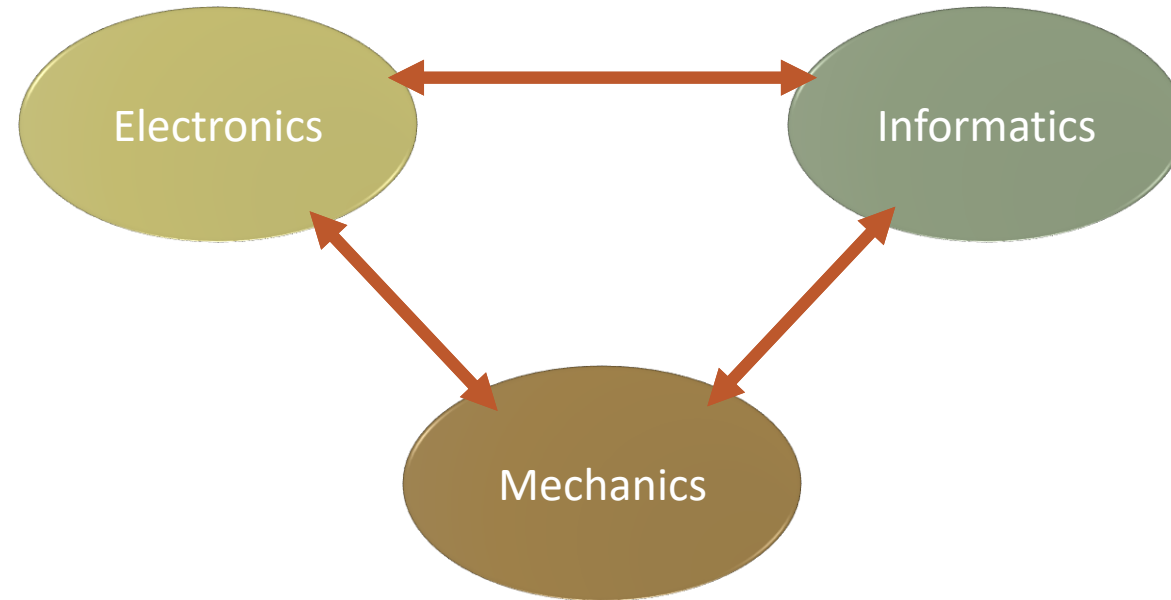# Robust Mechatronics

Fundamentals of Mechatronic Systems

Dr Loukas Bampis, Assistant Professor
Mechatronics & Systems Automation Lab

What is Mechatronics?

Mechanical + Electronics = Mechatronics

The term was established in 1969 by Tetsuro Mori,

senior engineer at the Yaskawa Electric Company, Japan

Fundamentals of Mechatronic Systems

- Mechatronics is synergistic integration of mechanical engineering, electronics engineering, control engineering and computer science.

- Mechatronics engineering is the design of computer-controlled electromechanical systems.

- A mechatronic system is a computer controlled mechanical system.
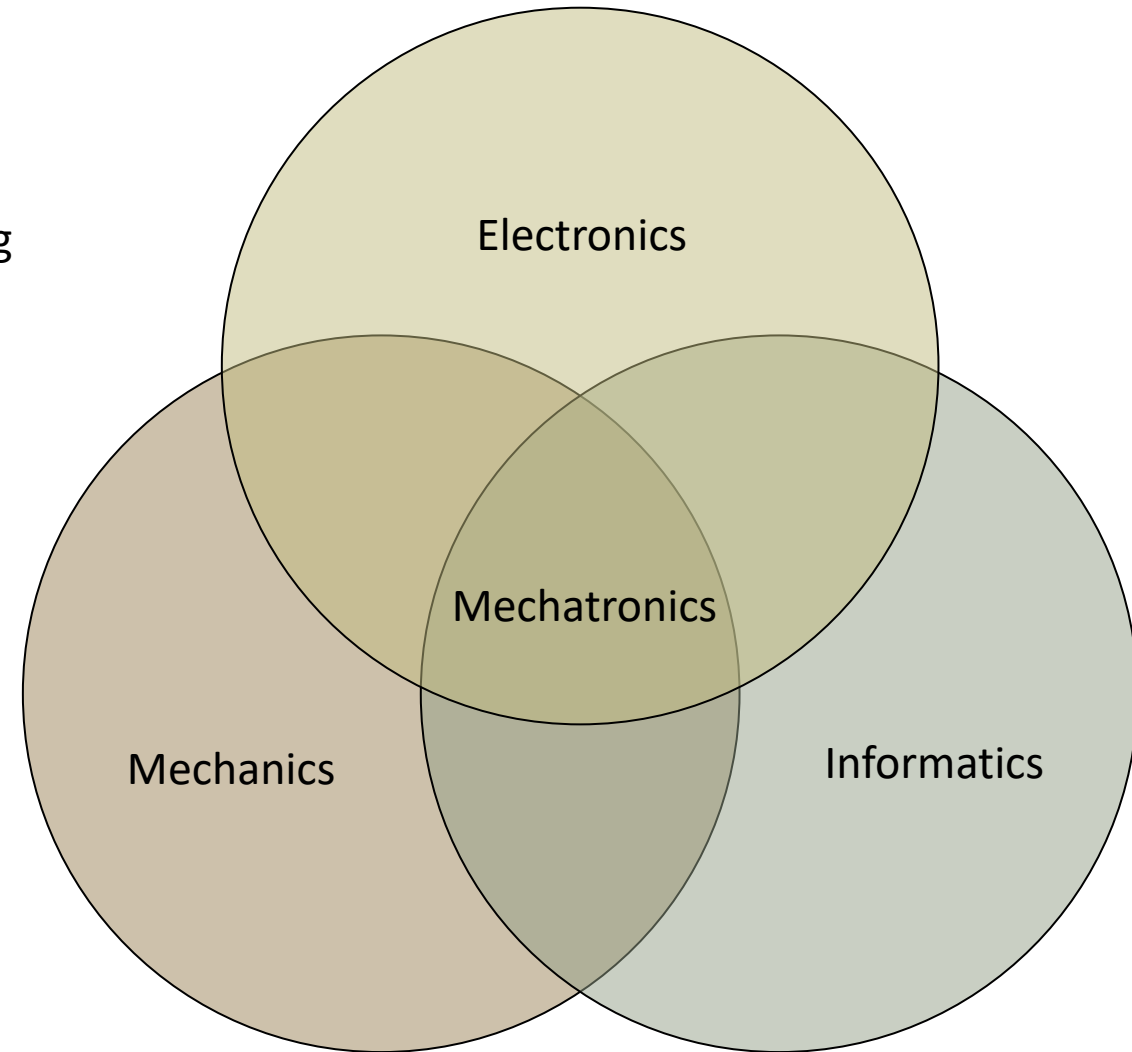
Fundamentals of Mechatronic Systems

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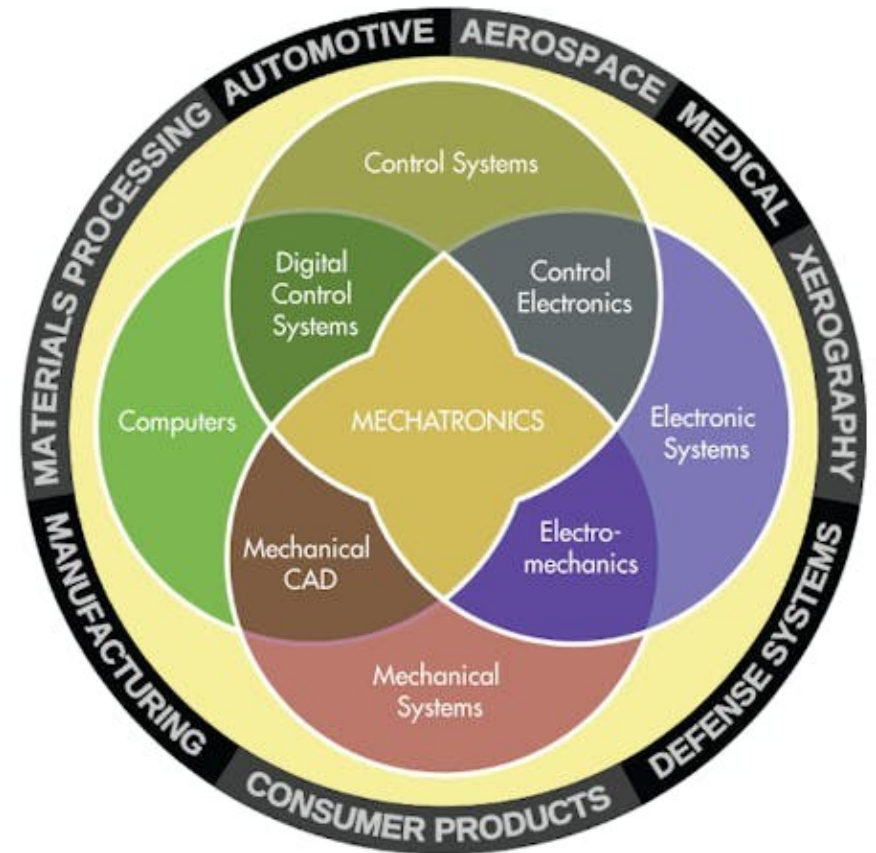
Source: Wikipedia

Fundamentals of Mechatronic Systems

Mechatronics component analysis

Mechanics	Electronics	Informatics

Our means of interacting with the environment through mechanisms

- Levers
- Mechanical arms
- Wheels
- Gears
- Sprockets – chains
- Pulleys – belts

Our means of actuating mechanisms and sensing the environment

- Resistors
- Capacitors
- Coils
- Transistors
- Operational amplifiers
- Relays
- Actuators
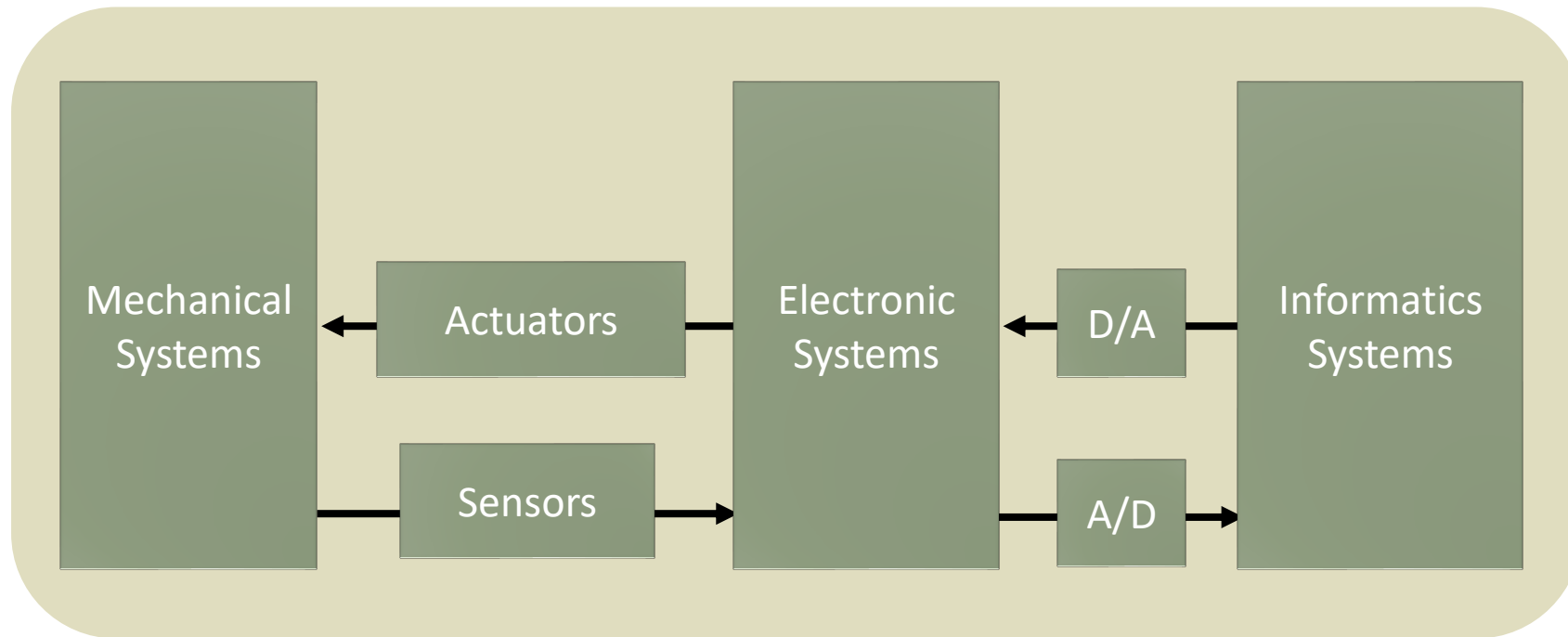- Microcomputers/microcontrollers

Our means of perceiving and reasoning on sensor inputs and controlling our actions

- Probability theory
- Control
- Estimation theory
- Vision
- Data mining
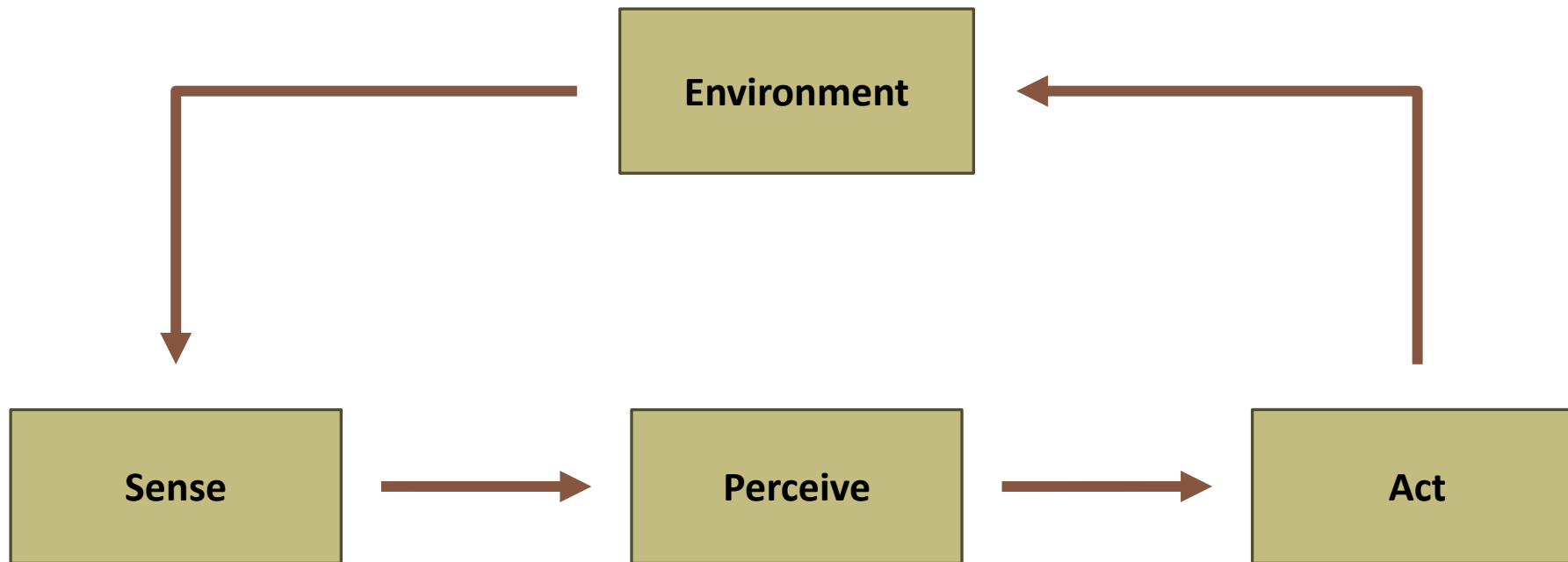- Machine learning / AI

Fundamentals of Mechatronic Systems

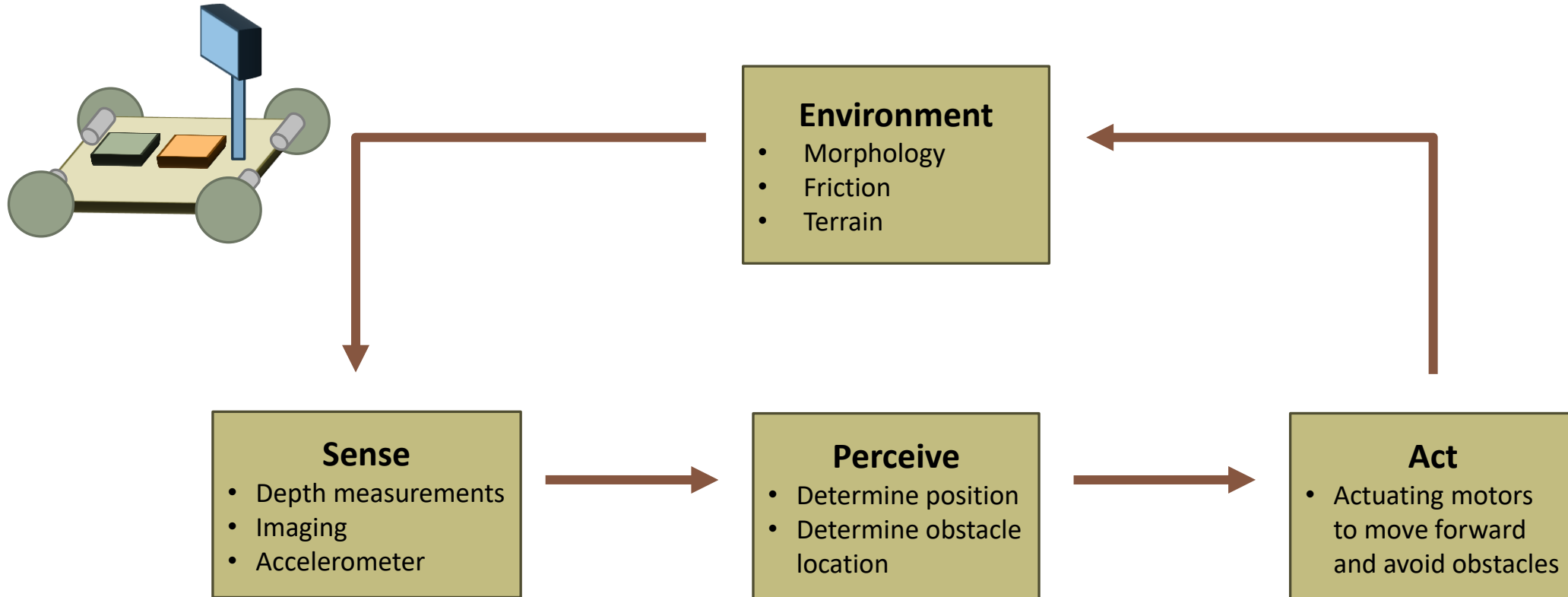**Mechatronics component analysis**

Fundamentals of Mechatronic Systems

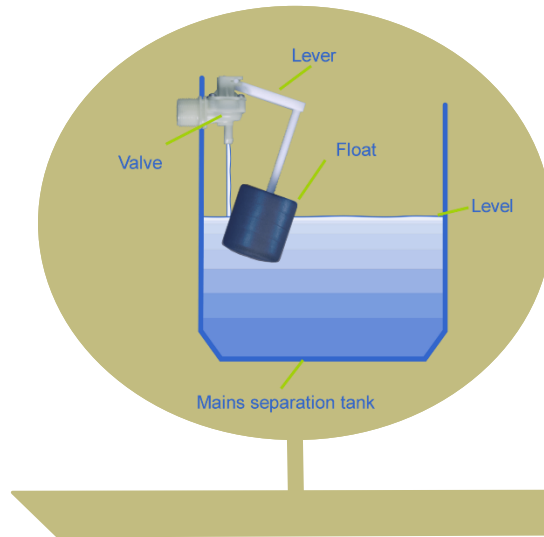**Mechatronics operational analysis**

Fundamentals of Mechatronic Systems

Mechatronics operational analysis

Fundamentals of Mechatronic Systems
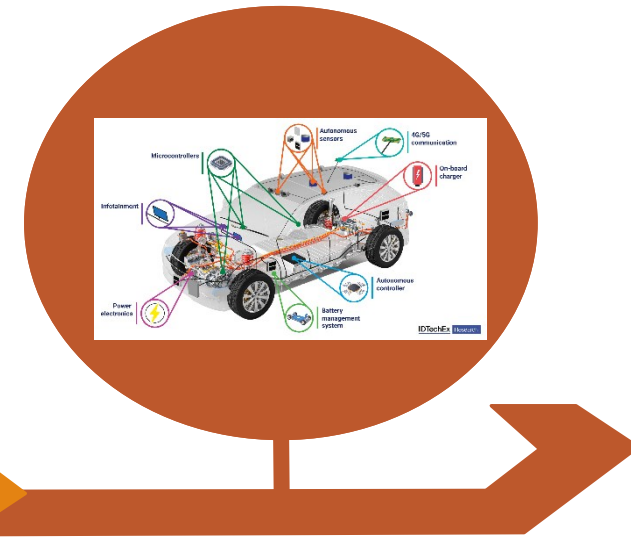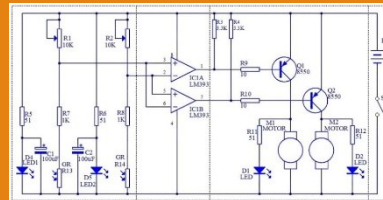
Evolution of automated systems

Lever

Valve

Float

Level

Mains separation tank

Early 1900s to 1970s

Automatic devices with electronic components such as relays, transistors, op-amps

Before and early 1900s

Completely mechanical automatic systems

1970s–present

Computer controlled automatic systems

Fundamentals of Mechatronic Systems
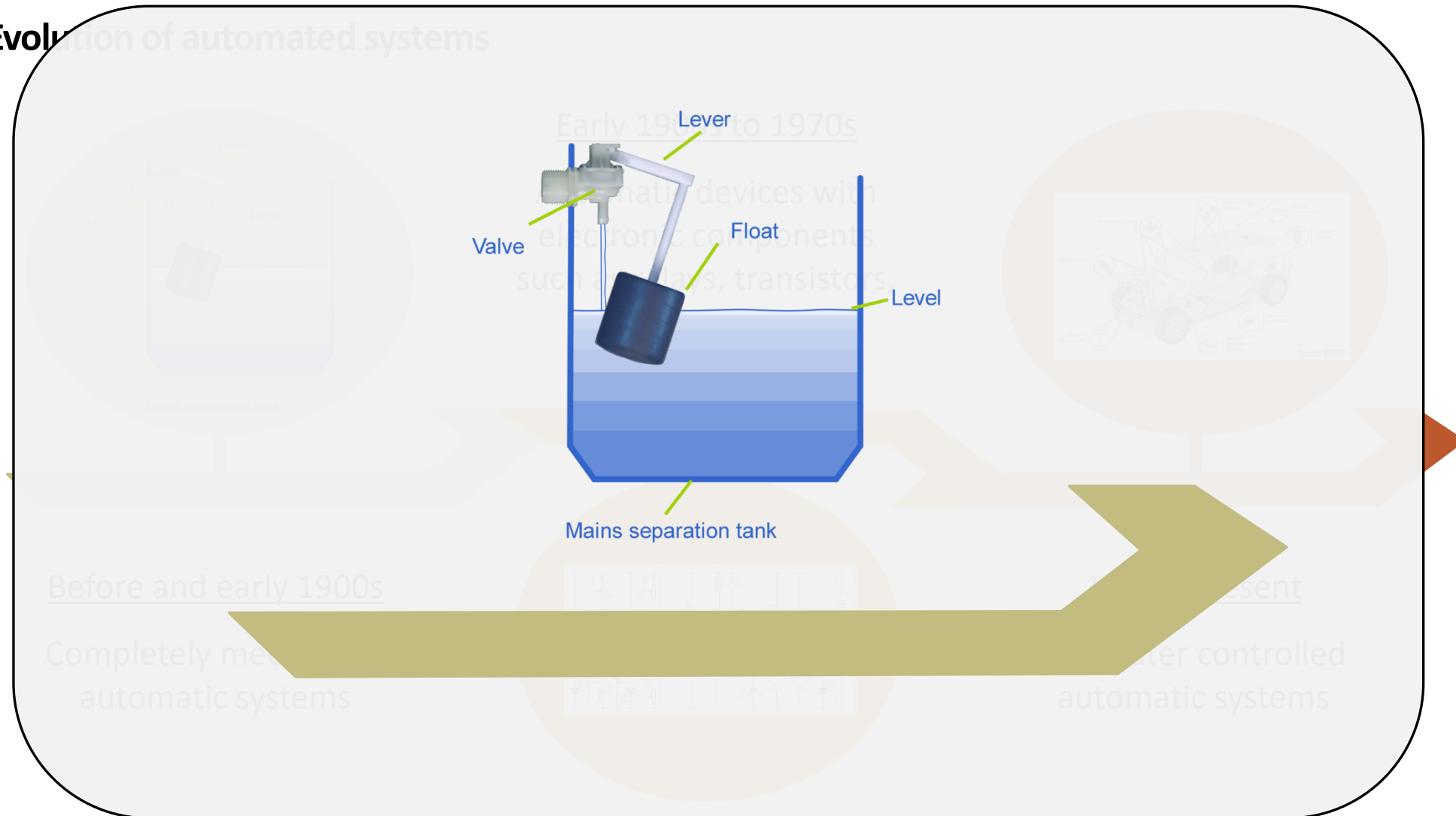
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Before

Comp   lled
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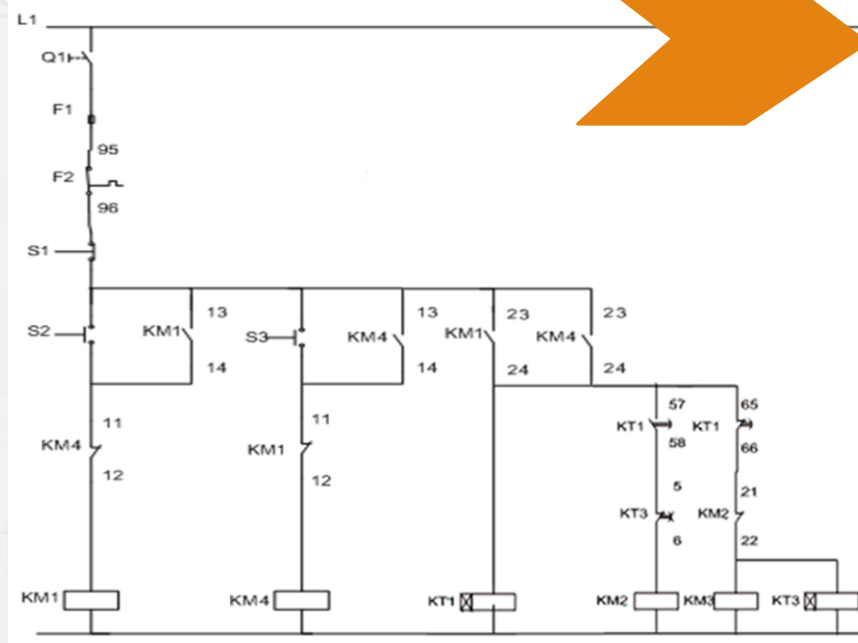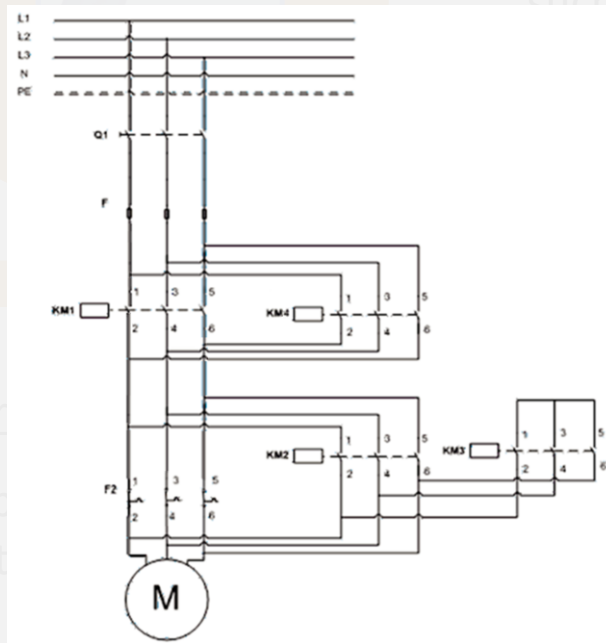
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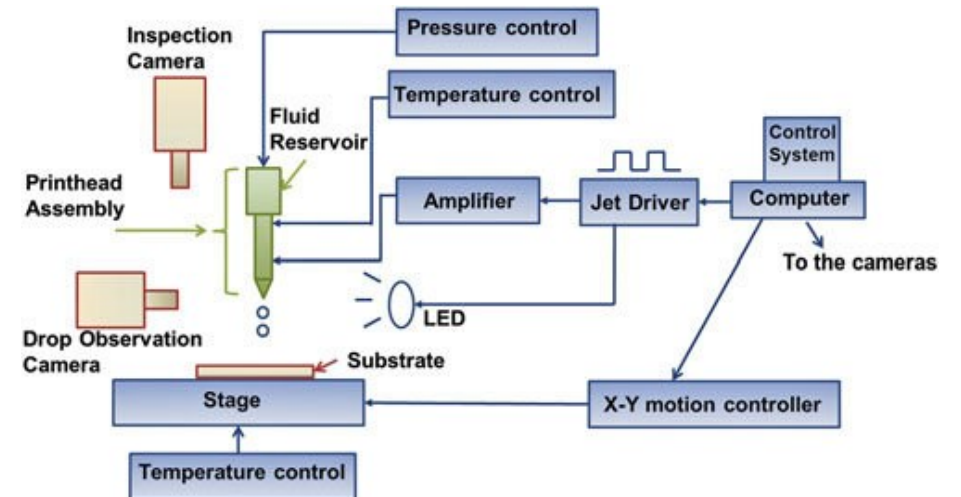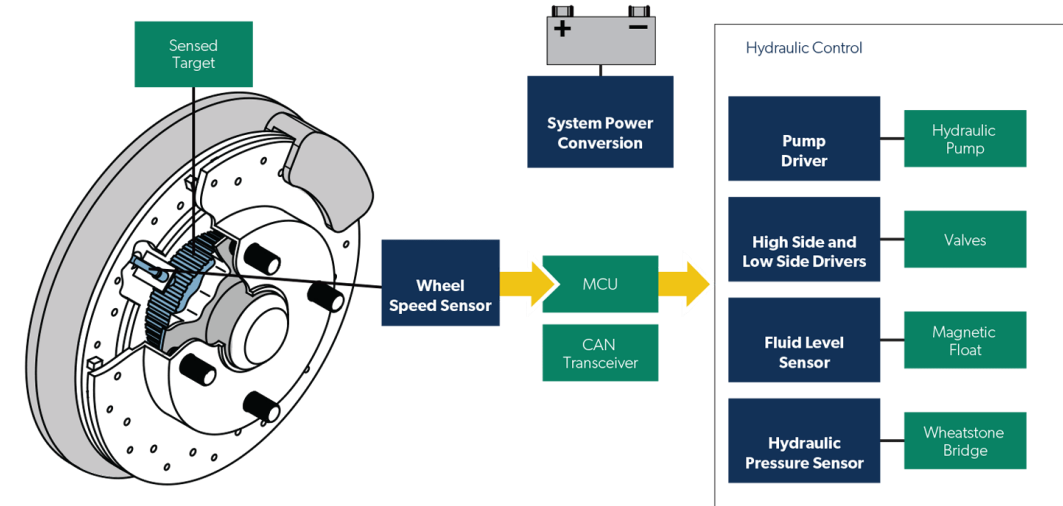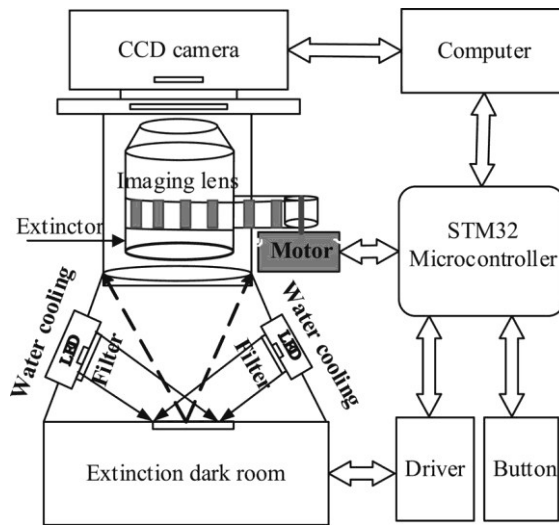Computer controlled automatic systems

Examples of Mechatronic Systems

- Antilock Brake System (ABS)
- Scanner
- Printer
- Solar Tracker
- Hard Disk Drive
- Robotic Arms
- Drones / UAVs
- Autonomous Cars
- Mobile Robots (Wheeled Robots, Legged Robots, etc.)
- …

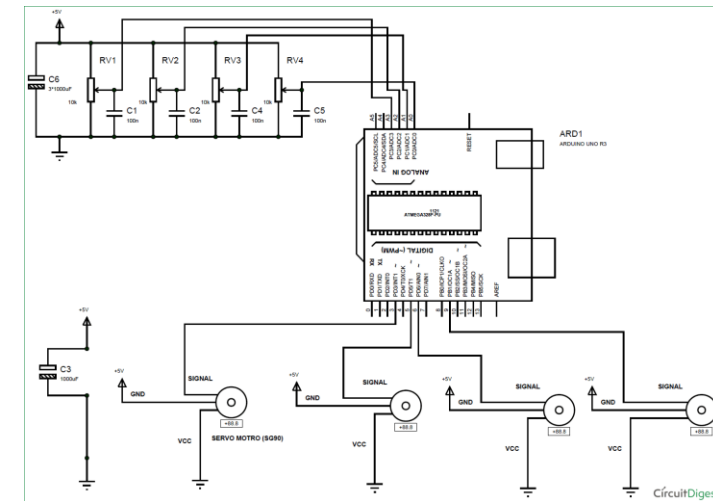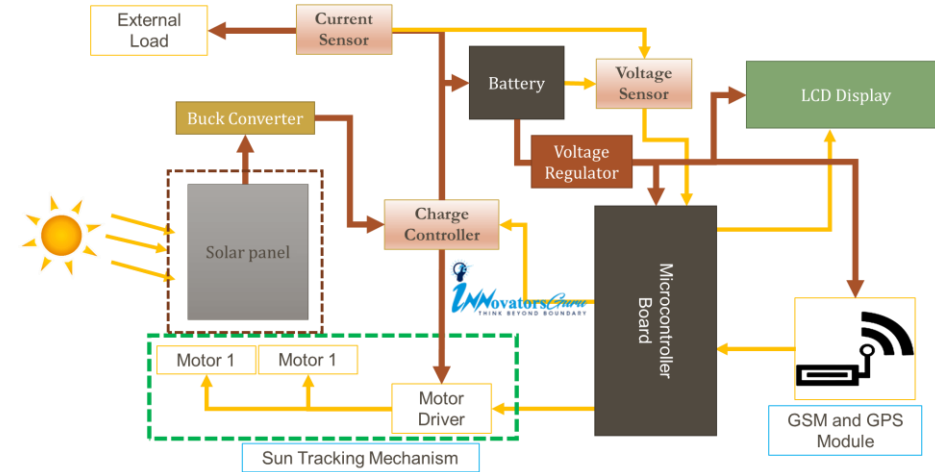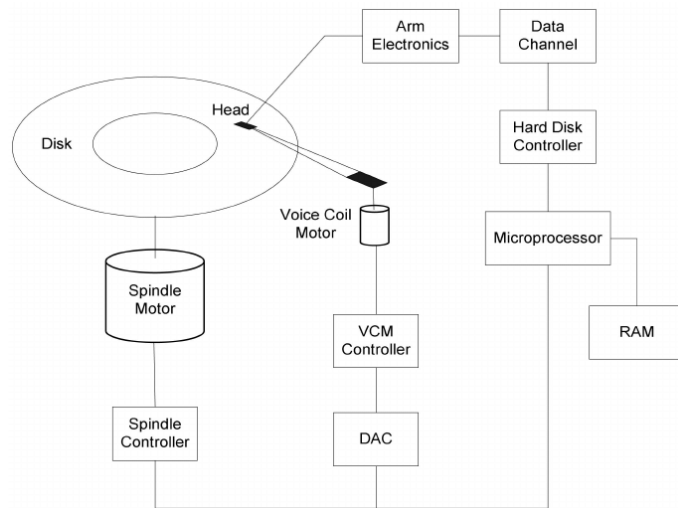# Fundamentals of Mechatronic Systems

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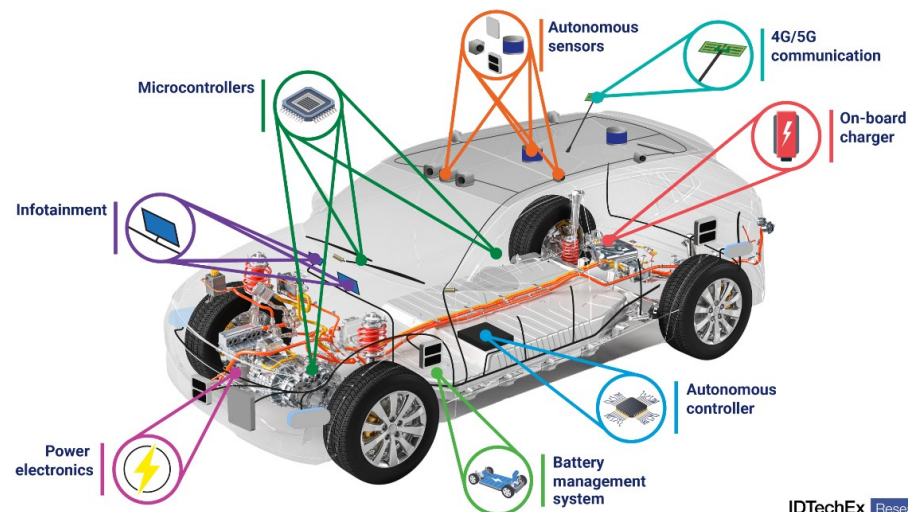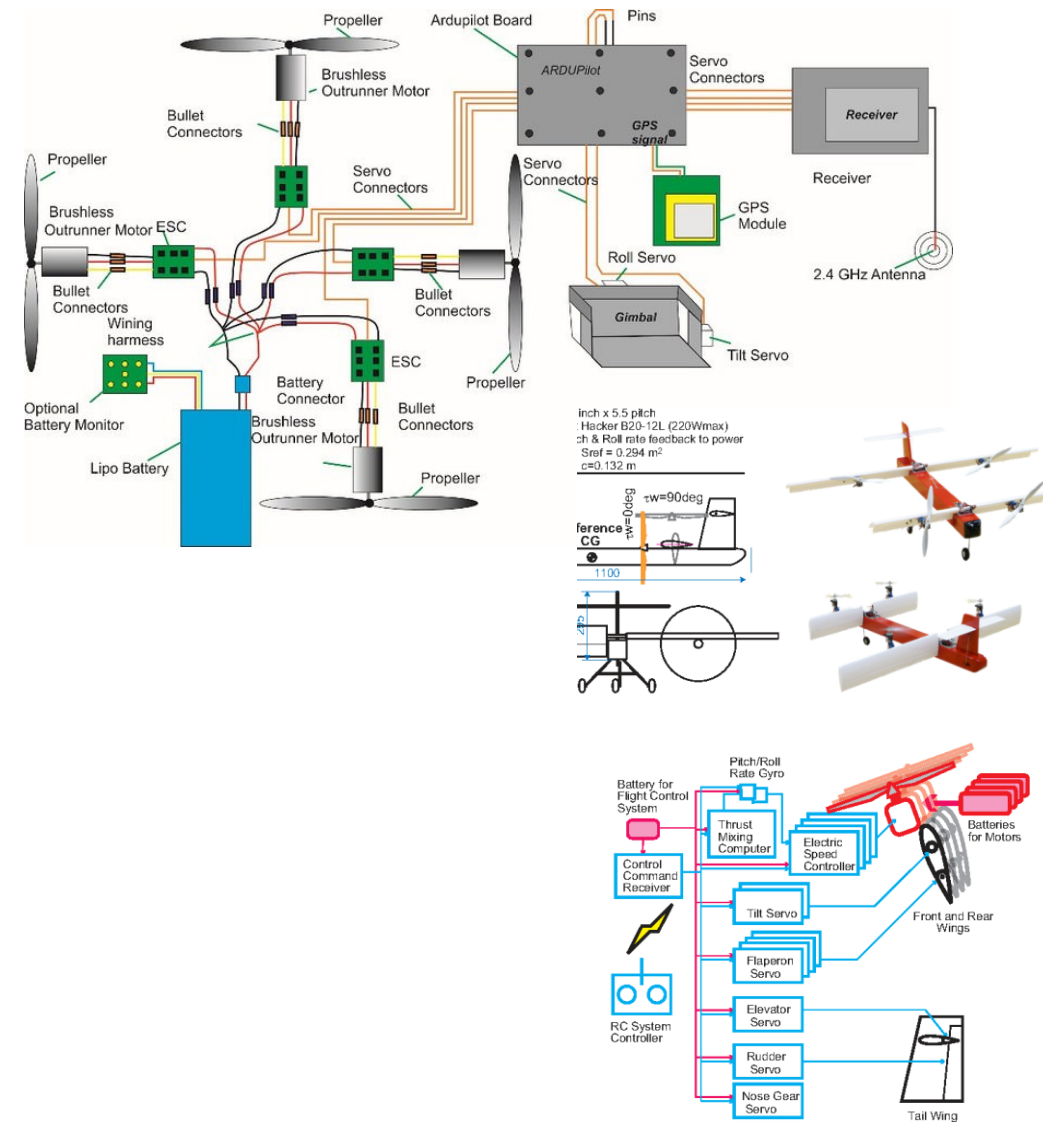
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