

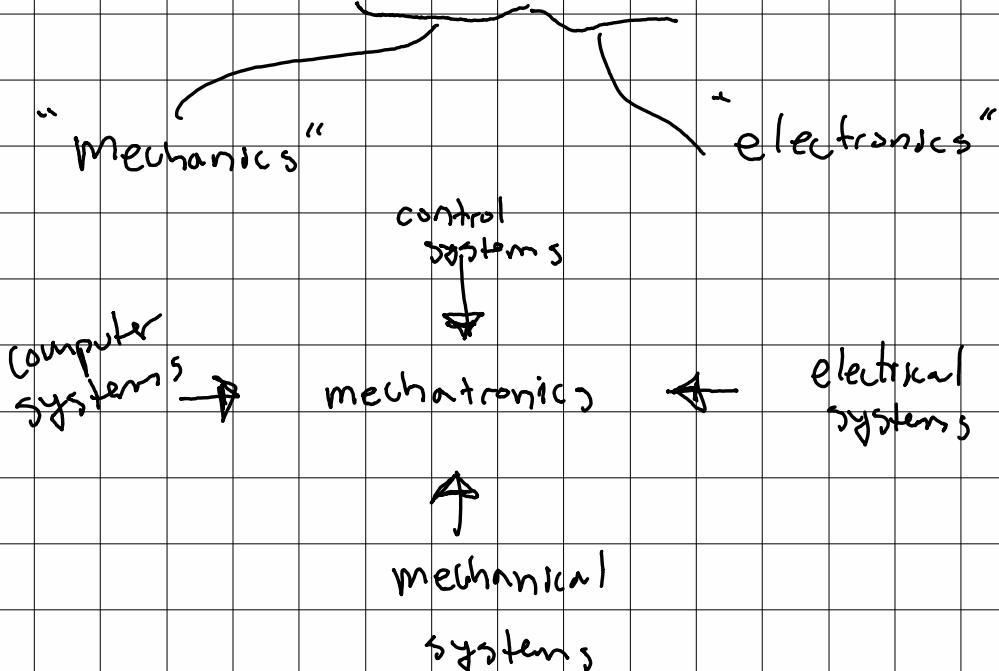
ME 133 - Intro to Mechatronics

Today :

① syllabus ←

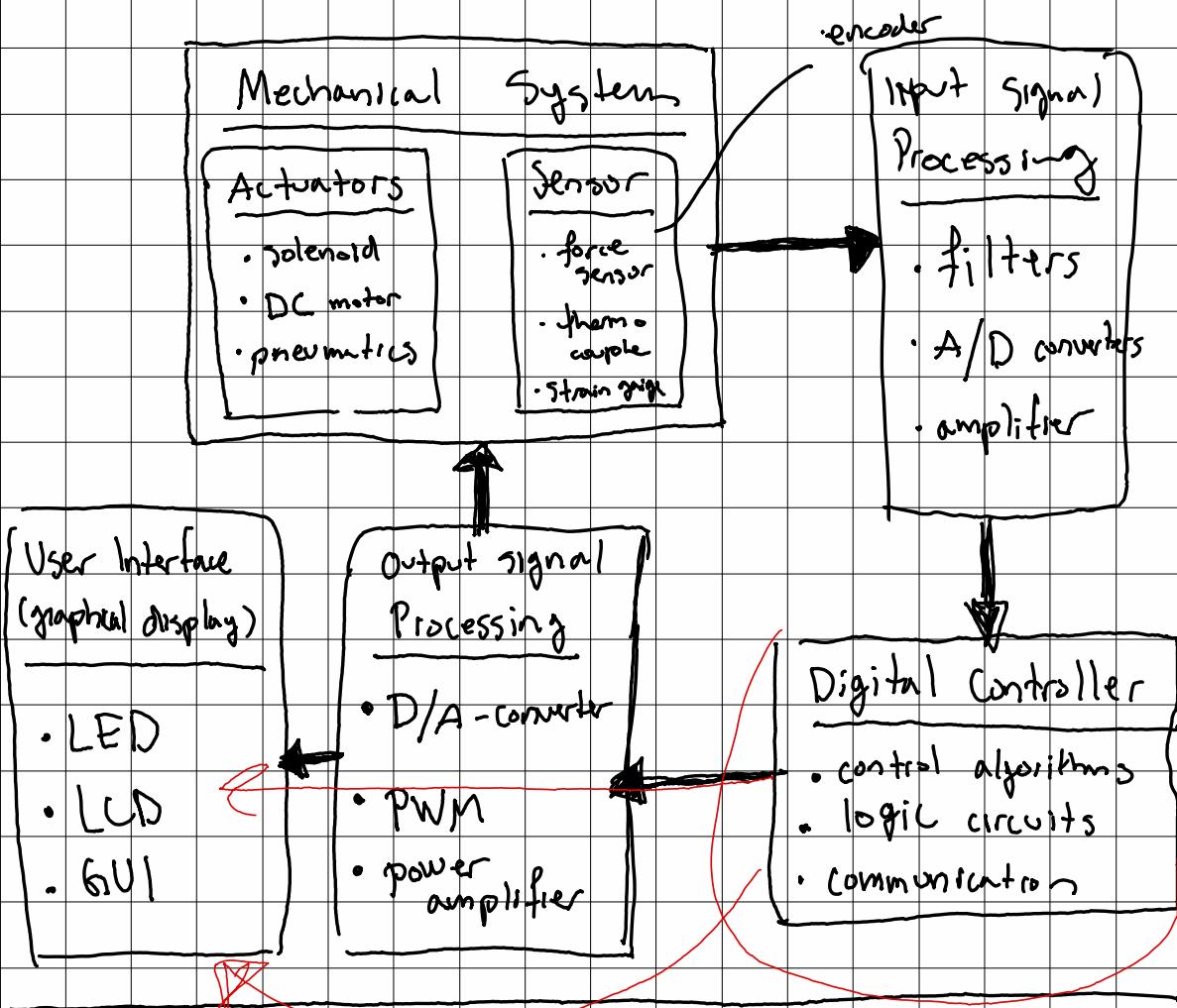
② What is mechatronics? CH-1

What is Mechatronics?



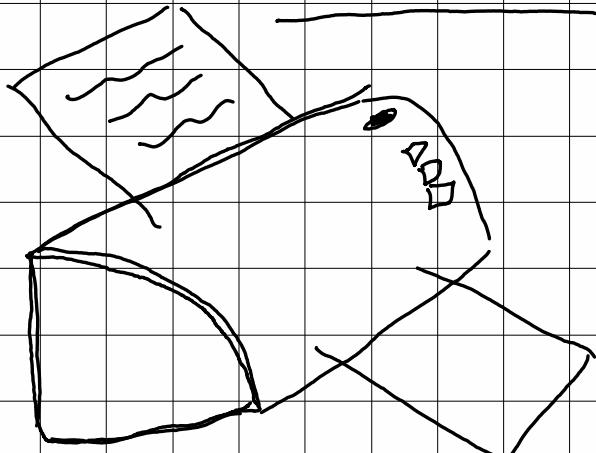
mechatronics : integration of mechanical & electrical components by a control architecture (CPU)

Mechatronic System Components



- Course is designed to introduce concepts from each block
- main focus:
 - ① circuits (digital & analog) for signal processing
 - ② mathematical analysis & reasoning of Mechatronics.
 - ③

Ex:1 Ink Jet Printer



Actuators:

stepper motor

- move the print head
- feed paper

pump (piston)

- pushes ink out

speaker

- beep for error

heater

- heat ink

Sensors: ink sensor

- low ink

switch

- print end position

temperature sensor

- heat of ink
- over heat circuits

Signal processing: image → print head position

image → Bit map × 3

010001

| Red

| Blue

| Green

Digital Control: file system

(CPU)

queue

communication

- wifi

- ethernet

Beagle Bone

credit card size

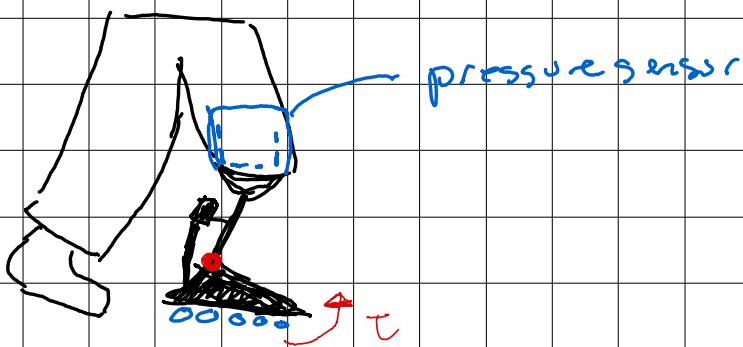
Display: green (LCD)

UI

LED

Ex. 2 lower-limb prosthesis

active



Actuators: piston, or electric motor

Sensor : pressure sensor

EMG (electromyography)

activation of muscle

IMU (inertial measurement unit)

- accelerometer

- gyroscope

- magnetometer

FSR

force sensitive resistors

pressure

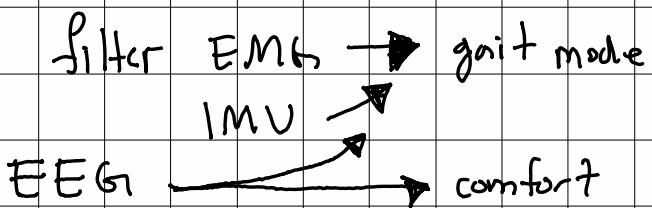
Encoder (ankle joint)

Feedback of the motor

Signal processing : convert pressure
in $V \rightarrow Pa$
or
 $\rightarrow N$
process the speed &
the current in windings



electronic speed
controller



Digital control :

(k-means) clustering

Torque control \rightarrow idesired
current of motor

Position control

Display : iphone app

\rightarrow plot outcomes

LED on the device

Breakout Room Example

① Come up with an example
of a mechatronic system

② list a few possible examples
for each component category

Actuators

Sensors

Signal processing

Digital Controller

Display (V/I)

③ 7 - mins

Arduino Platforms

- open source micro controllers
- simple 'C-like' language
- large community : lots tutorials
libraries
etc.

Lab Kits

- Arduino + components
- You need to download software
 - integrated development environment (IDE)

Lab organization

- 2 groups
- TA provide summary ; Background
 - Group 1 : 2pm - 3:20
 - Group 2 : 3:30pm - 4:50