can accelerate service of different kinds of sectors such as healthcare, logistics, retail and hospitality. AI is applied in robotic technology to make it an automation system [6]. Quick response of robots in the service sector helps to boost financial interests that plays an important role to promote these areas in the future. In the emerging markets of hospitality, healthcare, logistics and retail, utilization of service robots can provide various opportunities to these markets due to its boosting performance in the service sector. Considering the benefits of it, development of service robots is also emerging and various advanced technologies are included in this kind of robots to increase its performance in the service industry. Internet, advanced sensors and modern autonomous systems are included in service robots to increase capabilities for accelerating service by robots.

Rapid development of service robots occurred under industrial revolution 4.0. Improvement of modern technology such as information technology has boosted the utilization of service robots through developing its capabilities in the service industry. Development of technology has boosted usability of service robots as service for individuals, accelerated in learning, service of homogenous quality and interconnection [7]. Meso-level service robots are used in the service market, mostly these kinds of robots are used in hotels as front-line service providers to boost service quality in the service industry. On the other hand, macro level service robots can reduce the number of unattractive. The robots are capable of providing smooth service to the customer and for this reason consumers get a smooth experience through

service robots that helps to decrease the number of unattractive service industries.

However, time consumption is a vital factor to enhance customer experience and service robots are capable of reducing time consumption in providing services. In the healthcare sector service robots are able to interact with people directly, can handle routine, can help in transportation of patients and in logistics supply. Utilization of service robots in these tasks helps to boost service of the healthcare sector and on the other hand, quality of service is also improved that provides social and economic benefits to healthcare firms. Trends of using service robots are increasing worldwide. AI and ML have provided service robots with great productivity ability [8]. In the healthcare sector, demands for medical services for older people are rising and nurses cannot provide all kinds of services that are essential for the elderly. For example, service robots are used in medical services for feeding, moving, soaping and picking patients from bed as an assistant with human nurses.

From other studies it is found that service robots such as humanoid Aldebaran NAO are used as coaches in physical exercise for older people. Human coaches use these robots to operate exercise programs smoothly during training. Telemedicine robots are robots which have four wheels and a camera [9]. These kinds of robots are used to monitor navigation to define obstacles that can hamper movement. Mostly in the healthcare sector these kinds of robots are used for taking medicine, door passing, wall following. In others tasks such as fetching, calendar and in the communication of interpersonal skills are used with this kind of robots. Service robots are used in industries for monitoring chatboard that are used to make financial calculations. The robots are capable of calculating sales from customers to commercial products.



Figure 2: Telemedicine robots
(Source: [9])

Utilization of service robots in these tasks decreases the possibility of error that helps to reduce risk of financial losses. Database is input among the service robots about the conservation with customer in service description. In service industries such as the banking sector these kinds of robots are used in rapid numbers. Voice activated semi-automatic service robots are used to provide better service experience to customers in the hospitality industry [10]. This kind of technology helps to detect customer needs and are able to make enough responses as per the requirements of the customer. The robots are able to communicate in a quick manner that helps to improve customer experience in the hospitality industry and it plays to satisfy customers.

In the service industry, customer satisfaction plays a vital role to boost its performance in the existing market. In multiple purpose usage, service robots are used globally. Mobile robots are in CNN from different rooms with better accuracy in an indoor environment. These kinds of technologies are implemented in the hospitality industry to operate its service with better efficiency for improving customer satisfaction level. In recent times robotic waiters such as SLAM and IMU are used in indoor environments and mostly in the hospitality industry [11]. In the retail industry service robots are used to accelerate product supply and monitoring financial calculations that help to operate the entire system smoothly.

METHODOLOGY

A plan or procedure that is used to operate entire research is considered a research methodology. Under research methodology research design, philosophy, approach, data analysis, data collection, sample and sample technique are involved. Research methodology chapter provides justification for choosing these research parameters. Design of research is about the process that is used to monitor whole research and choosing data collection in study [12]. Both primary and secondary data collection are involved in research methodology. Human participants are necessary in primary data collection to collect data from human participants. In this process of data collection, more time and budget are needed. On the other hand, different kinds of factors such as ethical consideration for human participants must be obtained, which is a lengthy process of data collection. However, secondary data collection can be done with short time and more budget is not required as compared to primary data collection.

Online articles, magazines, journals and websites are the sources of secondary data collection and these sources of data are easily available in google and google scholar. Researchers have the opportunity to collect data from these sources as per their requirements. Wide range of data is available in these sources and for this reason researchers have no pressure in choosing data. Availability of data helps researchers to collect needed data within a limited budget and time that helps to complete the entire study within the proposed time [13]. Considering the fact, most researchers

approach secondary qualitative data collection and, in this study, a secondary qualitative data collection method has been chosen to collect needed data. Approaching secondary qualitative data collection helps to complete the entire research within the proposed time that plays an important role to maintain acceptance of this study.

Article, magazine, journals and websites are considered to collect for this proposed research. Google has been used to collect information about classification of robots and its importance in the modern time. Various websites have been considered to gather information related to utilization of robots in different industries such as manufacturing and service. Online articles and journals are the sources of data and these sources have also been approached to gather information on utilization of service robots in the service industry [14]. Information related to current development of robots has been collected from journals and articles. Google has been used for approaching articles and Google scholar has been used to find journals which are full of information related to utilization of service robots and its current development. Journals and articles have been chosen to collect data or information about the technologies which are involved in service robots.

Artificial intelligence, machine learning, sensors and IoT. These modern technologies are included in robots to increase its capabilities to manage different kinds of work in various industrial activities by the robots. The chosen journals help to understand the implementation of these technologies for improving the working ability of service robots. Various benefits are gotten from the utilization of service robots to accelerate activities in the service industry [15]. Articles and journals have been collected from both Google and Google scholar to understand the usability and benefits by using service robots in the service industries such as hospitality, retail, healthcare and logistics. Information from the journals has been collected on how the retail industry uses service robots and what are the main purposes to use this technology. Developments that are happening due to utilization of service robots in retail industry related information have also been collected from the sources of secondary qualitative data.

Impact of service robots in the healthcare sector and how this sector has facilitated through the utilization of this technology related information has been collected from the choosing data sources. Benefits of using service robots in the logistics industry and how logistics firms utilize this technology has been understood by the information that has been collected from online journals and articles. Current trends on utilization of service robots in multiple tasks in service industry related information has been gathered to define its importance in the service industry. Various service robots have been developed as per the requirements in the service industry [16]. Data sources are chosen such as journals and articles describing various kinds of service robots have been collected. Collecting information from various secondary qualitative data sources helps to make accurate discussion on utilization of service robots in

logistics, healthcare, retail and hospitality industry as an assistant of human workers.

RESULT AND DISCUSSION

Entrance of service robots is rising in the retail industry to characterize competitive advantages. Service robots are more capable to work in the retail industry as compared to human workers and on the other hand, the rising salary of human workers is also a big issue for the retail firms to maintain the overall cost of the retail industry. Most of the retail firms try to decrease overall cost and in this initiative service robots are more beneficial. For example, Amazon uses service robots in retail business to cut down cost [17]. Utilization of service robots is to accelerate retail activities that helps to reduce overall cost in the retail industry. Modern technologies such as artificial intelligence and IoT are used to collect data from the retail market about the purchasing behavior of customers.

Gathering this data helps to make decisions on development of products in the retail market. European retail firms have approached autonomous service robots to monitor the entire market and purchasing behavior of consumers. Service robots assist humans to make decisions about the purchasing trends of the existing retail market that help to introduce new products and develop new products for the market. In various studies it is found that robots are untiring and stable and have the ability to integrate multiple data. On the other hand, various consumers are technology friendly and utilization of service robots helps to motivate them to purchase products from the retail firms. This motivation helps to increase sales of retail firms that is a financial benefit of utilizing service robots on retail firms. On the other hand, complexity and workload have been reduced for human workers through the assistance of service robots in retail firms.

In recent times, it is found that dramatic developments have happened utilization of mobile healthcare robots. In previous times the communication network was poor and demands of quick communication are rising in the healthcare sector. Mobile healthcare robots are capable of quick communication in healthcare and for this reason rapid development has been noticed in utilization of it in this sector [18]. Artificial intelligence systems have been implemented in robots of mobile healthcare. This implementation helps to experience the robot as medical experts and it is used to diagnose various kinds of patients. In many cases it is found that mobile healthcare robots are even more capable to make diagnoses as medical experts. This expertise of service robots provides more efficient treatment to patients as compared to human caregivers. Various sensors are equipped in service robots of healthcare such as mobile healthcare robots and for this reason more accurate treatment can be provided to patients through these robots.

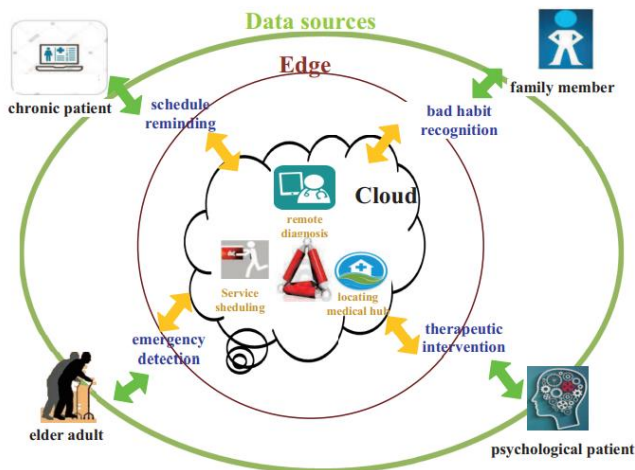


Figure 3: Works of mobile healthcare robots
(Source: [18])

In most of the cases on nursing elderly and chronic patients' mobile healthcare robots are used. The robots are utilized to detect abnormal actions such as falling down and asking for help. In the healthcare sector, this way mobile healthcare robots assist humans to provide better treatment to the elderly and chronic patients. Healthy lifestyle is considered vital for people and many unhealthy habits put people in unhealthy conditions [19]. Service robots are used to remain for making individual consciousness about unhealthy habits. Hospitality and tourism industry is also adopting service robots and development of information technology has made it possible. Most hospitality and tourism firms have started to adopt service robots such as zoomorphic and humanoid which have various capabilities such as guide, porters, hosts, cooking, taking attendance of housekeeping, room servers and bellboy. Development of artificial intelligence and information technology have helped to input these capabilities in service robots. In several studies it is found that adoption of service robots is increasing in the tourism and hospitality industry to provide better customer service as the robots are more capable in these tasks. In recent times, corona has hit most countries and as per the guidelines human touch can increase infection of this disease.

Social distance must be needed and for these guidelines the tourism and hospitality industry have been badly affected. Firms of the hospitality industry recognize service robots to provide customer service and through this initiative social distancing is maintained in the hospitality industry. Hospitality business is based on people's engagement and providing superior customer service. Service robots are able to provide superior service quality to customers that are much more beneficial to hospitality [20]. In logistics service robots can assist humans in lifting heavy loads, supplying products quickly. In most cases service robots are used in warehouses and storage for transporting products through the supply chain. Mostly these robots are utilized for arranging products in warehouses and in this work, robots perform better than

human workers. Automation systems are implemented in these robots to operate in warehouses for arranging products.

CONCLUSION

Demands for products are rising and for this rapid demand mass productivity is necessary. Robots basically have been developed to accelerate productivity in various industries. On the other hand, trends of customers are changing and for this reason the service industry tries to participate in these trends by including robots. Robots are classified into service robots and industrial robots. In the entire study, benefits and utilization of service robots in hospitality, healthcare, retail and logistics have been described. Development of advanced technologies such as artificial intelligence, information technology and IoT help to increase its capabilities and for this reason utilization of service robots has been increased in hospitality, retail, healthcare and logistics. Mostly these kinds of robots are used to assist humans to accelerate service activities of these sectors. Technological development has increased the physical power and strength of service robots that help to assist humans in heavy-duty work.

This kind of assistance plays an important role to gain speed in various kinds of work in logistics. On the other hand, robots are capable of arranging products in a better way in the warehouse. Even in many cases it is found that service robots are able to arrange and move products in the warehouse quickly and in a better way as compared to humans. However, overall cost is competitive to utilize service robots in warehouses for those works. Considering these benefits, service robots are used in logistics. In the retail industry interaction with customers is important and advanced service robots are able to interact with people effectively. This function of service robots plays an important role to increase customer satisfaction that has a huge impact on the future growth of retail firms.

However, the overall cost of retail industry has been reduced due to utilization of service robots and for this reason most retail firms consider this technology in their firm to make competitive pricing of products. This initiative helps to get competitive benefits in the existing market that provides financial benefits and for this reason retail firms adopt service robots to assist human workers. Hospitality and tourism industry is based on customer service and for this reason most hospitality firms adopt service robots to ensure better customer service. In different kinds of service, the robots are involved, hospitality firms use robots as guides, attendants of housekeeping, room server, waiters and hosts. It is found that utilizing service robots in these posts helps to provide better quality of service with assisting humans and for this reason service robots are used in the hospitality industry.

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