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ROBOTS

Robot. It is a word that seems so very modern. A word that creates a string mental picture. A piture of something that looks and acts like a human. We have a report on these machines and what they are doing.

Not long ago, the American "Star Wars" films made two robots very popular. The robots were called C3PO and R2D2.

C2PO moved and talked much as a human does. He looked like a strange metal man. But his computer brain made him much quicker at most mental activities than a human. R2D2 did not move or talk like a human. He was a short fat tube—shaped thing with a rounded top and flashing lights. Like C3PO, he had a very intelligent computer brain.

Human—like robots still are found only in movies and science fiction stories. Simple robots, however, are found in many places.

Robots are very much linked to our image of the future. The thought of what they may be able to do seems exciting. Yet the idea of robots also is a little frightening. Part of he fear comes from the way robots have been pictured in movies and science fiction stories.

The word "robot" is not as modern as you might think. It was used first in 1920 in a play by Czechoslovak writer Karel Capek. The word robot comes from the Czech word for slave.

In Capek's play, there were metal devices that looked and acted like humans. They were designed to do all kinds of work to free humans from labor. Then the robots developed feelings. They killed the hrmans who made them.

The word robot, and robots themselves, are less than 100 years old. but humans have been dreaming of real and imaginary copies of themselves for thousands of years. Early peoples made little human statues out of clay. And they cut wood and stone to look like humans.

Perhaps they thought if they could make a copy that looked human enough, it might really come to life. Stories about creating human life continued for centuries. They usually involved the use of magic. At the same time, people were beginning to invent devices that did some jobs by themselves. Such devices were called "automatons." The name came from Greek words meaning "acting by itself". Clocks run by water or by heavy weights, for example, were some of the earliest automatons.

Early in the 19th century in France, Joseph — Marie Jacquard invented an automaton that could weave cloth. His machine was given information through holes in wooden cards. Different cards told the machine how to produce a different design or kind of cloth.

Inventing an automaton that acted like a human, however, was a much more difficult task. It would not be done until another machine was invented —— the computer.

The first computers were large and heavy. Then the silicon chip was developed. It became the tiny but powerful heart of the computer. The chip made it posible to connect computer brains to robot bodies. In 1954, the world's first robot was produced in the United States. After that, the robot industry began to grow in Europe and Japan. During the 1960S, the first industrial robots appeared beside human workers in factories.

What do today' s robots do? Robots do work. Work that humans consider uninteresting or dangerous. Many robots are machines designed to do just one job. They are made to move and work by information put into their computers by humans. Robots used in industry are designed to copy the movements of the human arm. Simple robots pick up objects and place them in position. They cannot see. So parts and materials must be brought to them in the correct position.

Motors make it possible for a robot to move. Directions are put into a computer. The computer is connected to the robot. The computer controls the motors. It tells the robot arm which way to move.

Robots im factories do many jobs that people consider tiring. Robots never need to rest. People make mistakes when they get tired. Robots never do.

What kinds of jobs are robots doing? They are welding, a method of joining two parts of something by using high heat. They are loading hot metals and plastics in machines that press the materials into shapes. They are spray painting.

Robots are not harmed by heat, noise or chemicals that would be dangerous to humans. And they are controlled from a distance. So they can do dangerous jobs. Robots investigate unexploded bombs. They work underwater repairing pipes at the bottom of the sea. And they work With materials that give off radiation. Robots are very valuable in space exploration. In 1976, the American Viking spacecraft landed in Mars. Its robot arm gathered Martian soil. The robot arm on America' s space shuttle has been used to capture satellites for repair while in orbit.

Robots do make mistakes sometimes. But they are not responsible for the mistakes. In one automobile factory, for example, the doors on more than 1, 000 cars were welded shut. A human had given the robot' s computer brain the wrong instructions. When robots get the correct instructions, their work is good and fast. A company in Florida, for example, uses robots to build small communicating devices. The robots put about 130 tiny electronic pieces into each device. The factory can produce a device just two hours after it receives a request for one. The company says it would take almost one month to produce a device in a normal factory with human workers.

What is the future of robots? The goal of scientists is to create a true human—like robot. Some experts have described this robot of the future as one that can act independently with the physical world through its own senses and actions. Humans have the ability to see, hear, speak and solve problems. Engi-

neers have built robots that have one or two of these abilities. But it takes a number or big costly computers to make the robots work.

The biggest problem in creating a human—like robot is copying human intelligence. The way the human mind works is almost impossible to copy. A simple computer can do mathematical problems far beyond the ability of even the smartest human mind. But the human mind is better than a thousand supercomputers at speaking, hearing and problem—solving. Several American and Japanese companies are working to develop the senses of sight and touch for robots. The development of these senses will make robots much more useful.

However, the most important human ability —— and the most difficult to copy —— is problem—solving. An intelligent robot must be able to change the way it acts when it faces an unexpected situation. Humans do it all the time. Computers must do it for robots. This means computers must have a huge base of information about many things. They must be able to find the information in their systems quickly. And they must make choices about how to act. So far, this is beyond the ability of computers.

Will it always be so? Probably not. Computers have improved at an unbelievable speed. In 20 years, computers have become 1,000 times more powerful. Scientists expect this rapid improvement to continue. Computers of the future will have the power to operate more human—like robots.

C3PO of the "Star Wars"movies may not appear soon. But simpler robots will be used more and more. Many persons fear robots will replace human workers. Experts say this should not happen. They say robots can free humans to do things robots cannot do. And they note that humans and robots are more effective as a team, than either working alone.

机器人

机器人，这似乎是一个非常摩登的字眼。它使人浮想联翩，使人觉得它的样子和行动都像人。机器人当然不是人，它们是机器。我们来谈谈这些机器以及它们正在做些什么。

不久前，美国的《星球大战》电影使两个机器人名闻遐迩，它们叫C3PO和R2D2。

C3PO的言谈举止很像人，看起来像一个奇特的金属人。但是它的计算机大脑使它在大多数智力活动中比人要敏捷得多。R2D2的言谈举止不像人，是一个矮胖的管子形状的东西，有一个圆圆的顶，不断地闪光。像C3PO一样，它也有一个聪明的计算机大脑。

像人一样的机器人目前还只能在电影和科幻小说中找到。不过，简单的机器人则许多地方都有。

机器人同我们对未来的设想有非常密切的联系。一想到它们能够做的那些事情，似乎令人兴奋。然而对机器人的想法也有点叫人害怕。这种害怕的感觉有一部分是产生于电影和科幻小说对机器人的描写。

"机器人"这个词并不像人们可能想象的那么摩登。它是

捷克斯洛伐克作家恰彼克1920年首次在一剧本中使用的。Robot（机器人）来源于捷克语，意思是奴隶。在恰彼克的剧本里，有一些相貌和动作都像人的金属装置。它们被设计成用来从事各种各样的工作，以便使人摆脱劳作。后来，机器人有了知觉。它们杀死了制造它们的人。

机器人一词和机器人本身，其历史还不到一百年。但人类几千年来一直在梦想有人类的真实的和想象中的复制品，古代人用泥土做小人像。他们把木头和石头雕刻得像人一样。

也许他们曾经想，如果他们能够制造一个十分逼真的人的复制品，它或许会真的活起来。关于造人的故事继续了许多世纪。这些故事通常都涉及到使用魔法。与此同时，人们开始发明一些装置，它们可以做一些工作。这些装置被叫作“自动装置”。Automaton（自动装置）这个词来源于希腊语，意思是“靠自身去做”。例如，用水或重物运转的时钟就是最早的自动装置之一。

19世纪初，法国的约瑟夫—马里·雅卡尔发明了一种可以织布的自动装置。他的机器是通过木制卡片的小孔接受信息的。不同的卡片告诉机器如何生产设计种类各异的布匹。

可是发明一种能够像人一样动作的自动装置，却要困难得多。只有到发明了另一种机器——计算机，才能做到这一点。

第一批计算机庞大而又笨重。后来研制出了硅片。它成为计算机的小而有力的心脏。硅片使得有可能把计算机大脑同机器人的躯体联结在一起。1954年，世界上第一个机器人在美国被制造出来了。以此以后，机器人工业开始在欧洲和日本发展起来。60年代，第一批工业机器人同工人并肩出现

在工厂里。

今天的机器人做什么呢？机器人在做工，做人类认为枯燥乏味或危险的工作。许多机器人是被设计成只能做一种工作的机器。它们按照人给它们的计算机输入的信息移动和工作。工业部门使用的机器人模仿人类手臂的运动。简单的机器人可以拣东西，放回原地。它们没有视觉，因此，零件和材料必须放到它们周围的正确位置上。

发动机使机器人可以移动。人们给计算机输入了方向程序，把它同机器人联结在一起。计算机控制发动机，它告诉机器人的手臂向何处移动。

工厂里的机器人做许多人们认为单调乏味的工作。机器人从来不需要休息。人们疲乏时会犯错误，而机器人则不会。

现在，机器人从事着什么样的工作呢？它们从事焊接，利用高温把一件东西的两部分焊在一起。它们把灼热的金属和塑料装到模压机中，压制成型。它们喷油漆。

高温、噪音、或对人类有危险的化学物，不会损害机器人。机器人被遥控指挥着，所以它们能够做危险的工作。机器人可以搜寻未爆炸的炸弹。它们在水下工作，修理海底管道。它们可以同有放射性的物质打交道。在空间探索中，机器人是很有价值的。1976 年，美国海盗号宇宙飞船在火星着陆。它的机器人手臂收集了火星的土壤。美国航天飞机的机器人手臂被用来抓住卫星，在轨道上进行修理。

机器人有时也会犯错误。但这些错误不是机器人的造成的。例如，有一家汽车制造厂，一千多辆汽车的车门被焊上了。原来是一个人给机器人的计算机大脑发出了错误的指令。当机器人得到正确的指令时，它们的工作做得又好又快。例

如，佛罗里达的一家公司，用机器人制造小型通讯装置，把大约130个微型电子零件安放到每个装置里。工厂在收到订货单后，两个小时就可以生产一台。这家公司说，在一般工厂里用人工生产一台，大约需要一个月。

机器人的前途如何呢？科学家的目标是，制造一种真正类似于人的机器人。一些专家描绘了这种未来的机器人：它可以通过自己的知觉和行动，独立自主地同外部世界打交道。人有看、听、说和解决问题的能力。工程师已经制造了具有一两种这种能力的机器人。但需要有许多耗资巨大的计算机，才能使这种机器人运转起来。

在制造类似人的机器人方面，一个最大的问题是模仿人的智能。人脑的运转情况几乎是无法模仿的。一个简单的计算机在运算数学方面的能力可能大大超过最聪明的人。但是在说、听和解决问题方面，人的能力却胜过一千台超级计算机。美国和日本的几家公司正在研究制造机器人的视觉和触觉。如果研制出这些知觉，机器人将变得更加有用。

不过，人类最重要的能力——也是最难模仿的——是解决问题的能力。智能机器人必须具有这样的能力：当它面临意想不到的情况时，它要能够改变行动方式。人一直是这样的。而机器人，则必须由计算机替它这样做。这就是说，计算机必须拥有涉及到许多事物的巨大信息库。它们必须能够迅速地在其系统中找到所需要的信息。它们还必须作出如何行动的选择。迄今为止，计算机还做不到这一点。

是否会一直这样下去呢？未必一定如此。计算机在以难以置信的速度不断改进。20年来，计算机的能力增强了一千多倍。科学家预计，这种迅速的改进将继续下去。未来的计

算机将有能力操纵更加相似于人的机器人。

《星球大战》电影中的C3PO不可能很快出现。但简单机器人将越来越多地被使用。许多人担心，机器人将取代人力。专家说，不会出现这样的事，他们说，机器人可以把人解放出来去做一些机器人做不到的事。他们注意到，人和机器人协同工作比各干各的更有效率。

SPACE SHUTTLE CHALLENGER

On Tuesday, January 28, 1986 the United States launched a space shuttle for the 25th time. The shuttle was to remain in space for seven days. But the flight lasted only 74 seconds. Before the spacecraft reached orbit, it exploded. There was no warning. And there appeared to be nothing the seven crew members could do to save themselves.

America's space agency, NASA, said it did not know what caused the explosion. It formed a committee to investigate the accident. And it suspended all future shuttle flights.

Investigators examined all the evidence they could find. That included information from the many computers that recorded the activities of all parts of the space shuttle during launch. It included pictures and films taken as the shuttle lifted into the air. And it included pieces of the spacecraft that fell into the Atlantic Ocean off Cape Canaveral.

Challenger was about 16 kilometers high When it exploded. It was moving more than 3, 000 kilometers an hour. The explosion was so great at this height and speed that wreckage continued to fall from the skies for an hour. As soon as it was safe, ships, planes and helicopters began to search for possible survivors. No survivors were found. Searchers did discover a human bone, perhaps part of a foot. NASA did not say if the bone was from one of Challenger's crew members.