托福阅读素材实例解析：无动力行走装置

曾经人们认为想要造出帮助人行走的装置非常困难.现在美国科学家造出一种小的可带在普通鞋子上的装置。这个新发明减轻肌肉的活动，使行走变得轻松。在研究和设计过程中，他们主要参考了哪些研究结果，这种装置将会用在哪些方面呢?和托福小编一起浏览今天的托福阅读材料吧!

文章中的疑难词：

boost n. 推动 vi. 宣扬 vt. 促进

exoskeleton n.外骨骼

restorevt. 恢复;修复

spring n. 春天 vt. 使跳起

clutch n. 离合器;控制 vt. 抓住;紧握

stroke .中风;轻抚 vt.轻抚;敲击

manufacturer n. 制造商

Motor-Free Device Reduces Stress from Walking

让行走更轻松的无动力装备

Devices that help people walk were once thought to be difficult, if not impossible, to design. Until recently, such a device required electricity from an external power supply. Now, American scientists have built a small, wearable addition to normal shoes. Their new invention eases the load on muscles in the leg and makes walking easier.

Steven Collins and Greg Sawicki are biomedical engineers. They both studied how human beings walk. They found that our ankles and calves perform motions similar to a spring joined to a clutch. In an automobile, a clutch is used to connect and disconnect a driving or driven part of an engine or other piece of equipment. The researchers found that the human body parts are able to both store and release energy, just like a spring.

Steven Collins works with Carnegie Mellon University in Pennsylvania. Greg Sawicki is with North Carolina State University.

"We found in basic science experiments that that system, your calf and Achilles tendon, works a lot like a catapult. So, the muscle holds on to the tendon and your body actually stretches your Achilles tendon quite a bit and then stores the energy in the tissue and then it's given back to propel you forward in the world."

Mr. Sawicki says he and Mr. Collins designed a mechanical device that performs the same kind of energy ‘give-and-take' outside the body. Their new ankle exoskeleton is made of carbon fiber and metal. It connects to ordinary shoes and takes over part of the work of

walking. Mr. Sawicki says the device reduces the amount of energy required for walking by as much as seven percent.

The unpowered ankle exoskeleton can help people walk farther with the same amount of energy. It also can restore normal movement for individuals who have trouble walking.

Mr. Sawicki says it takes only a few minutes for someone to get used to the ankle exoskeleton. He says the wearer quickly learns to use less muscle energy, letting the device do much of the work.

"You really don't notice it until when you take it off. And when you take it off you realize that it was there and giving you the boost."

Mr. Sawicki says the device is mainly meant for people recovering from a surgery operation or a stroke. He adds that anyone who spends a lot of time walking, like hospital workers and policemen, could use the device.

There are no plans to make the ankle exoskeleton available to the general public. But the inventors say some manufacturers have expressed interest in the device.

长难句：

1.So, the muscle holds on to the tendon and your body actually stretches your Achilles tendon quite a bit and then stores the energy in the tissue and then it's given back to propel you forward in the world.

这个句子的难度在于多个 and，结构不清晰。

句子拆分：

主干：the muscle holds on to the tendon and your body actually stretches your Achilles tendon

在后半句又有两个 and then 结构

翻译：肌肉附在跟腱上，当身体伸展开跟腱时，就把能量储存到人体组织中，之后再释放出来推动人们向前行进。

2.He says(the wearer quickly learns to use less muscle energy), letting the device do much of the work.

句子类型：宾语从句+伴随状语

句子拆分：

主干：He says…

宾语从句:省略了 that, the wearer quickly learns to use less muscle energy

伴随状语 letting the device do much of the work

翻译：他说，佩戴者很快能学会使用更少肌肉能量，而让设备承担很多工作。

3.He adds (that anyone who spends a lot of time walking, like hospital workers and policemen, could use the device).

句子类型：宾语从句+插入语

句子拆分：

主干：He adds…

宾语从句: that anyone who spends a lot of time walking could use the device

插入语: like hospital workers and policemen

翻译：他补充说，医院工作人员和警察等长时间行走的人群也可以使用这种设备。

文章大意：

曾经人们认为想要造出帮助人行走的装置非常困难.现在美国科学家造出一种小的可带在普通鞋子上的装置。这个新发明减轻肌肉的活动，使行走变得轻松。

两位生物医学工程师一直在研究人类如何行走。他们发现，人类脚踝和小腿进行运动的原理与离合器上的弹簧类似。能够像弹簧一样储存和释放能量。在基础科学实验中，小腿和跟腱这一系统就像弹射器一样工作。肌肉附在跟腱上，当身体伸展开跟腱时，就把能量储存到人体组织中，之后再释放出来推动人们向前行进。

根据这一原理，他们设计出一种机械装置，能够在体外进行同样的能量储存与释放。他们这种新的外骨脚踝是用碳纤维和金属制成，可以附加到普通鞋子上并承担部分行走工作。这种装置可以让行走所需能量降低 7%。这种无动力外骨脚踝可以帮助人们用相同能量走得更远。它还能让走路困难的人恢复正常运动。

这种设备主要用来帮助人们从外科手术或中风中康复。目前尚无向大众推广这种装备的计划。但是设计者表示一些厂商已经对此产生了兴趣。

文章架构：

第一部分，第 1 段，主旨：之前人们觉得想要造出帮助人行走的装置非常困难，现在已经造出了可带在普通鞋子上使行走变得轻松的装置。

第二部分，第 2，3,4 段，研究者在研究人类如何行走时发现的人类脚踝和小腿进行运动的原理。

第三部分，第 5-8 段，根据这一原理，他们设计出一种机械装置，能够在体外进行同样的能量储存与释放。

第四部分，第 9 段，这种设备主要的用途。

以上就是我们今天的托福阅读文章及分析，希望大家可以学到相应的托福阅读背景知识。