Retraction

**Retraction: Design of life assistance device for the elderly based on artificial intelligence (J. Phys.: Conf. Ser. 1846 012011)**

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The authors of the article have been given opportunity to present evidence that they were the original and genuine creators of the work, however at the time of publication of this notice, IOP Publishing has not received any response. IOP Publishing has analysed the article and agrees there are enough indicators to cause serious doubts over the legitimacy of the work and agree this article should be retracted. The authors are encouraged to contact IOP Publishing Limited if they have any comments on this retraction.

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Design of life assistance device for the elderly based on artificial intelligence

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Abstract. With the development of the times, China has entered a stage of aging population. Because of the increase of age, the elderly are often hard to finish like bend over, squat such simple actions, which brought great challenge to the basic life of old people. Some basic activities such as walking and the toilet, are very difficult for them. In order to guarantee the basic life of the elderly, a kind of life assistance device for the elderly based on artificial intelligence is designed to help the elderly in walking and toilet. The mechanical structure of the device mainly consists of five parts, namely, walking mechanism, lifting mechanism, rotating seat cushion mechanism, rotating handrail mechanism and pulling rod backrest mechanism. The control part is mainly based on voice recognition technology. The device is simple in structure, convenient in operation and low in cost. Compared with the existing life assistance devices for the elderly, the device has more complete functions, which better solve the difficulties of the elderly in walking and using the toilet, and provides great convenience for the elderly.

1. Introduction
In 2020, there will be about 180 million Chinese aged 65 and above, which is expected to reach 376 million by 2050 and reach a peak of 414 million by 2058, by which time there will be about one in every three Chinese aged over 65. The aging population is huge, and the aging process is accelerating. As a special group, the elderly are unable to move easily and their children are often unable to accompany them. There are many empty nesters who fail to timely rescue because there is no one around when an accident happens. How to improve the ability of the elderly to live independently and ensure their basic life security are the key issues concerned by the society. At present, some auxiliary devices have appeared to help the elderly live. Chen Xiao studied a kind of old people sit implement, enhanced the independence that old people uses sit implement, but applicable scope is narrower, the device is more bulky also; Li Zhaoliang et al. studied the elderly intelligent toilet auxiliary device, the structure is relatively simple and convenient, but its clothes off module is not humanized enough, the device is not intelligent enough. In order to make up for the deficiency of existing equipment, the research designs a senior living auxiliary device based on artificial intelligence, the motion mechanism on the equipment can help the elderly to walk, to meet the elderly before using the toilet can reach the destination, and the device can satisfy the elderly in the toilet every moment of the force will be the auxiliary support, assist the elderly bend over, squat. Compared with the existing auxiliary walking toilet device, the device has more perfect functions, more humanized design, more reasonable structure, and has a high safety and comfort, which can better play the role of assisting the elderly to walk and go to the toilet.
2. Mechanical structure design

The mechanical structure of the equipment mainly includes five parts: walking mechanism, lifting mechanism, rotating cushion mechanism, rotating armrest mechanism, and pull rod back mechanism. The walking mechanism is a wheel type walking mechanism, which provides power for the walking of the equipment; the lifting mechanism is a parallelogram structure, which is connected with the stepping electric push rod to realize the lifting and lowering of the equipment; the rotating cushion mechanism is driven by the gear mesh to rotate the cushion; the rotary armrest mechanism can be manually rotated and locked by the automatic spring bolt; the pull rod back mechanism can be manually stretched and contracted. The 3D model of the elderly's life assistance device is shown in Figure 1.

2.1. Walking mechanism

The walking mechanism includes front wheel, rear wheel, brake mechanism, coupling, and DC motor. The front and rear wheels are installed on the lower part of the device to realize the walking of the device. The front wheel adopts the directional wheel, the auxiliary device walks, and has the brake mechanism, which plays the brake role, and is convenient to stop the device at a specific position. The rear wheel is connected with the DC motor through the coupling, and the coupling is driven by the motor rotation, so as to drive the wheel to rotate, providing power for the walking of the whole device, realizing forward and backward, and turning through the differential speed between the two wheels of the rear wheel. The 3d model of the walking mechanism is shown in Figure 2.

2.2. Lifting mechanism

The lifting mechanism includes a lower chassis, a stepping electric push rod, a parallelogram structure, and an upper chassis. The two-stage parallelogram structure connects the upper and lower panels,
which are respectively installed on the left and right sides of the device. The step push rod is placed vertically and connected to the pin between the left and right parallelogram structures. Through two working states of push and contraction of step push rod, the device can be up and down. The 3d model of lifting mechanism is shown in Figure 3, the finite element analysis diagram of lifting mechanism is shown in Figure 4, and the maximum strain diagram for finite element analysis of lifting mechanism is shown in Figure 5.

![3d model of lifting mechanism](image1)

6-lower chassis, 7-step electric push rod, 8-parallelogram lifting unit body, 9-upper chassis

![Finite element analysis diagram of lifting mechanism](image2)

Figure 3. The 3d model of lifting mechanism.

![Maximum strain diagram for finite element analysis of lifting mechanism](image3)

Figure 4. The finite element analysis diagram of lifting mechanism.

![Maximum stress diagram of lifting mechanism](image4)

Figure 5. The finite element analysis of the maximum stress diagram of the lifting mechanism.

2.3. Rotating seat cushion mechanism

The rotating seat cushion mechanism includes upper chassis, cushion, rotating shaft, gear 1, gear 2, gear 1 protection frame, gear 2 protection frame and servo motor. Two servo motors are fixed on the lower side of the upper chassis of the device. The rotation of the servo motor drives the gear to rotate, and the gear mesh drives the shaft to rotate, and the driven shaft is fixedly connected with the cushion, so as to realize the rotation of the shaft and the cushion. The 3d model of rotating seat cushion
mechanism is shown in Figure 6, the finite element analysis of rotating cushion mechanism is shown in Figure 7, the finite element analysis strain diagram of rotating seat mechanism is shown in Figure 8.

9-upper chassis, 10-cushion, 11-rotating shaft, 12-gear 1, 13-gear 2, 14-gear 1 guard, 15-gear 2 guard, 16-servo motor

Figure 6. The 3d model of rotating seat cushion mechanism.

Figure 7. The finite element analysis of rotating cushion mechanism.

Figure 8. The finite element analysis strain diagram of rotating seat mechanism.

2.4. Rotating handrail mechanism

The rotating handrail mechanism comprises an upper chassis, an armrest, a rotating hinge and an automatic spring bolt. The armrest is installed on the upper chassis through a rotating hinge, which can rotate freely. When the device is in use, the armrest can be manually turned up from the lower side of the upper panel, and then locked by the automatic spring bolt. After the device is used, press the button of the automatic spring bolt to release its locking function, and then turn the armrest to the lower side of the upper chassis, close to the parallelogram lifting structure, realize the folding function of the device, reduce the space occupied by the device, and facilitate the user's storage. The 3d model of rotating handrail mechanism is shown in Figure 9.
2.5. Pulling rod backrest mechanism

The pulling rod backrest mechanism includes a pull rod button, a backrest and a telescopic pull rod. The device adopts three-stage telescopic pull rod, and uses the principle of telescopic pull rod mechanism to realize the effect of retraction of the back with the pull rod. The back is installed in the third stage of the telescopic rod, which can support the back of the human body when the device is used, ensuring the safety and comfort of the device. At the same time, the mechanism also has the function of retraction. When the device is used up, the user can press the pull rod button to lower the telescopic rod to the lowest position, and the back of the device will also be lowered to the lowest position. The user can also manually complete the contraction of the pull rod to reduce the storage space of the device, which is conducive to the user's storage. The 3d model of the pulling rod backrest mechanism is shown in Figure 10.

3. Control system design

The device is based on the speech recognition technology and the speech control is realized by the speech recognition system. The speech recognition system includes LD3320 speech recognition module, STM32 MCU and SYN6288 speech synthesis module. The STM32 single-chip microcomputer controls the DC motor under the lower chassis, the stepper electric push rod above the lower chassis and the stepper motor under the upper chassis. In other words, the STM32 single-chip microcomputer can control the walking mechanism, lifting mechanism and rotating seat mechanism.

After the module identification to the user's voice, pretreatment and speech feature extraction, the first in the match the key words in the library of deposit in advance, will sound into text, realize voice input, and through a serial port communication with STM32 microcontroller, passing the information to the STM32 MCU, again by STM32 microcontroller to control device, so as to realize the voice control of the plant, at the same time, the STM32 MCU control speech synthesis module output action name voice, realize voice remind function.
Therefore, in order to realize the corresponding functions of most mechanisms of the device, users only need to speak the corresponding instructions after the device wakes up, which makes the intelligent operation convenient for the elderly to use.

4. Conclusions

Introduced in this paper, we study a kind of based on the mechanical structure of the elderly living auxiliary device of artificial intelligence, the device can assist disabled old man walking to the toilet, in the process of the toilet can also help to support the old man to complete the next crouching, get up, to ensure the safety of the old man's armrest and back of a chair to make the old man in the process of using this device is more safe and comfortable. It can be seen that the device is very humanized and more acceptable to the elderly. Compared with the existing auxiliary device, the speech recognition function of the device is more intelligent, which can bring great convenience to users. How to guarantee the quality of life of the elderly is a long-term topic, for this, a variety of elderly auxiliary devices emerge in endlessly, the future, is bound to be diversified, multi-functional, intelligent direction.

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