Mechatronics - Evolution and impact

Mechatronics are machines that combine electrical and mechanical components to create a system. The term was coined in 1969 by a Japanese engineer at Yaskawa Electric, and over its years, it has increased efficiency, especially automation, in many parts of society.

Mechatronics started when electrical and mechanical engineering merged together in the mid 20th century, although the first examples of mechatronics may be found before that, with automated looms using electromechanical relays to automate weaving.

Early mechatronics have seen the emergence of numerical control machines that are controlled with punched tape, and feedback control systems that make sure the machine corrects itself to keep on reaching its requirement.

The 1980s saw the rise of microprocessors and microcontrollers. This made mechatronics much more efficient because of less moving parts and programmability, as opposed to the older systems using relays, analogue circuits and hard-wired logic, meaning that to change the machine's function would require rewiring the whole system. Microprocessors also meant that it was much easier to do calculations, utilise sensors and user interfaces.

In the present, mechatronics are taking over manufacturing and automating many processes. It drastically increases efficiency, some companies like Tesla being able to make a car under half a minute.

Robots are also being developed in the present, especially humanoid models, to further increase efficiency in all of society, whether that be manufacturing or domestic use. Many systems use an AI of some sort to control, navigate, and even balance itself.

The future of mechatronics will see more machine to machine communication, creating the internet of things (IoT), with the potential of making manufacturing fully automated. The industrial changes will also bring many technologies together, such as artificial intelligence, gene editing and advanced robotics. Technology will constantly make them smaller, with people already being able to wear them and have them be integrated into them, and may even get smaller than bacteria. A slightly larger mechatronics may also be in the form of microfactories manufacturing on demand rather than mass production. Robots will also be everywhere, even houses being robots themselves if it is a smart home.

Mechatronics play a huge role in present-day life, domestic and industrial settings alike. Recently, technology has been integrated into everyday appliances, making them more adaptive, resource-efficient. They are also able to be connected to the internet and mobile

devices, so users are able to have one central hub to manage their appliances. They will also be capable of keeping record of past usages, adapting to the user's preferences and usage patterns. This is one of the many effects of mechatronics that will improve the lives of many people.

Industrial settings will also benefit in not only efficiency and quality but also safety. Machines are able to operate in places of high heat or toxic chemicals, all hazardous to the human worker. This way of operation would mean increased workplace safety and decreased injuries

Mechatronics have advanced enough to be able to operate in a medical setting because of its precision. This is not limited to surgery robots, but also drug delivery systems, giving the person the correct dosage and leads to less complications and hospital visits. Another example of mechatronics in medicine are found in diagnostic and imaging equipment, specifically MRI scanners, CT scanners and ultrasound machines. They can retrieve extremely precise data, allowing for a more accurate and fast diagnosis.

Future mechatronics may also be seen doing even more finer or complex tasks, and new ways of usage can revolutionize the way humans do things.