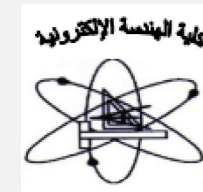




Minufiya University
Faculty of Electronic Engineering



ELECTIVE COURSE [4]

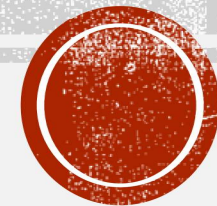
MECHATRONIC-3

ACE 415

Prepared By:

Dr. Alaa Khalifa

alaakhalifa64@gmail.com



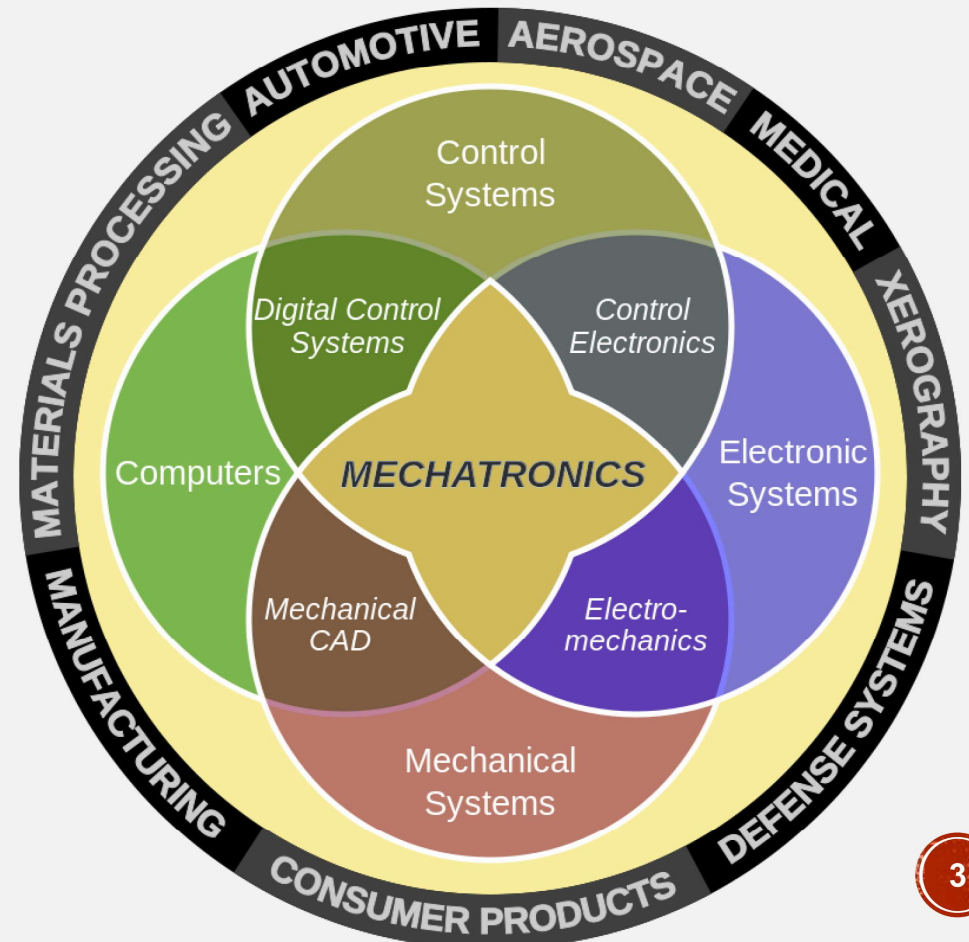
Outline

- ☐ **What is mechatronics?**
- ☐ **Examples of mechatronic systems**
- ☐ **Covered Topics**
- ☐ **Resources, and Software**

What is mechatronics?

❑ The term mechatronics was 'invented' by a **Japanese** engineer in 1969, as a combination of 'mecha' from **mechanisms** and 'tronics' from **electronics**.

❑ The word now has a **wider** meaning, **integration** of mechanical engineering with electronics and intelligent computer control in the design and manufacture of **products and processes**.



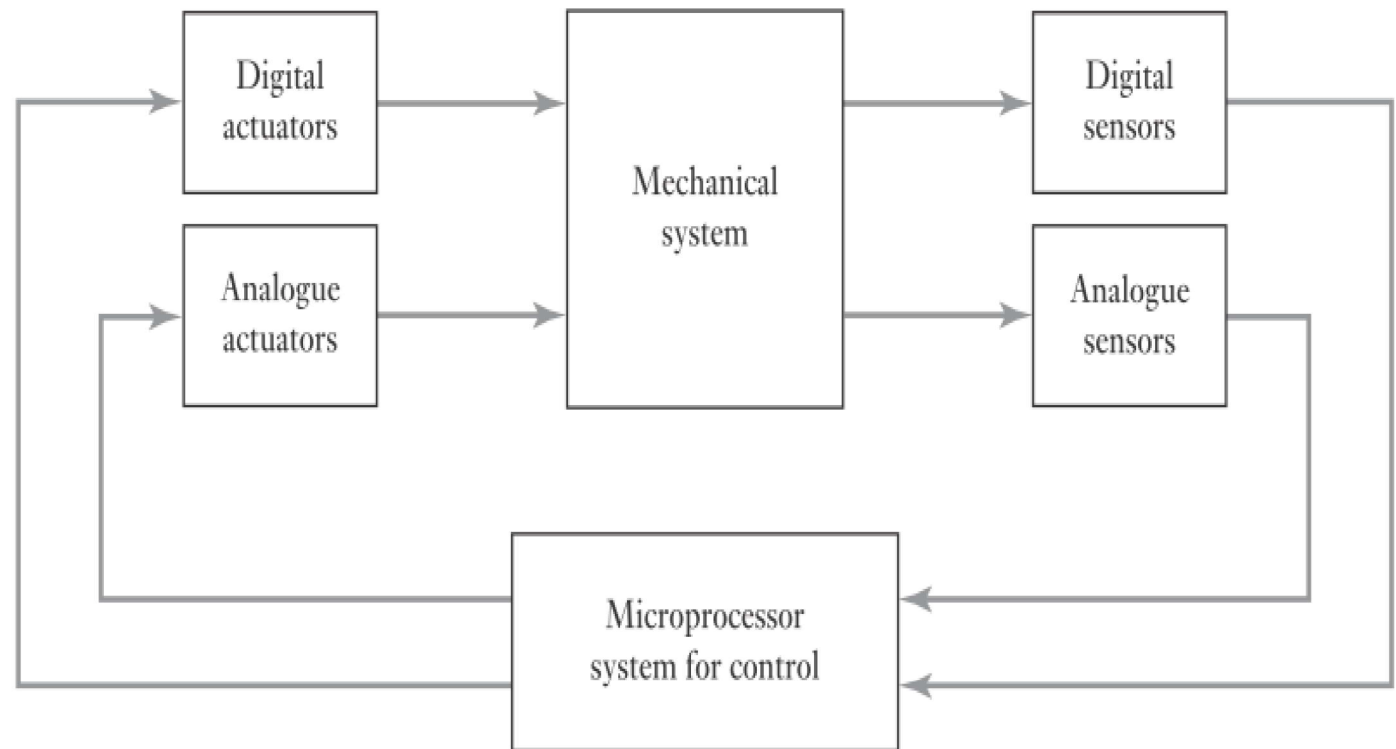
What is mechatronics?

- ❑ Mechatronic products have many mechanical functions replaced with electronic ones.
 - ✓ This results in much **greater flexibility**,
 - ✓ Easy **redesign and reprogramming**,
 - ✓ The ability to carry out automated data collection and **reporting**.

- ❑ In the design of **cars, robots, machine tools, washing machines, cameras** and very many other machines, such an integrated and interdisciplinary approach to engineering design is increasingly being adopted.

What is mechatronics?

Figure 1.1 The basic elements of a mechatronic system.

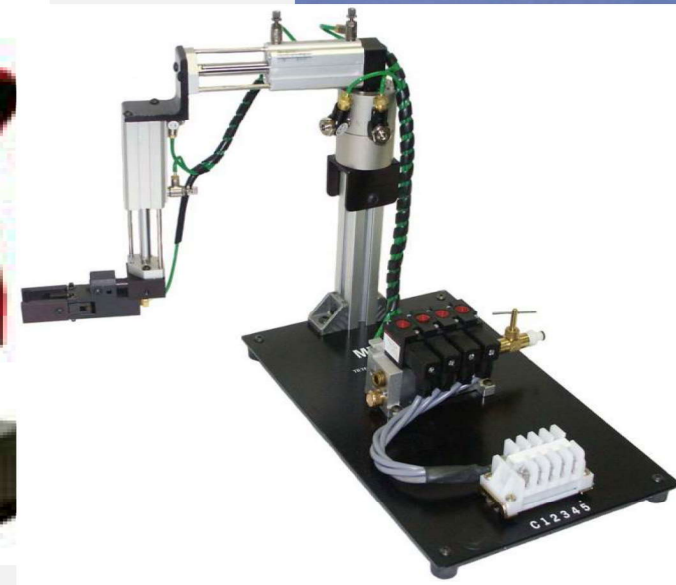


Examples of mechatronic systems



Examples of mechatronic systems

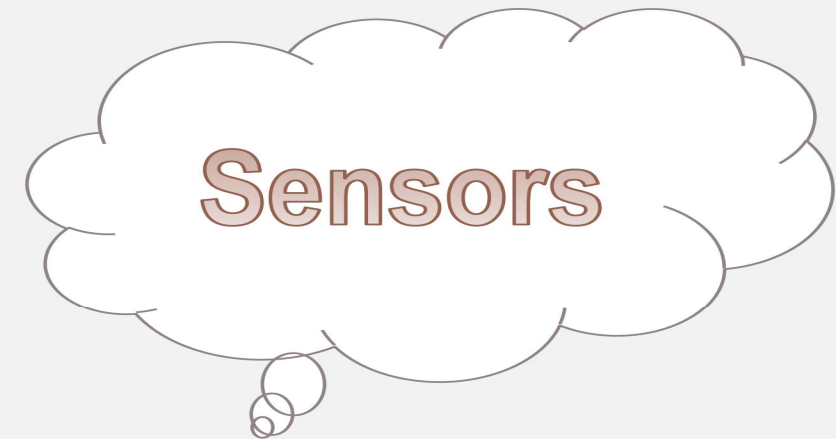
Robots Applications



da Vinci® surgical system

Covered Topics

- Introduction
- Kinematics Fundamentals
- Graphical Linkage Synthesis
- Position Analysis
- Velocity Analysis
- Acceleration Analysis
- Dynamic Force Analysis



TEXT BOOK

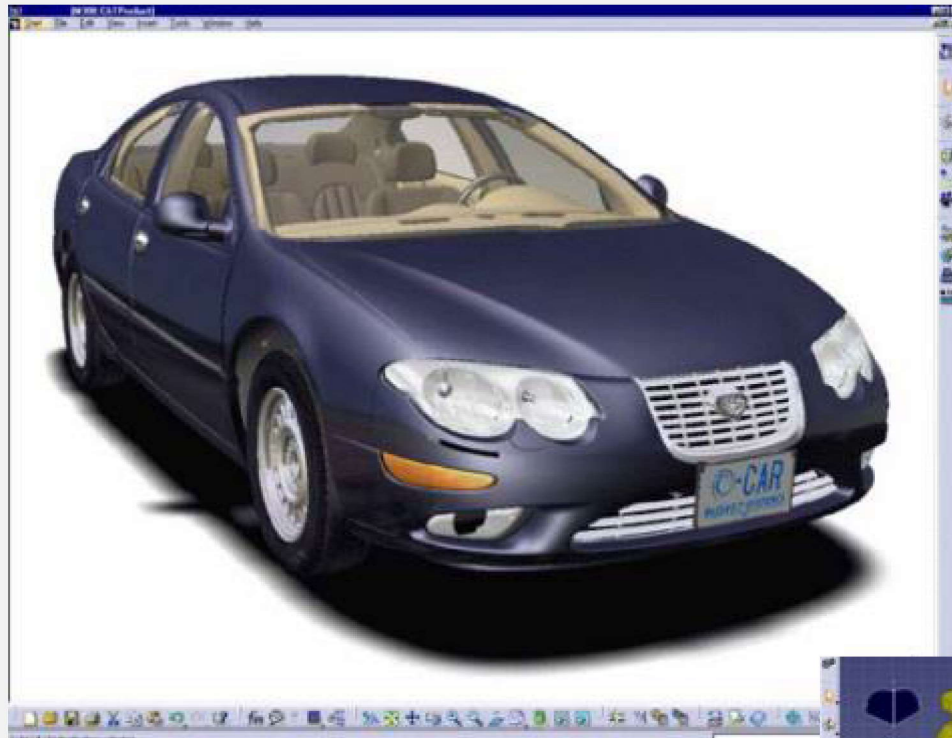
- ❖ Robert L , **Norton**, ” Design of machinery: an introduction to the synthesis and analysis of mechanisms and machines ”, third edition.
- ❖ William **Bolton**, ” MECHATRONICS: ELECTRONIC CONTROL SYSTEMS IN MECHANICAL AND ELECTRICAL ENGINEERING ”, sixth edition.

SOFTWARE

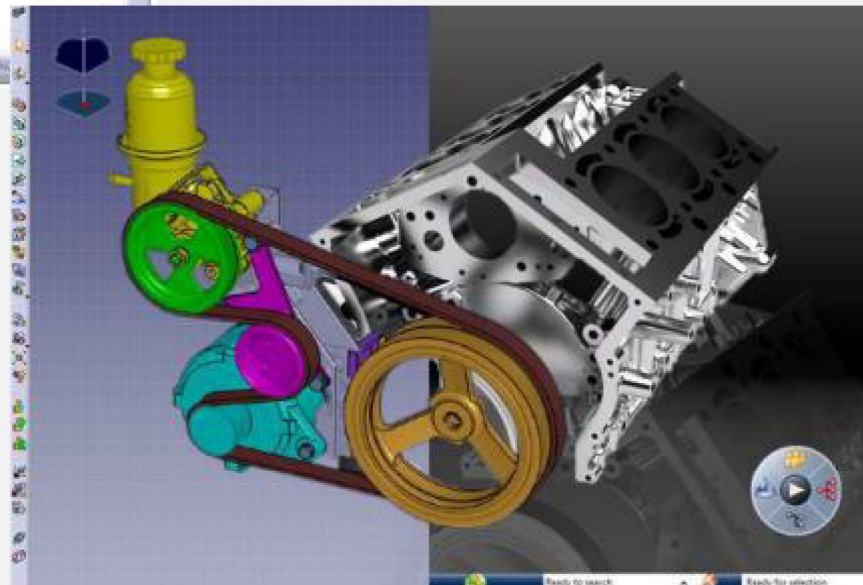
- CATIA
- ADAMS
- MATLAB

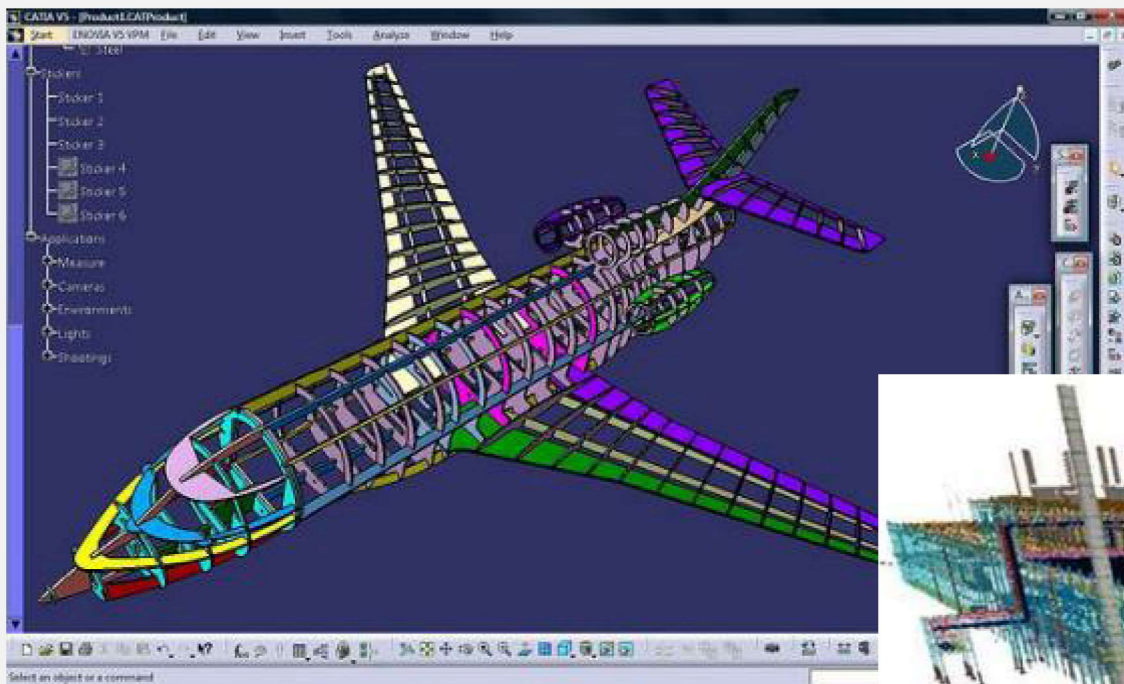
SOFTWARE

- ❑ **CATIA** (Computer Aided Three-Dimensional Interactive Application) is a powerful system developed originally for aircraft and has established itself in the automotive industry, industrial machinery, electronics, shipbuilding, plant design, and consumer goods.
- ✓ With CATIA, it is possible to develop three-dimensional models from which two-dimensional drawings can be created.



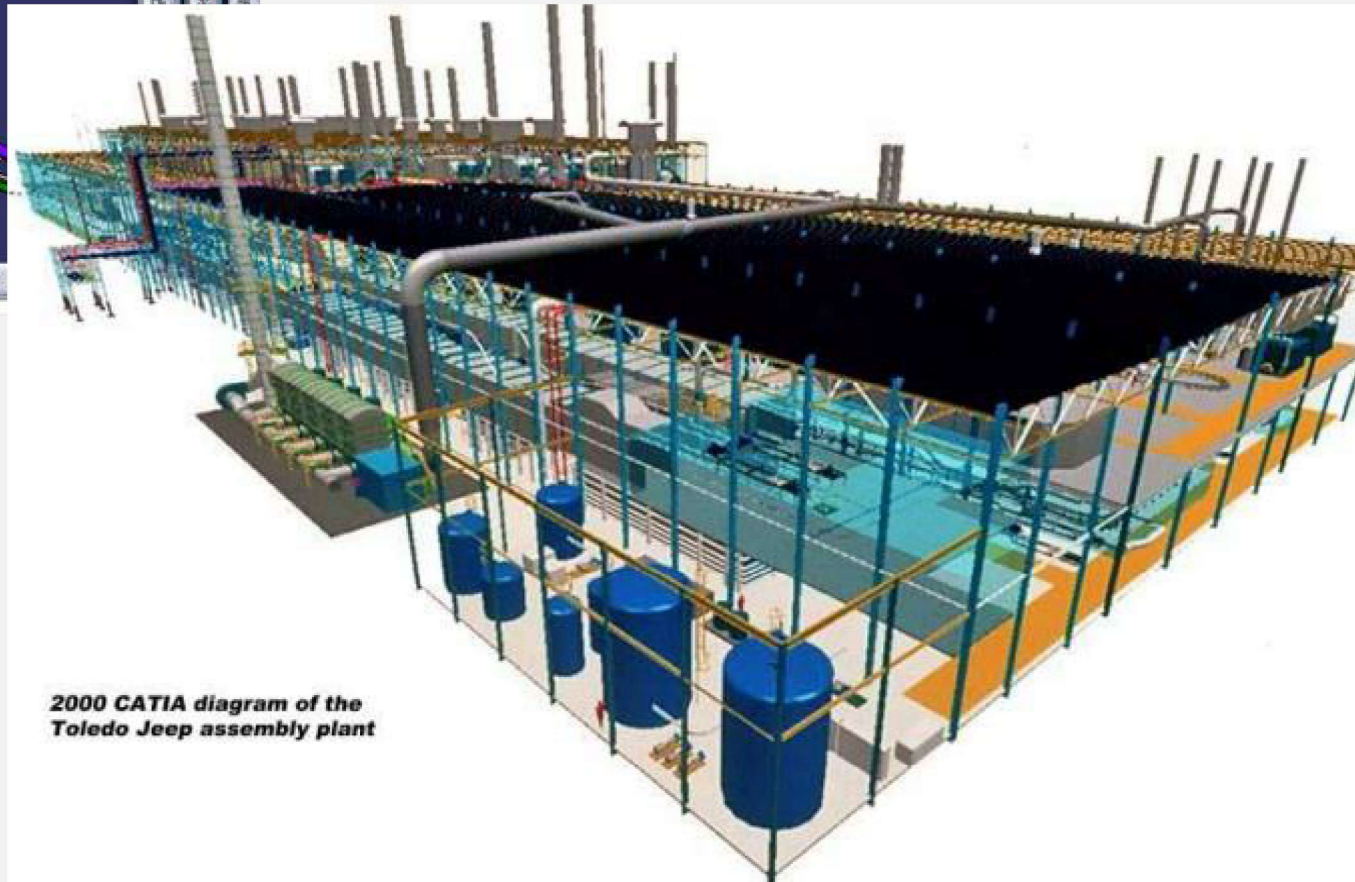
- ✓ You can create complete Car including all details, such as its Engine.

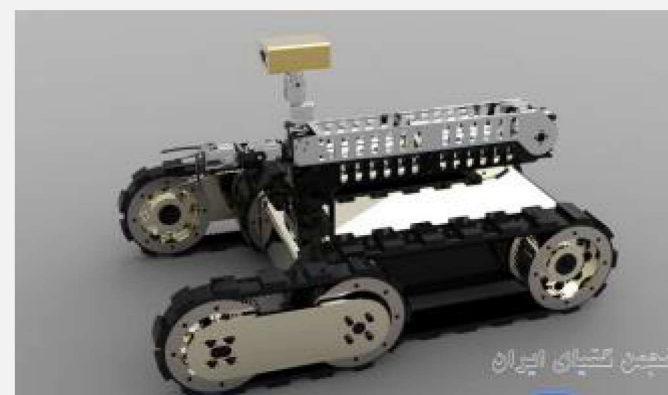
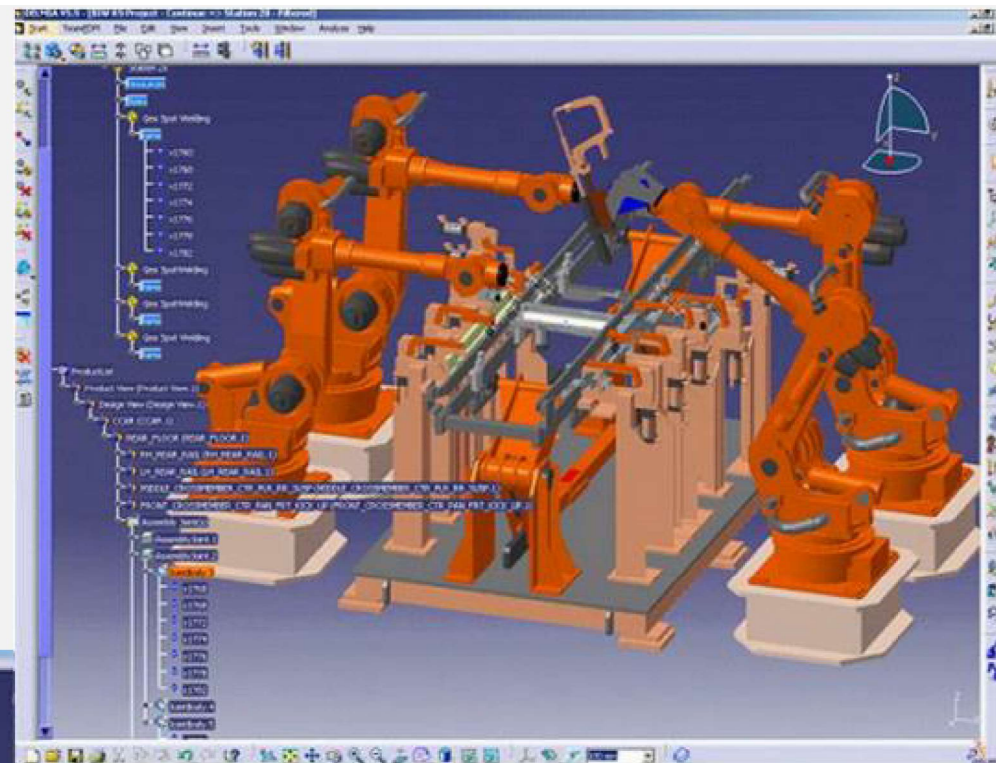
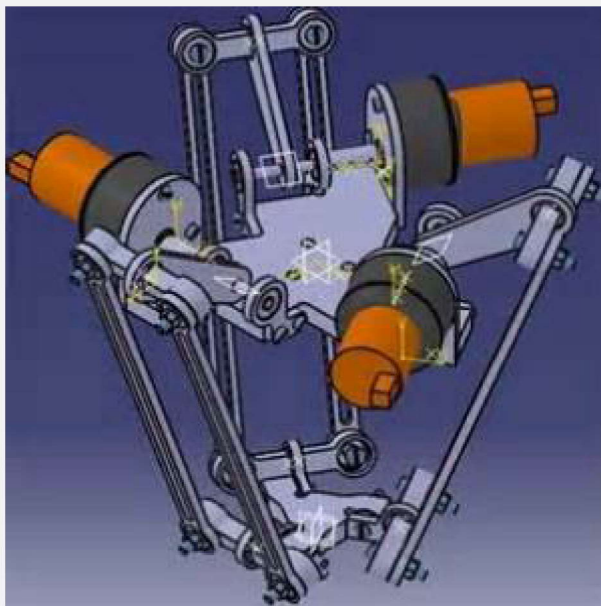




✓ Also, you can create Aircrafts; civilian or military.

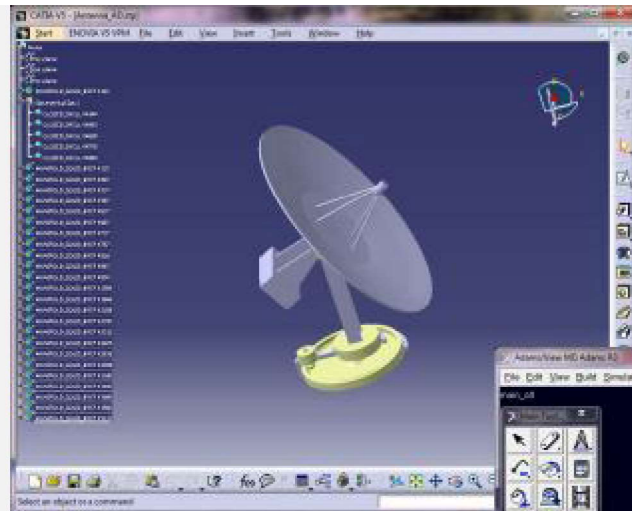
✓ You can carry out Plant Planning and Assembly.



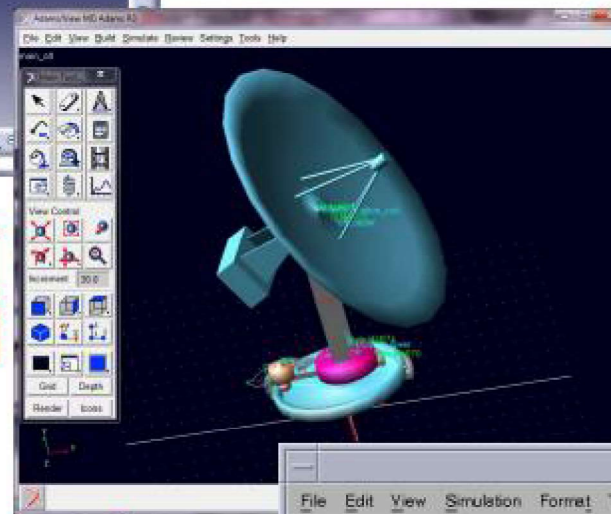


انجمن گسترش ایران

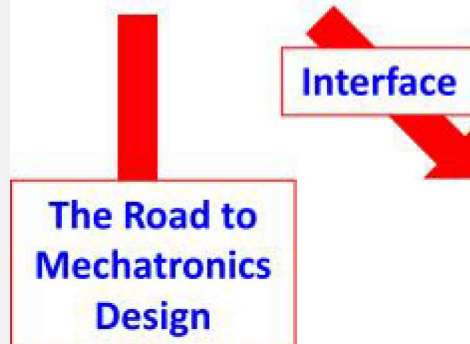
✓ You can create different types of robots.



CATIA: Sophisticated Mechanical Design with simple Kinematics simulation



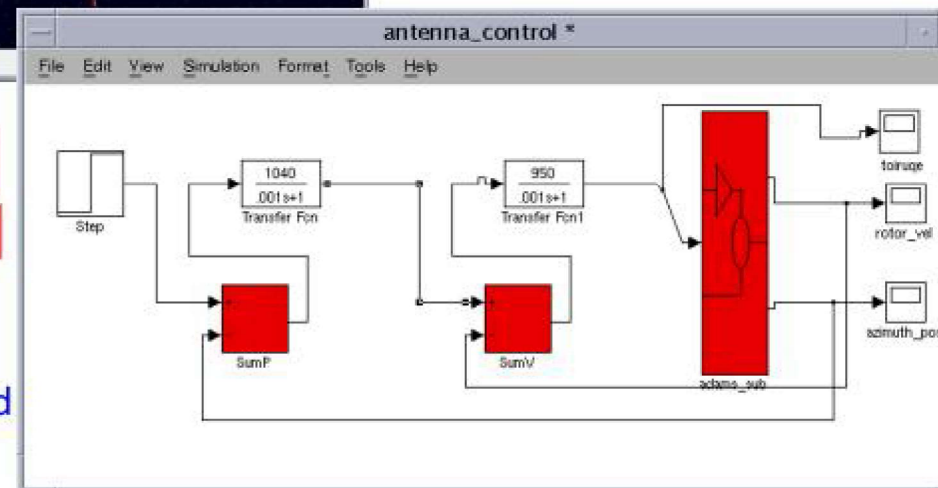
ADAMS: Sophisticated Kinematics and Dynamics simulation with simple control



Interface

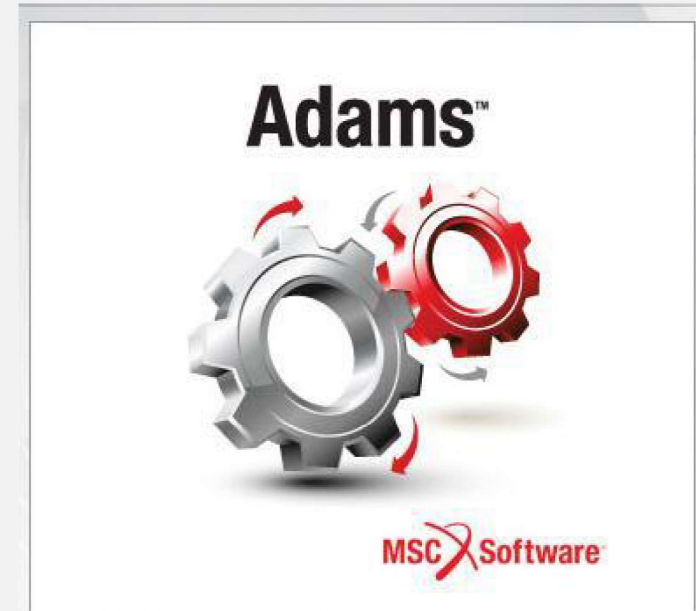
Interface

MATLAB\SIMULINK: Sophisticated Control



SOFTWARE

- **ADAMS** (**A**utomated **D**ynamic **A**nalysis of **M**echanical **S**ystems) is a multibody dynamics simulation software.



Weighing of Assessment

Minoufiya University

Faculty of Electronic Engineering

Department: Industrial Electronics and Control Engineering

Fourth Year

First Semester

Code	Subject	Weekly Hours					Maximum Mark			Total	Exam Time (hours)
		Lec.	Exercise			Total	Work	Oral	Written		
			Theory	Lab	Pract						
ACE 415	Elective (4)	2	1			3	30		70	100	3

❖ Midterm Evaluation, Semester Work, Project,.....

THANKS