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ROBOT REVOLUTION FUN FACTS

More than 40 robots from all the over the world—including Japan, Poland, Denmark, Germany, China, Canada, South Korea, as well as coast to coast throughout the U.S.—are included in *Robot Revolution,* supported by Google.org with additional major support from The Boeing Company.

Robot history:

- "Robot" comes from the Czech word "robota," which means forced work or labor, and was first used to denote fictional humanoid in a 1921 play, "R.U.R." by the Czech writer, Karel Čapek.

- The history of robotics can date back to the fifth century B.C., when Archytas of Tarentum, a friend of Plato's and a renowned mathematical scientist, built a mechanical bird driven by a jet of steam or compressed air—arguably history's first robot.

- Al-Jazari—a scholar, inventor, mechanical engineer, artist and mathematician—built what is believed to be the first programmable humanoid robots in 1206. They were musicians that played instruments while boating to entertain royal guests.

- In the late 1400s, Leonardo da Vinci sketched plans for a humanoid robot. He was said to be influenced by the works of al-Jazari. In the 18th century, Jacques de Vaucanson was famous for creating an automated human figure that played the flute, in addition to a mechanical duck that would flap its wings and eat.

- Elektro, built by Westinghouse, debuted in 1939. This seven-foot-tall walking machine "spoke" more than 700 words stored on 78-rpm records to simulate conversation.

- Alan Turing, in a 1950 paper, proposed a test called "The Imitation Game" that proposes a solution to determining machine intelligence. It tests the machine's ability to exhibit intelligent behavior equivalent to, or indistinguishable from, that of a human. Since then, the Turing test has become an essential concept in the philosophy of artificial intelligence.

- In 1954, inventor George Devol secured patents for robot technology. In 1956, physicist and engineer Joseph F. Engelberger adapted and applied Devol's ideas to start Unimation Inc., the world's first robotics company. This led to the development of the first industrial robotic arm, installed in 1961 at the General Motors plant in Ewing Township, New Jersey, which lifted and stacked hot metal parts, weighed 4,000 pounds and cost $25,000. Devol and Engelberger's ideas reshaped production lines around the world.

- In 1973, German robotics company, KUKA, created the first industrial robot with six electromechanically-driven axes, called the Famulus.

- In 2013, Harvard scientists created a tiny, insect-sized robot that is able to flap its wings eerily similar to a fly. The Robo-fly is the smallest flying robot, weighing 106 milligrams and made from carbon fiber.

- As of 2014, Guinness' world's largest robot is Traddino, a 27-foot-tall robotic dragon in Zandt, Germany, that can not only walk, but also spit fire.

- In 2015, Kirobo, a small android able to have conversations in Japanese, set Guinness World Records for First Companion Robot in Space and Highest Altitude for a Robot to Have a Conversation following an 18-month stay onboard the International Space Station.

Facts about robots featured in the exhibit:

RoboThespian, a humanoid robot added to the exhibit in 2017, is designed for human interaction in a public environment.

The developers of **EMYS** were inspired by watching cartoon characters, which helped them discover how to translate human expressions into simple movements. By moving and tilting just three disks and its two eyes, EMYS can look happy, sad, angry, afraid, disgusted and surprised.

Robots similar to the **TOPY OSCAR stair climbing robot** investigated radiation leaks after the Fukushima nuclear disaster in Japan in 2011.

PARO® robots can be especially soothing for patients who can't communicate well with other people. They have been used with people suffering from dementia in nursing homes and hospitals in Australia, Europe, the U.S. and Japan.

The one-pound **Recon Scout® Throwbot® XT** can be thrown up to 120 feet, or dropped from a 30-foot roof. This robot moves quietly and its infrared optical system enables it to see in complete darkness. More than 4,500 are in use worldwide, primarily in search-and-rescue missions.

People have been thinking about **self-driving cars** since the development of the automobile more than 100 years ago. Today's robot cars have quicker reactions than humans, no blind spots and sensors that can see 360 degrees around them. Vehicles will be able to talk to each other and avoid collisions.

Facts about the robotics industry:

Robots have been featured in mainstream pop culture for years, familiarizing and personalizing robots for the general public. The Maschinenmensch robot in 1927's *Metropolis*; Isaac Asimov's 1950 collection of short stories *I, Robot*; Robby the Robot in 1956's *Forbidden Planet*; R2-D2 and C-3PO from the *Star Wars* series; and 2008's *Wall-E* are among many robots that people may recognize from movies, books and television.

The first toy robot for consumer purchase is believed to be the yellow tin robot, Lilliput, made and sold in Japan in the mid-1940s. Today, consumers can buy robotic toys ranging in price from $15 up to $1,000.

Robot brains are similar to computers, and most have software written in computer code that controls their actions. These algorithms are a series of logical steps that help the robot decide what to do with the information it has. Computer code boils down to questions with only two answers: “true” or “not true.”

Demand for qualified robotics engineers is expected to grow by as much as 13 percent through 2018, according to the Bureau of Labor Statistics. Additionally, the National Association of Colleges and Employers ranked mechanical engineering, which includes robotics, fifth on its list of most in-demand bachelor’s degrees for its Job Outlook 2016 survey. The same survey also ranked mechanical engineering number one among the top engineering degrees in demand, and noted that mechanical engineering majors will be targeted by more than half of those hiring engineering majors.

The consumer-robot market is the fastest growing, according to research done by *Business Insider Intelligence*. By 2019, the consumer robot industry is predicted to be a $1.5 billion market.

To date, robots have been used in 43 disasters worldwide, according to data provided by the Center for Robot-Assisted Search and Rescue (CRASAR).

Global demand for industrial robots in 2014 reached more than 200,000 units for the first time, according to the president of the International Federation of Robotics (IFR) in Chicago. Strongest drivers of the growth were the automotive industry followed by the electronics industry.

In 2014, China was the largest market destination for industrial robots, with about 56,000 units being sold, 54 percent more than in 2013. South Korea was the second-largest destination with about 39,000 units, followed by Japan, the U.S. and Germany, according to the IFR.

According to the Robotic Industries Association (RIA), a record 14,135 robots, valued at $788 million were ordered from North American robotics companies in the first half of 2014, an increase of 30 percent in units and 16 percent in revenue over the same period in 2013.

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