

Human-like robotic inspectors - science fiction and reality

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ABSTRACT

The field of robotics spun off automation and it resulted from the need to perform tasks that are too complex to handle by a simple production line manipulation system. Robotics is benefiting Nondestructive Evaluation (NDE) by allowing for rapid testing of large structures both in the field and at inspection facilities. Such robotic devices as crawlers are increasingly being used for testing aircraft and other fracture critical structures. Robotics is a field that is highly inspired by concepts from biology and it is mimicking or adapting many of nature's inventions. Thru evolution of billions of years, nature addressed its challenges by trial and error "experiments" and came up with solutions/inventions that work well and last. For its evolution, nature employs principles of physics, chemistry, mechanical engineering, materials science, and many other fields of science and engineering. Human-like autonomous robots can potentially inspect structures with configuration that are not predetermined, reach hard to access areas of structures, and they can be designed to operate at harsh or hazardous environments that are too dangerous for human presence. Biologically Inspired technologies (also known as biomimetics) such as artificial intelligence, artificial muscles, artificial vision and numerous others are increasingly becoming common engineering tools. The emergence of Electroactive Polymers (EAP), which have the moniker artificial muscles, gave a boost to the development of biomimetic application including human-like robots. Inspired by science fiction, making human-like robots is increasingly becoming an engineering reality and in this paper the state-of-the-art and the challenges will be reviewed.