

# **Mechatronics 1**

What is Mechatronics?

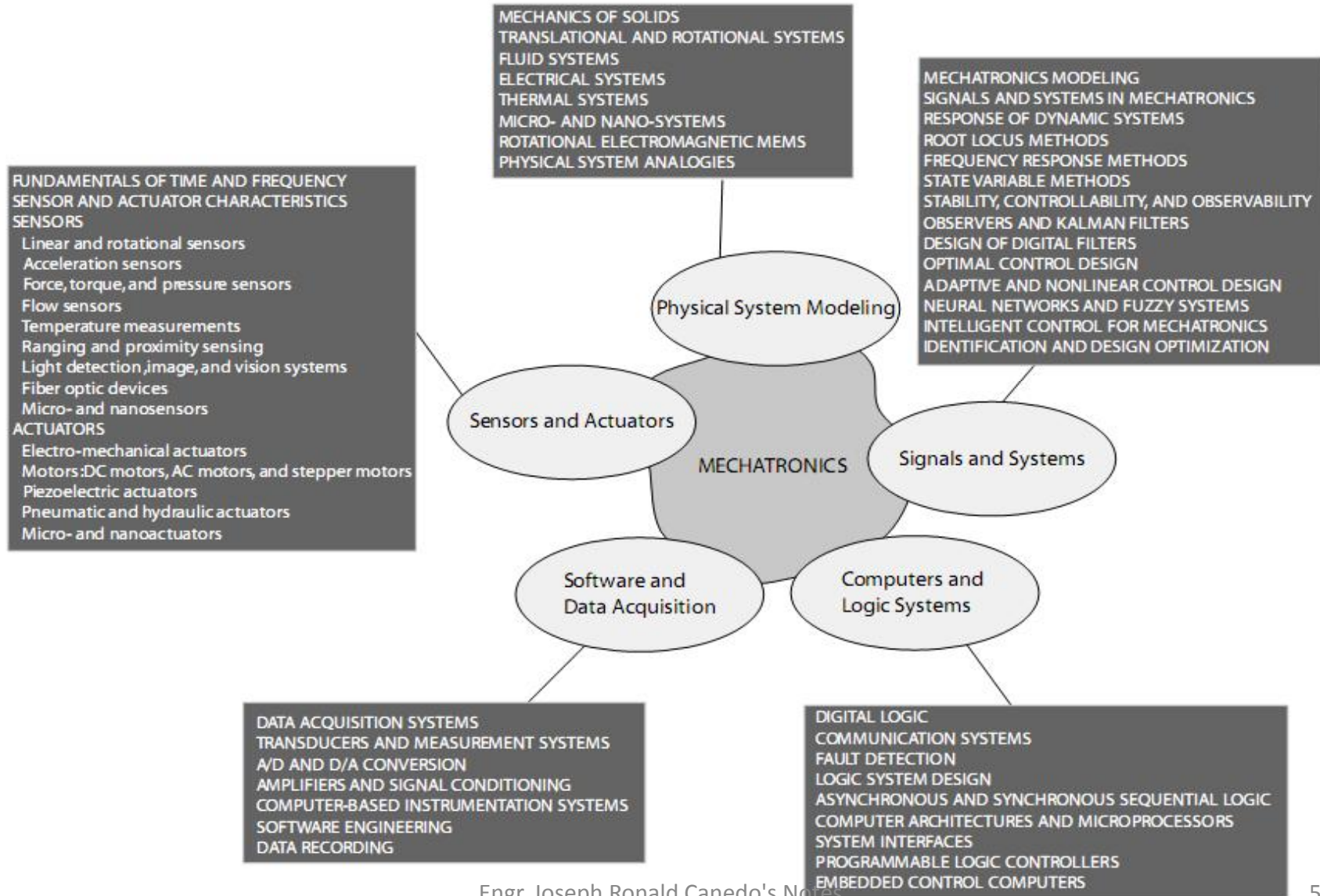
# Basic Definitions

- The word mechatronics is composed of “mecha” from mechanism and “tronics” from electronics. - Yasakawa
- Mechatronics is defined as the synergistic integration of mechanical engineering, with electronics and intelligent computer control in the design and manufacturing of industrial products and processes. – Harashima, Tomizuka and Fukada (1996).
- Mechatronics is a methodology used for optimal design of electromechanical products. – Shetty & Kolk (1997)
- A mechatronic system is not just a marriage of electrical and mechanical systems and is more than just a control system; it is a complete integration of all of them.

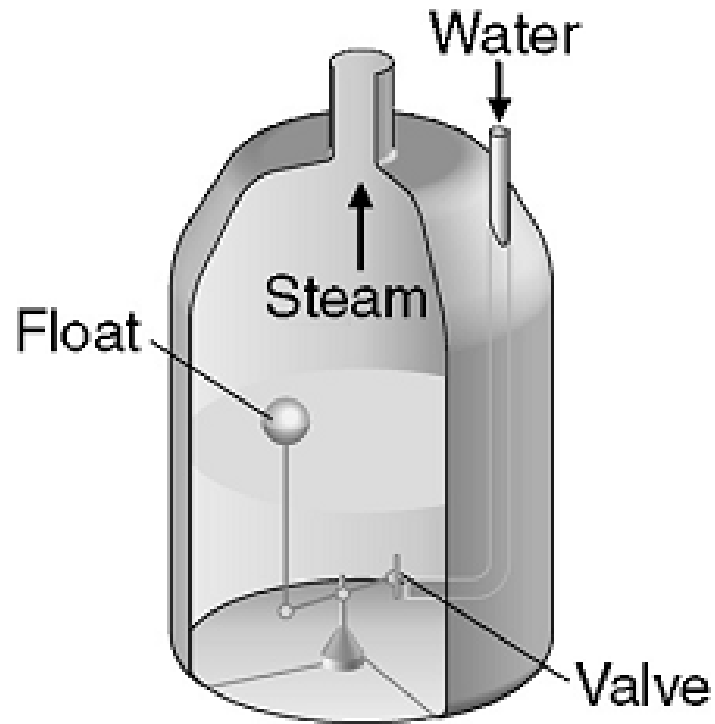
# Key Elements of Mechatronics

- The study of mechatronic systems can be divided into the following areas of specialty:
  1. Physical Systems Modeling
  2. Sensors and Actuators
  3. Signals and Systems
  4. Computer and Logic Systems
  5. Software and Data Acquisition

# Key Elements of Mechatronics

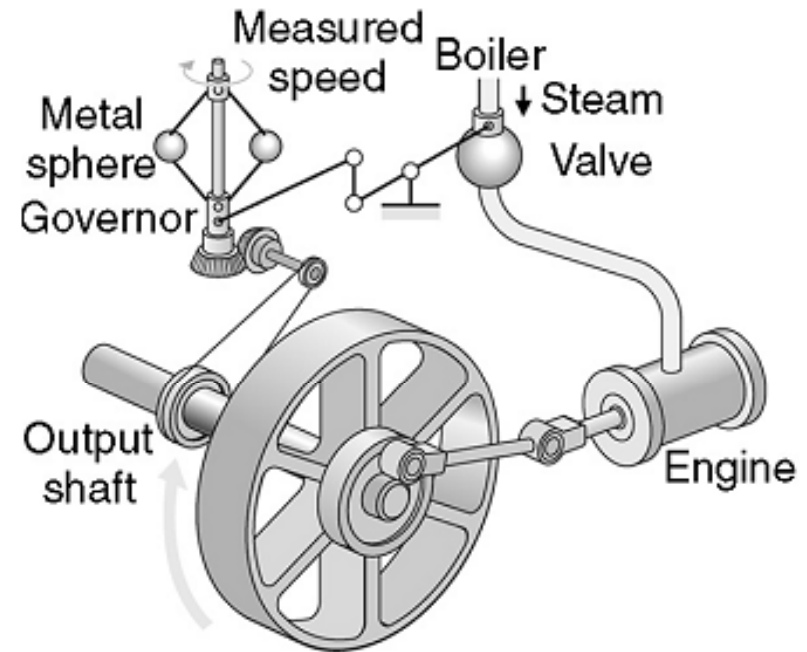


# Historical Perspective



**Water-Level Float  
Regulator**

Greece 300 to 1 BC



**Watt's Flyball  
Governor**

# Historical Perspective

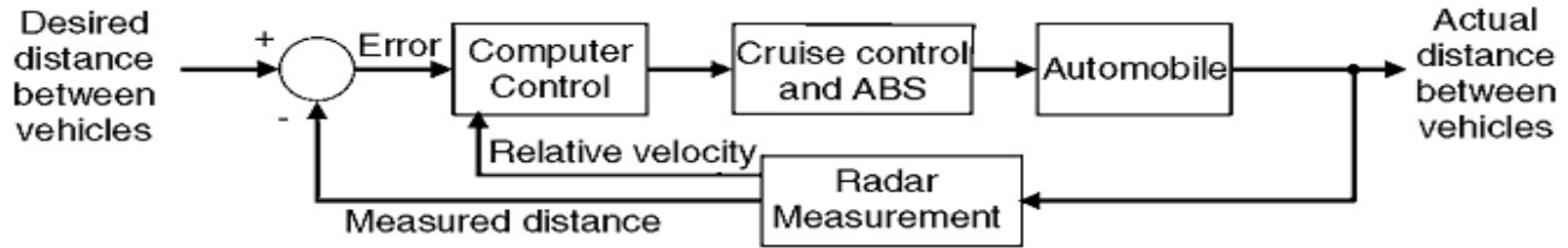
In the late 1970s, the Japan Society for the Promotion of Machine Industry (JSPMI) classified mechatronics products into four categories [1]:

1. *Class I:* Primarily mechanical products with electronics incorporated to enhance functionality. Examples include numerically controlled machine tools and variable speed drives in manufacturing machines.
2. *Class II:* Traditional mechanical systems with significantly updated internal devices incorporating electronics. The external user interfaces are unaltered. Examples include the modern sewing machine and automated manufacturing systems.

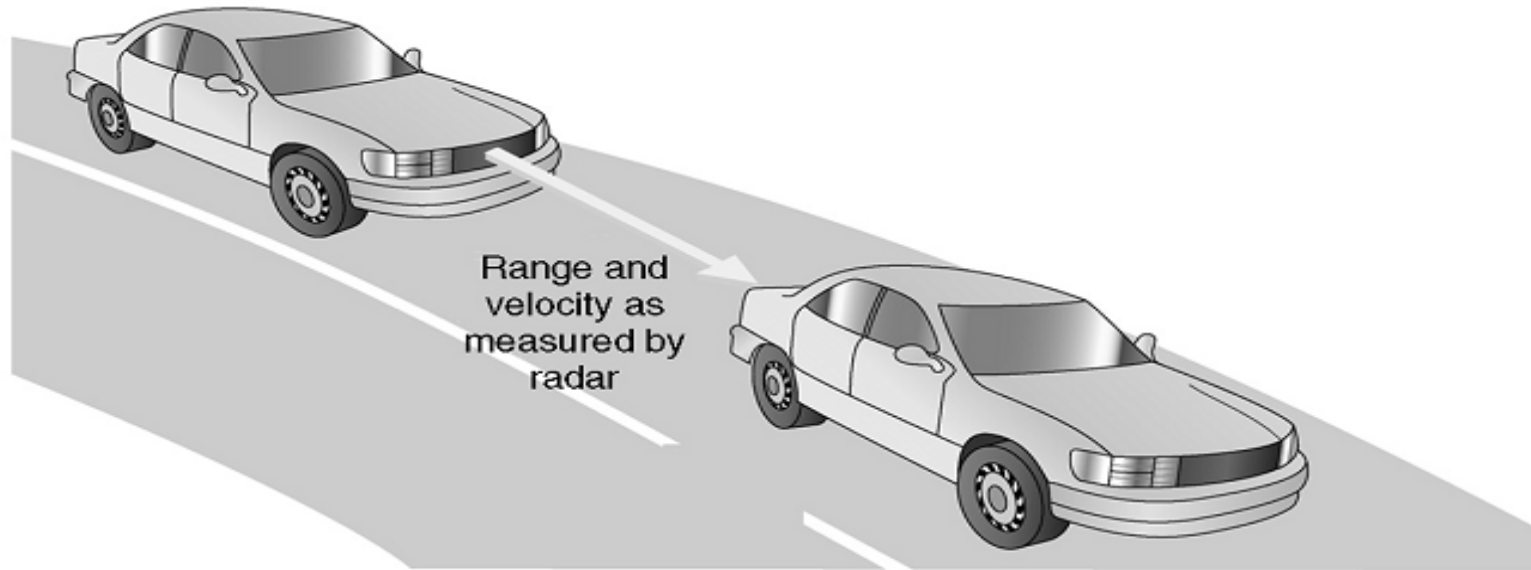
# Historical Perspective

3. *Class III:* Systems that retain the functionality of the traditional mechanical system, but the internal mechanisms are replaced by electronics. An example is the digital watch.
4. *Class IV:* Products designed with mechanical and electronic technologies through synergistic integration. Examples include photocopiers, intelligent washers and dryers, rice cookers, and automatic ovens.

# The Development of the Automobile as a Mechatronic System

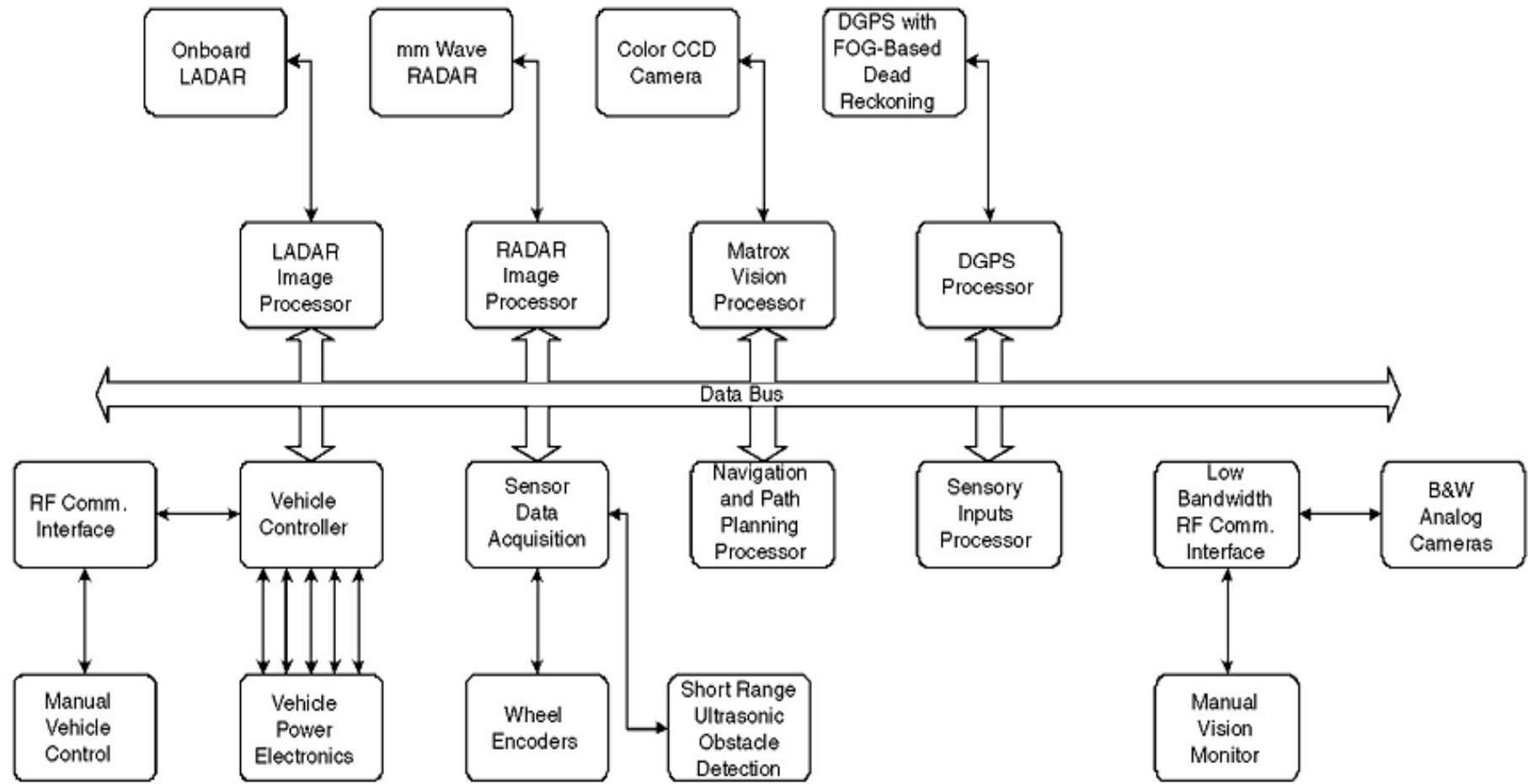


(a)



(b)

# The Development of the Automobile as a Mechatronic System



# What is Mechatronics? And What's Next?

- Mechatronics is an evolutionary process, not a revolutionary one. It is clear that an all-encompassing definition of Mechatronics does not exist, but in reality, one is not needed. It is understood that Mechatronics is about the synergistic integration of mechanical, electrical, and computer systems. One can understand the extent that Mechatronics, which include (i) physical systems modeling, (ii) sensors and actuators, (iii) signals and systems, (iv) computers and logic systems, and (v) software and data acquisition.
- Engineers and scientists from all walks of life and fields of study can contribute to Mechatronics.

