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A Brief History of Robotics

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ABSTRACT

Robot, the first smart and programmed machine developed by humans for doing various tasks with combination of the different technologies such as mechanical controls, computers and electronics.

Keywords: control, machine, program, robot

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INTRODUCTION

A robot is an electromechanical device which has multiple degrees-of-freedom and pre-programmed to complete a variety of tasks. Robotics is the science of robots. The term degrees-of-freedom is very significant because, it is the number of independent motions a device can make in different directions, which is also called mobility.

The common applications of robots such in industries, they are used in manufacturing: pick & place, assembly, welding, machining, etc. But for remote operations, robots are used for the purpose of undersea discovery, fire extinguishing, bomb disposal, rescue and law enforcement, and outer space applications. Robots have been also employed as hospital helpmates, handicapped assistance, retail, household servants, and vacuum cleaners.

A BRIEF HISTORY OF ROBOTICS

In 1400 BC, the Babylonians introduced the clepsydra water clock which was one of the first automated mechanical artifacts. In the subsequent centuries, human creativity created devices such as the automaton theatre of Hero of Alexandria in 100 AD and the hydro-powered water-raising and humanoid machines of Al-Jazari in 1200.

In 1500, Leonardo da Vinci drafted many human-inspired, robot-like designs and models.

In 1920, the word robot inspired from Robota, the Czechoslovakian word for worker or serf (peasant) was first appeared in a play R.U.R. (Rossum's Universal Robots) by Karl Kapek, a Czechoslovakian playwright in written form.

"When he (Young Rossum) took a look at human anatomy he saw immediately that it was too complex and that a good engineer could simplify it. So he undertook to redesign anatomy, experimenting with what would lend itself to omission or simplification. Robots have a phenomenal memory. If you were to read them a twenty-volume encyclopedia they could repeat the contents in order, but they never think up anything original. They'd make fine university professors." – Karel Capek, R.U.R. (Rossum's Universal Robots), 1920.

The term robotics was coined by the Russian science-fiction Isaac, Asimov

writer in his novel Runaround. He popularized the word by introducing the same through many science-fiction novels and short stories. In 1930, Asimov proposed a positronic brain for controlling robots; this pre-dated digital computers by a couple of decades. The earlier robots in science fiction do not threaten humans.

Asimov invented the Three Laws of Robotics:

(1) A robot may not harm a human or, through inaction, allow a human to come to harm.
(2) A robot must obey the orders given by human beings, except when such orders conflict with the First Law.
(3) A robot must protect its own existence as long as it does not conflict with the First or Second Laws.

In mid-20th century, the first experiment for connecting the human intelligence and machines were done, shaping the beginning of research in the field of artificial intelligence (Al). Joseph Engleberger and George Devoe were the fathers of industrial robots. The company, Unimation, built the first industrial robot, the PUMA (Programmable Universal Manipulator Arm, in 1961, inspired by the human arm.

The first robots were made from the combination of the different technologies of mechanical controls, computers and electronics. The new experimental designs motivated new research and discoveries, leading to enhanced solutions and thus form new concepts. During the cycle of time, the knowledge and understanding gave birth to the field of true robotics, properly referred to as: the science and technology of robots. The early robots built in the 1960s developed from the convergence of two technologies: numerical control machines for precise manufacturing, and telcooperators for remote radioactive material handling. These slave arms were designed to duplicate one-to-one the mechanics of the human arm and had rudimental control and little perception about the environment.

Then during the mid-to-late twentieth century, the development of integrated circuits, digital computers and miniaturized components, enabled robots to feel the surrounding environment (force and tactile, range and vision). The intelligent connection is entrusted to plan and control the architecture which relies on the perception of available models of the robot and environment.

In the 1990s, the research was improved by the need of robots to address human safety in hazardous environments (field robotics) such as rescue and prevention. The efficiency and strong desire of human led to development of robots for self-service. By the start of the new millennium, robotics has undergone a major transformation both in scope and dimensions. This expansion has been brought about by the maturity of the field and the advances in its related technologies. From a largely dominant industrial focus, robotics has been rapidly expanding specially to meet the challenges of human world.

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