Existing Service Robots and My Ideal Service Robots

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1 Existing Service Robots

1.1 Service Robot for Home

The service robot in a family scene can replace people to complete some domestic service work, or play the role of companion and care.At present, this kind of service robot has three development directions.

First, it is home service robot.This kind of robot is generally engaged in cleaning and sanitation, goods handling, home appliances control and other work in the family.Among them, represented by the sweeping robot, the intelligent cleaning robot has been put into mass production and commercialization, playing an increasingly important role in our family.For example, the *Roomba* robot produced by *iRobot* company is a well-known sweeping robot, which has intelligent functions such as anti winding and anti falling, timed cleaning, automatic charging and so on, which are suitable for home use.*Ugo*, a newly developed washing robot, can complete a series of operations such as washing, drying and sorting out clothes.The robot "*Aike*" with cooking function can cook dozens of Chinese dishes independently.There are also robots installed in household electrical appliances and they can monitor the operation status of household electrical appliances and receive remote control, such as a kind of smart refrigerator sold by *LG* in South Korea.However, this kind of home service robot can only complete a specific service project, which has difficult balancing multiple skills.

Second, the robot aiming to help the elderly and the disabled.The difficulty and feature of this kind of robot lies in the design of interaction function. Nowadays, the more mature robots are C*are-O-bot* series robots developed in Germany, which have the functions of intelligent care, monitoring and reminding, helping for walking and so on;besides, the robot *Optimal-G Pro* is suitable for the walking training of disabled people, which can intelligently assist in training patients who are ill at work due to nervous system or muscular damage.

Third, educational and entertainment robots.This kind of robot attaches importance to the perception and expression of emotion, and it is becoming more and more popular these days.Take the example closest to our life, Baidu's *xiaodu* intelligent voice assistant series products definitely bring convenience and joys to our life.Robot *PaPeRo* from Japan has quite a powerful interaction function, which can read the customers’ emotions, and communicate with them, playing the role of companion, care and interactive entertainment in the family situation.

1.2 Commercial Service Robot for Public

At present, there are many service robots active in public places such as hotels and logistics.They are able to deliver goods safely and quickly, realize automatic navigation and own many other functions to further ensure the efficiency of their work process and protect the privacy of customers.Robot *Savioke* designed and manufactured by *Relay* is the first automatic delivery robot in the world, which is also one of the robots actually used in hotel services at present. It can independently plan routes and deliver food supplies to customers’ rooms without employees’ assistance.The classic robot *Pepper* plays a welcoming role in many business occasions as well.Because of its excellent interaction function, it can communicate with customers, and provide simple services for customers.In the express warehouse, *AGV* handling robots are busy working. They can carry the corresponding shelves to the sorter according to the instructions and assist in the sorting of parcels, which greatly improve the efficiency of distribution.In the process of delivery, many logistics companies, such as *Amazon*, and *UPS,* are carrying out a lot of tests on *UAV* delivery, which is expected to build a *UAV* logistics network as soon as possible.In addition, there is a kind of security robot represented by robot *MDARS*, which can perform tasks such as patrol and sentry, fire and air detection, threat assessment, situation determination, detection and prevention of intruders. With the maturation of face recognition technology, the security robot will carry out real-time monitoring of the crowds in a more complex practical environment.

1.3 Service Robot for Special Occasions

    Sometimes there is a high risk or high precision need in some special occasions, therefore it is more suitable for service robots equipped with corresponding functions to operate.For example, robots that can work at heights: Cable painting maintenance robot of cable-stayed bridge that detect and maintain cable-stayed bridges can climb up to the highest part of the bridge along the cable to complete its tasks. Robots that can adsorb onto the glass outside the high-rise building for cleaning work avoid the risk of the traditional manual scrubbing method.There are also special service robots such as surgical robots for auxiliary medical treatment, such as Rehabilitation Exoskeleton assistance robot *Rewalk.*However, because of the high price and imperfect core technology, this kind of service robots concerned with medical field are not widely used.

2 Ideal Service Robot

First, the existing home service robots have relatively single functions and poor integration. The ideal service robots can lay more emphasis on the diversification of multiple functions, which means one robot may undertake not just one task.For example, we can try to add the entertainment function to the cleaning robot, or add the domestic service function to robot for helping the aged and the disabled.We expect more other wonderful “cross-border corporation”. The ideal service robot can realize the organic combination of functional modules without being limited in the existing classification.

Second, the ideal service robot has stronger interaction with people.At present, some popular service robots, such as sweeping robots, are more like automatic machines than "robots". The ideal service robots can realize real-time and effective interaction with users, so as to meet users’ needs more quickly and accurately.What’s more, there can be further development in HCI(Human–Computer Interaction). In addition to the commonly used touch interaction and speech recognition, we can try to apply motion recognition technology, BCI(Brain Computer Interface), etc. to the interaction between service robots and people, which can facilitate our communication with service robots.Besides, BCI matching with robot for helping the aged and the disabled can provide more personalized and humanized auxiliary functions for people who are inconvenient to move and speak,which can bring them great convenience.

Third, taking a family as an example, all service robots in the family can be built into an integrated whole to realize information sharing, communication and cooperation between robots.They will just like organs of a person, playing different roles and under unified allocation. They are uniformly deployed to become a "service robot" in a different sense, so that they can better explore and adapt to the working environment.