

## What is Mechatronics Engineering?

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

Many mechatronics 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. Mechatronics 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.

Mechatronics engineers also have roles in project engineering where their cross-disciplinary knowledge gives them an edge on mechanical or electrical engineers. Mechatronics 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.

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

Mechatronics 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

Written by Prof. J. Trevelyan

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 Mechatronics Engineering are found within the disciplines of Aeronautical, Engineering, Biomedical Engineering, Communications Engineering, Computer Systems Engineering, Electrical Engineering, Electrical Power Engineering, Electronics Engineering, Industrial Engineering, Instrumentation and Control Engineering, Manufacturing and Production Engineering, Mechanical Engineering, Software Engineering and Space Engineering.

There are still relatively few job vacancies, if any, labelled "mechatronics engineer". There are still not many experienced graduates available, so most employers would not want to restrict the field of applicants by calling for a mechatronics engineer. mechatronics engineering positions are often advertised as:

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

Mechatronics 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. Mechatronics 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 Associate Professor James Trevelyan at The University of Western Australia, telephone (08) 6488 3057, E-mail [James.Trevelyan@uwa.edu.au](mailto:James.Trevelyan@uwa.edu.au).