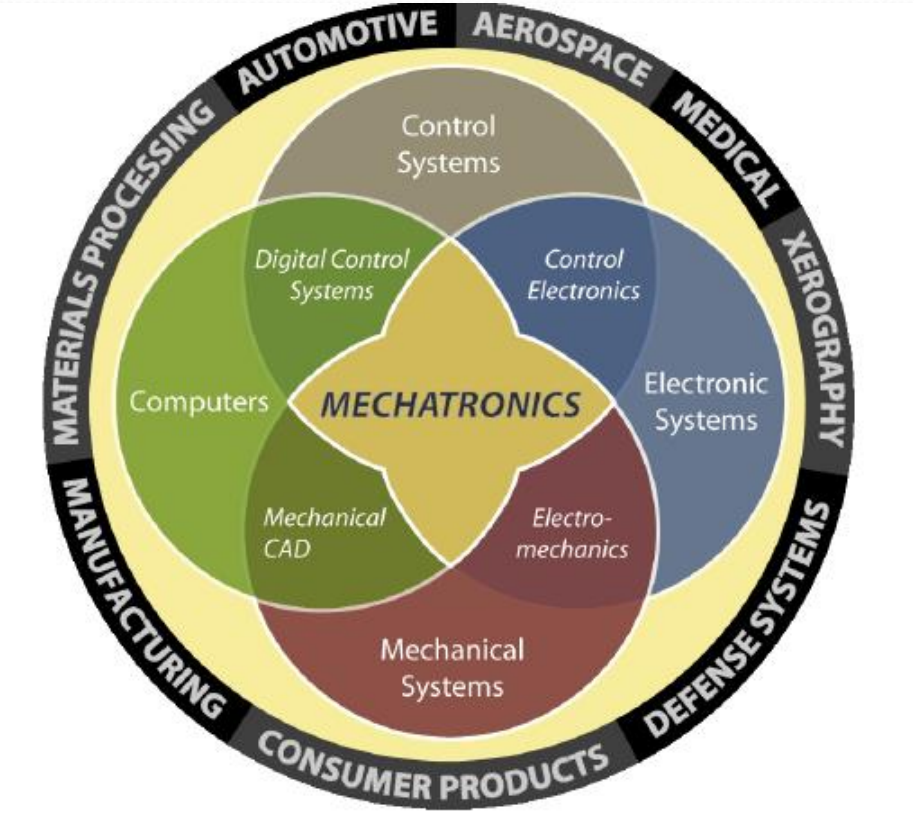
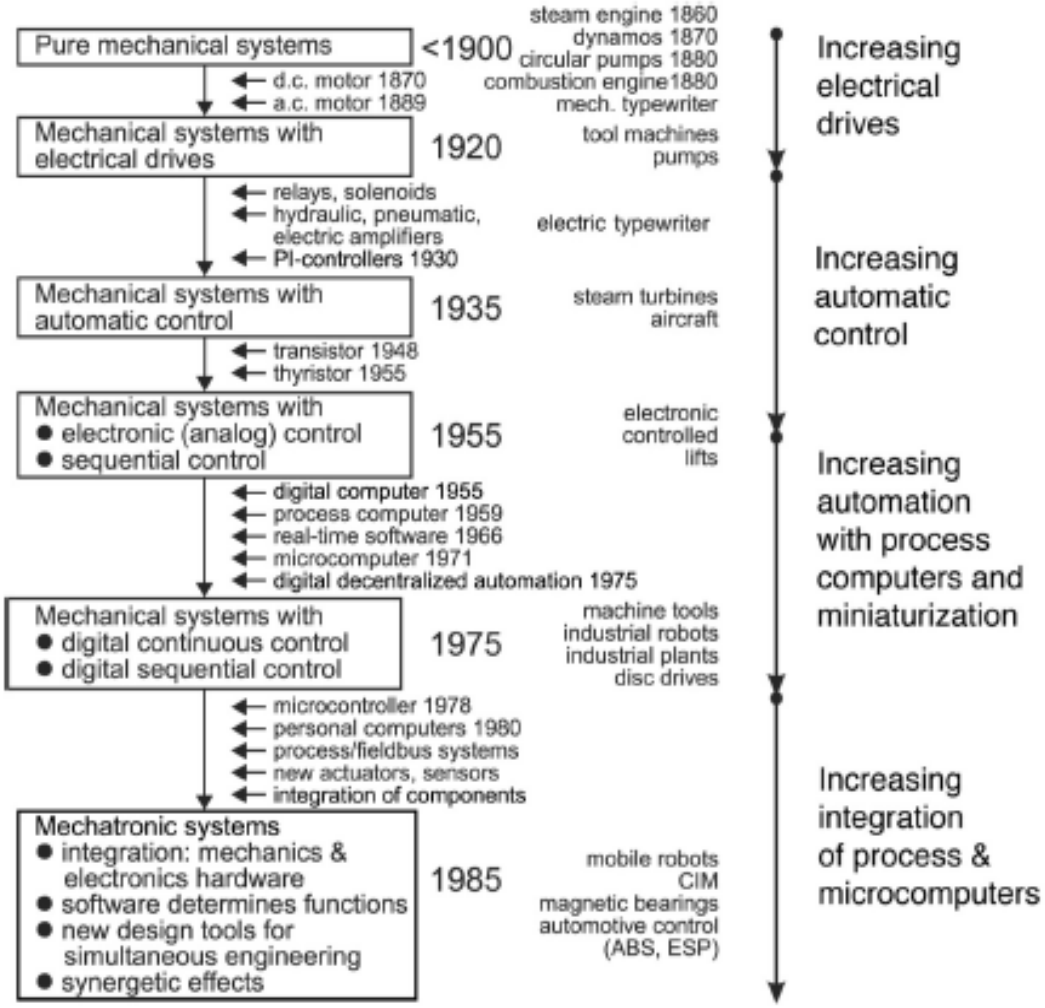
AREAS OF APPLICATION

- Mechatronics is the synergistic combination of mechanical and electrical engineering, computer science, and information technology, which includes the use of control systems as well as numerical methods to design products with built-in intelligence.



Historical Development



Examples of Mechatronics systems

Let's look at some examples of mechatronic systems

- Automotive Systems
  - Drive by Wire
  - Camless Engines
- Robotics
  - Humanoids
  - Telemedicine/Remote Surgery
- House Hold appliances
  - Washing Machine
  - Iron Box

Automotive Systems : Technology in today's vehicle

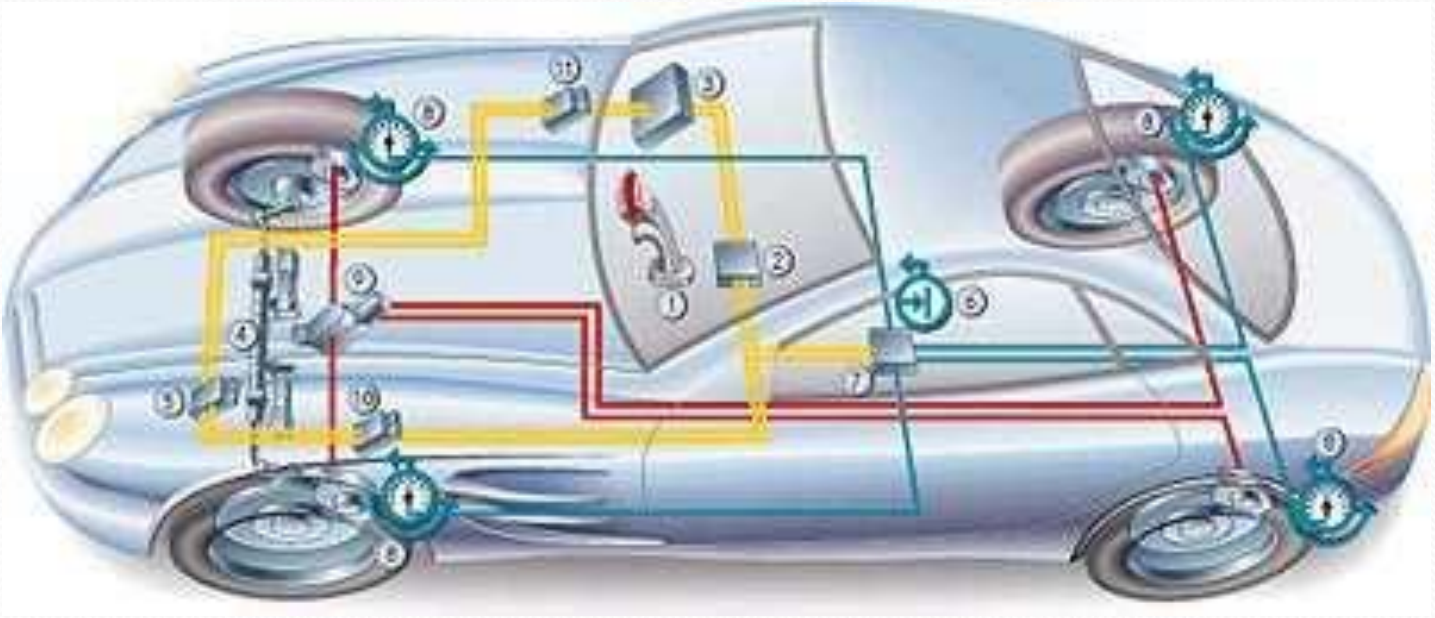
- **Adaptive Cruise Control**
- **Drive by wire**
- **Telematics**
- **Software body control**
- **Rain-sensing Wipers**
- **In-vehicle entertainment such as Small LCD display for games**
- **Generation II ABS**
- **Heads-up display**
- **Back-up collision sensor**
- **Navigation**
- **Tire Pressure Monitor**

Technology transitions in the auto industry in the next five years:

- **From Gasoline to hybrid to fuel cell and hydrogen.**
- **Mechanical connection to "Drive-by-wire".**
- **Adoption and implementation of IT standards in the technology of the car such as surfing in the net for navigation and other purposes.**
- **"On-demand" to "Always-on" vehicle connectivity to the Internet**

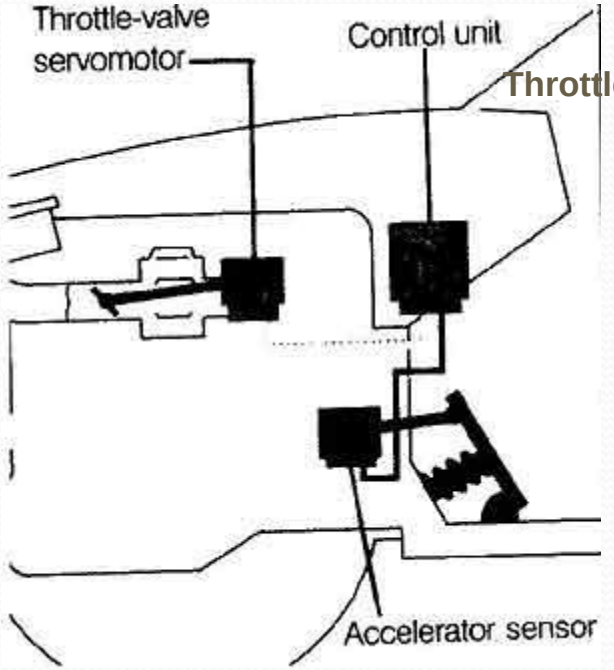
Drive-by-Wire (or) X-Y Wire

It replaces mechanical connections – push rods, rack & pinion, steering columns, overhead cams, cables to mechatronic connections – sensors, actuators, embedded controllers, control software



Automotive Examples for Mechatronics Systems

Camless Engine



Throttle Cor

Cams are replaced by actuators and embedded controls

Robotics Technology in Mechatronics Systems

Robot is, of course, the ultimate Mechatronic System

Robots are in

- Telemedicine/Telesurgery
- Unmanned vehicles
- Manufacturing automation

Levels of Mechatronic Systems' Integration

The First Level

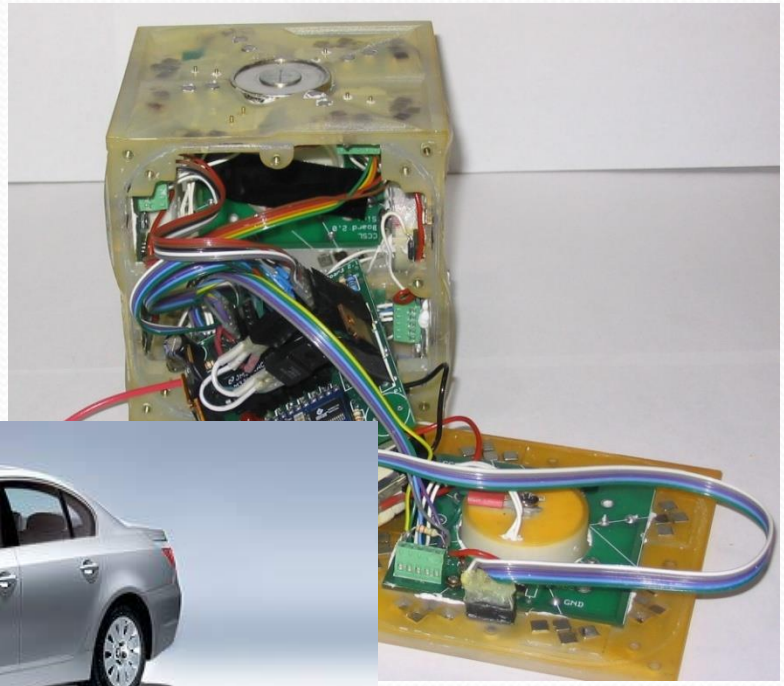
- conveyors,
- rotary tables,
- auxiliary manipulators

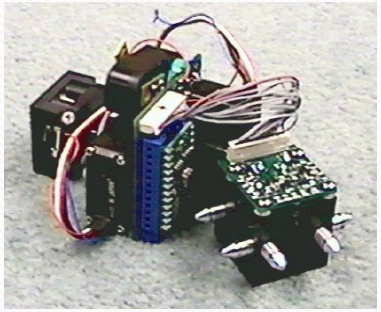
The Second Level

- Operated power machines (turbines and generators),
- Machine tools and industrial robots with numerical program management

The Third Level

Synthesis of new precise, information and measuring high technologies gives a basis for designing and producing intellectual mechatronic modules and systems.





USA Strategy for Mechatronics

- Understand the existing process
- Simplify the process
- Automate the process

Mechatronics leads to

✓Increase labour productivity and reduce labour cost
✓Mitigate the effects of labour shortage
✓Reduce or eliminate routine manual or clerical tasks
✓Improve safety – Worker and system.
✓Improve product quality
✓Reduce manufacturing lead time
✓Accomplish processes that cannot be done manually

Manual Labour in Manufacturing

- Task is technologically difficult to automate
- Short product life cycle
- To cope with the ups and downs in demand

Automation in Manufacturing

- Equipment maintenance
- Programming and computer operation
- Engineering project work
- Plant management

Summary

•The combination of mechanics, electronics, computer hardware and software, and control systems will revolutionize technology in the coming decades.

•This revolution will create exciting career opportunities in:

- •Automotive and Aerospace Industries
- •Medicine and Biomedical Industries
- •Robotics and Automated Manufacturing
- •Telecommunication Industries

Hence, there is a well defined scope for the educated engineers who trained in multidisciplinary systems engineering of Mechatronics.