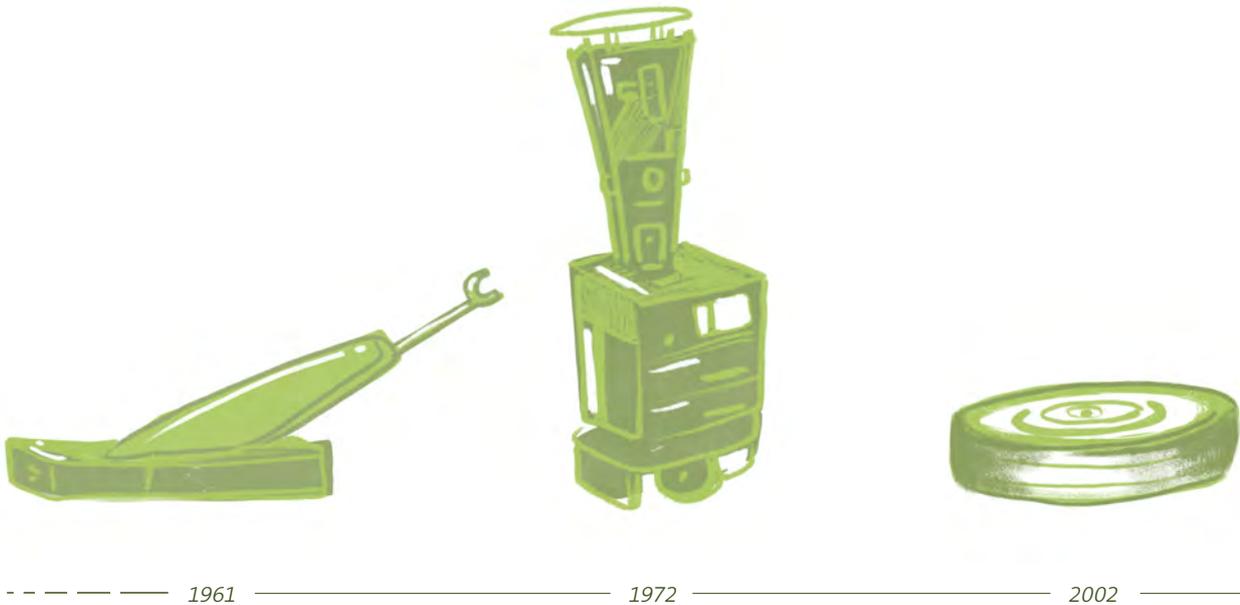


FAMILY TREE – From the manipulator arm to the potential ethical robot: A timeline of six main technological breakthroughs in the history of robotics, explained by inventor Ronald Arkin.

CECILIA ARREGUI (TEXT)
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ROBOTS OF YESTERDAY, TODAY, AND TOMORROW



The Unimate became the first mass produced industrial robotic arm in 1961. It basically consists of an automated piece of equipment that can make repetitive and highly accurate movements. “The factory was a whole lot easier [for early robots] because you can engineer the environment to the needs of the robot, rather than the machine trying to figure out the real world,” Arkin explains.

Developed between 1966 and 1972 by SRI International, Shakey was the first robot to combine logical reasoning with physical action. It used formal logic provers to build models of the world and reason through them. According to Arkin, the system was a breakthrough for traditional AI at the time, though its innovations are not used much anymore.

Some of Arkin’s early work included faster-reacting robots that were usually bio-inspired, modelled after insects or other small animals. They stopped relying on an internal concept of the world and shifted towards “using the world as its own best model,” in roboticist Rodney Brooks’ words. Such a paradigm paved the way for Roomba, the autonomous vacuum cleaner, released in 2002.

For at least six decades, advances in the vast field of robotics have been occurring at a dizzying pace. There is no doubt that these ever-evolving machines have already changed the world and will continue to do so. “We cannot exaggerate the potentials of the technology we are building,” American roboticist and “robo-ethicist” Ronald Arkin says.

For non-experts, it is hard to distinguish real developments and their applications from science fiction creations and conspiracies. But Arkin does not think robots will ever replace humans. Instead, he argues, shaping tomorrow’s robots is more about paying attention to how the know-how is moving forward and ensuring it delivers

things humanity desires. Says Arkin: “The future is not to be feared, it just needs to be managed.”

Arkin has been programming software for robots since the early 1980s. As the Director of the Mobile Robot Laboratory at the Georgia Institute of Technology College of Computing, he feels proud of all the machines he has created. In a way, they are like his own children.

In order to understand the past, present and possible future, Arkin explains the trajectory of robots in six basic chronological steps, classifying them according to the main technological breakthroughs that led to paradigm shifts in their use. ♦



2013



Tomorrow



In the future

At the beginning of the twenty-first century, advances in probabilistic robotics enabled all sorts of new capabilities, such as map-building. This technology, for instance, helped make possible the development of driverless cars. If Arkin had to choose one robot to capture today’s spirit, he says, it would be Atlas, by Boston Dynamics.

Human-robot interaction is a discipline that has been rapidly growing. From Arkin’s perspective, the next big leap will be designing devices people trust. That will result in humans feeling more comfortable around the automated machines. It involves understanding how humans relate to such objects. According to Arkin, they could take any physical form.

Taking it one step further, and probably taking advanced humanoid shapes, these machines will behave in a way that fits “human socio-cultural norms.” People will be treated with respect by the robots, who will also expect to be regarded that way. Says Arkin: “We should allow them to become part of our society, considering them partners and not slaves.”