

Unit-I

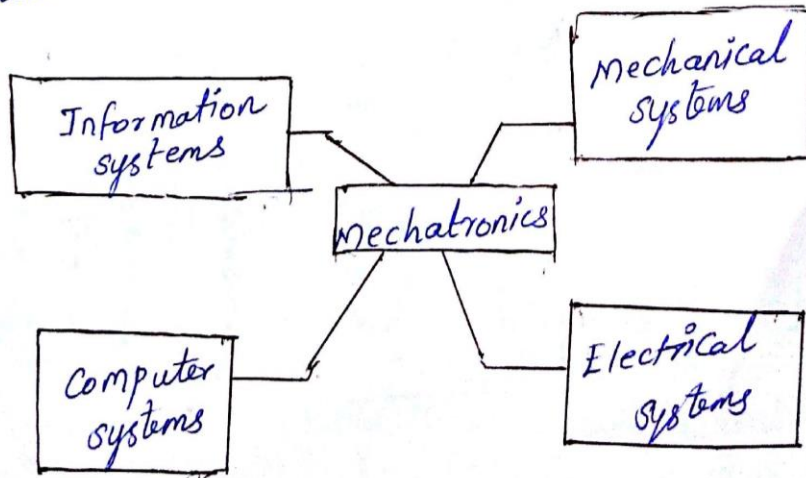
Introduction to mechatronics system.

Mechatronics: -

Mechatronics is a methodology used for the optimal design of electromechanical products.

The word, mechatronics, is composed of "mecha" from mechanism and the "tronics" from electronics.

A mechatronics system is not just a marriage of electrical and mechanical system and is more than just a control system; it is a complete integration of all of them.



Key Elements of Mechatronics system -

The key elements of mechatronics system

includes following -

- Physical system modelling
- sensors & actuators
- signals & systems
- computers & logical systems
- software & data acquisition

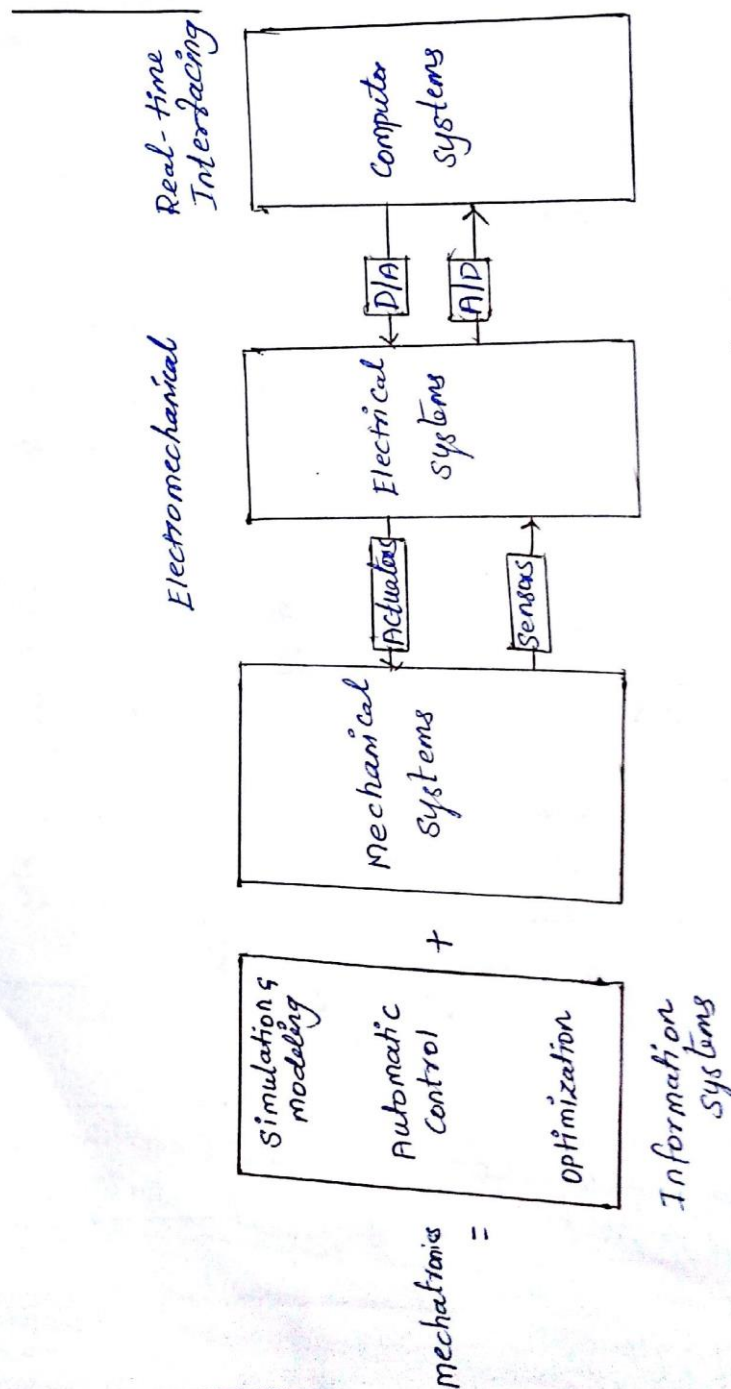
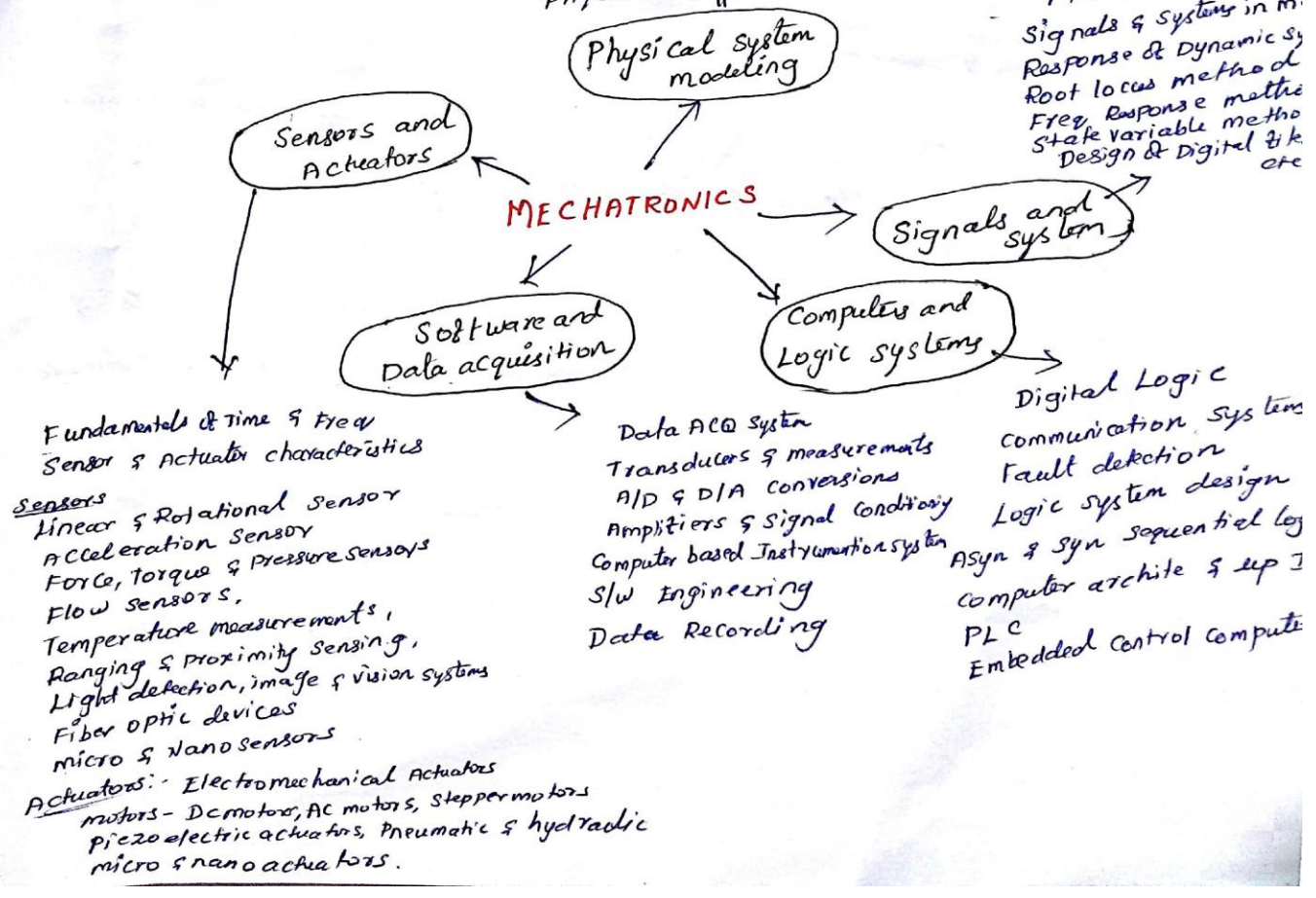


Fig. Mechatronics key Elements

- mechatronics is really nothing but good practice.
- The basic idea is to apply new controls to extract new levels of performance from a mechanical device.
- Sensors & actuators are used to transduce energy from high power (usually the mechanical side) to low power (the electrical & computer side).
- "Mechanical systems" consists of more than just mechanical components & may include fluid, pneumatic, thermal, acoustic, chemical & other disciplines as well.

Mechanics of Solids
 Translational & Rotational systems
 Fluid systems, Electrical systems
 Thermal systems, micro & Nano systems
 Rotational Electromagnetic MEMS
 Physical system Analogies

Mechatronics model
 Signals & systems in m.
 Response & Dynamics
 Root locus method
 Freq. Response method
 State variable method
 Design of Digital filters etc



- A typical mechatronic system consists of mechanical, electrical and computer components.
- The process of system data acquisition begins with the measurement of a physical value by a sensor.
- The sensor is able to generate some form of signal, generally an analog signal in the form of voltage level or wave form.
- The analog values are converted to digital values called as bits (often represented by 0's & 1's) using ADC (Analog to Digital Converter).
- microcontroller uses these digital values along with other inputs and preloaded values called calibrations to determine the output commands.
- DAC is used to convert digital values into analog form.
- The analog signal is used by an actuator to control a physical device or affect the physical environment.
- The sensor then takes new measurements & the process repeats, thus completing a feedback control loop.
- Timing for the entire operation is synchronised by the use of a clock.