

What is Mechatronic engineering?

Mechatronic engineering is strongly based on mechanical engineering, but is a distinctly different discipline.

Many mechatronic engineers work with the electronic and computer control systems which nearly all machinery relies on for efficient and reliable operation. We take it for granted that automatic systems monitor process plants for leaks and faults, and keep the plant operating all the year round. Mechatronic engineers build and design these systems and need expertise in computing and electronics, core mechanical engineering knowledge, and the ability to bring these together to make working systems which meet the safety and reliability levels we take for granted.

Mechatronic engineers also have roles in project engineering where their cross-disciplinary knowledge gives them an edge on mechanical or electrical engineers. Mechatronic engineers can work with electrical and mechanical systems together and solve problems that cross discipline boundaries. Their strength in IT, computer hardware and networking as well as software also helps them to be very versatile problem solvers.

Mechatronic engineers also learn to develop strong team skills. At several universities, including UWA, students develop team work skills through formal instruction and self-reflection during student team projects.

Leading mechatronic engineering academics across Australia agreed on the following more formal definition for future revisions of the Engineers Australia competency standards:

Mechatronic engineering is the engineering discipline concerned with the research, design, implementation and maintenance of intelligent engineered products and processes enabled by the integration of mechanical, electronic, computer, and software engineering technologies. Specific expertise areas include:

- Artificial Intelligence Techniques
- Avionics
- Computer Hardware and Systems
- Control Systems
- Data Communications and Networks
- Dynamics of Machines and Mechanisms
- Electromagnetic Energy Conversion
- Electronics
- Embedded & Real-time Systems
- Fluid Power and other Actuation Devices
- Human-Machine Interface Engineering and Ergonomics
- Industrial Automation
- Measurement, Instrumentation and Sensors
- Mechanical Design and Material Selection
- Mechatronic Design and System Integration
- Modelling and Simulation

Motion Control
Power Electronics
Process Management, Scheduling, Optimization, and Control
Process Plant and Manufacturing Systems
Robotics
Signal Processing
Smart Infrastructure
Software Engineering
Systems Engineering
Thermofluids

Other areas of specific expertise relevant to the practice of Mechatronic engineering are found within the disciplines of Aeronautical, Engineering, Biomedical Engineering, Communications Engineering, Computer Systems Engineering, Electrical Engineering, Electrical Power Engineering, Electronic engineering, Industrial Engineering, Instrumentation and Control Engineering, Manufacturing and Production Engineering, Mechanical Engineering, Software Engineering and Space Engineering.

There are fewer job vacancies labelled "mechatronic engineer" than other disciplines. There are still not many experienced mechatronic engineers available, so most employers would not want to restrict the field of applicants by calling only for a mechatronic engineer. Mechatronic engineering positions are often advertised as:

Asset Management engineer
Automation engineer
Data Logging engineer
Electrical/Electronic engineer
Electro mechanical engineer
Instrumentation engineer
Maintenance engineer
Plant engineer
Process engineer
Process monitoring and plant systems engineer
Project engineer
Software engineer
Systems engineer

Mechatronic engineering is a formally accredited branch of engineering in Australia, Japan, France, the Netherlands and Germany and several other countries. However this is not the case in the USA and Britain where competing professional engineering organizations cannot agree on who should provide accreditation. Mechatronic engineers in these countries tend to emerge from post-graduate masters programs after a first degree in mechanical or electrical engineering.

For further information, contact Professor James Trevelyan at The University of Western Australia, telephone (08) 6488 3057, E-mail James.Trevelyan@uwa.edu.au.