

Mechatronics--An Experience at IIT Delhi

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Introduction

Mechatronics is a word originated in Japan in 1980s to denote the combination of technologies which go together to produce industrial robots. A formal definition of Mechatronics is "the *synergistic integration* of Mechanics and Mechanical Engineering, Electronics, Computer technology, and IT to produce or enhance products and systems." A graphical representation of Mechatronics is shown in Fig. 1. Examples of such systems are Computers, Disk drives, Photocopiers, Fax machines, VCR, Washing machines, CNC machine tools, Robots, etc. Today's modern cars are also mechatronics product with the usage of electronic engine management system, collision detection, global positioning system, and others.

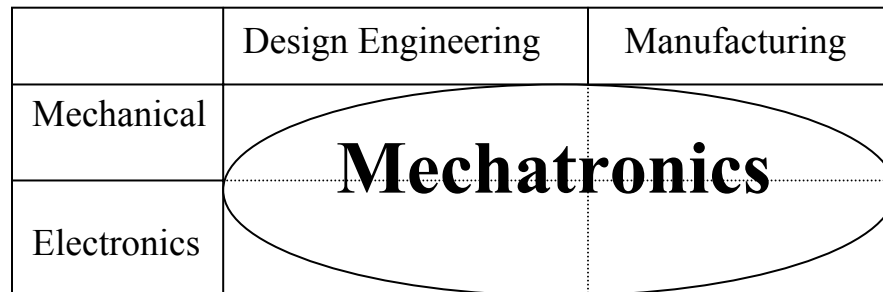


Figure 1 Graphical representation of Mechatronics.

Even though many people believe that the presence of mechanical, electrical, electronic components, and computers make a system mechatronics, others do not feel the same as there is nothing wrong with the individual identity. Hence, the term mechatronics should be used to represent a different meaning, namely, "a design philosophy," where mechanical, electrical, electronics components, and IT should be considered together in the design stage itself to obtain a compact, efficient, and economic product rather than designing the components separately. This is illustrated in Fig. 2. The concept of mechatronics is very important today to meet the customers' ever increasing demands and still remain competitive in the global market. Very often a mechanical engineer without the mechatronics background is considered equivalent to a mechanical engineer without the engineering drawing knowledge.

In India, we always look towards west for our technological requirement even though Indians excel everywhere except in India. So the issue is not the Indians' capabilities but their environment. Here, the author wishes to emphasize the creation of such environment through sharing his experience of establishing the Mechatronics Laboratory at IIT Delhi in 2001, conducting and participating in the workshops/open-

houses on "Mechatronics and Automation" from time to time, and the interactions he has with different industries like Sona Koyo Steering Systems Limited, Gurgaon, and SAMTEL Colour Tubes, Ghaziabad. By sharing the information and experiences, everybody should be in a position to decide their own strategy for their indigenous development rather than buying the same, which may be a technologically better product but the *technology* inside it will not be known as it is not told (a trade secret). So, one has to develop his or her own technology to stay competitive.

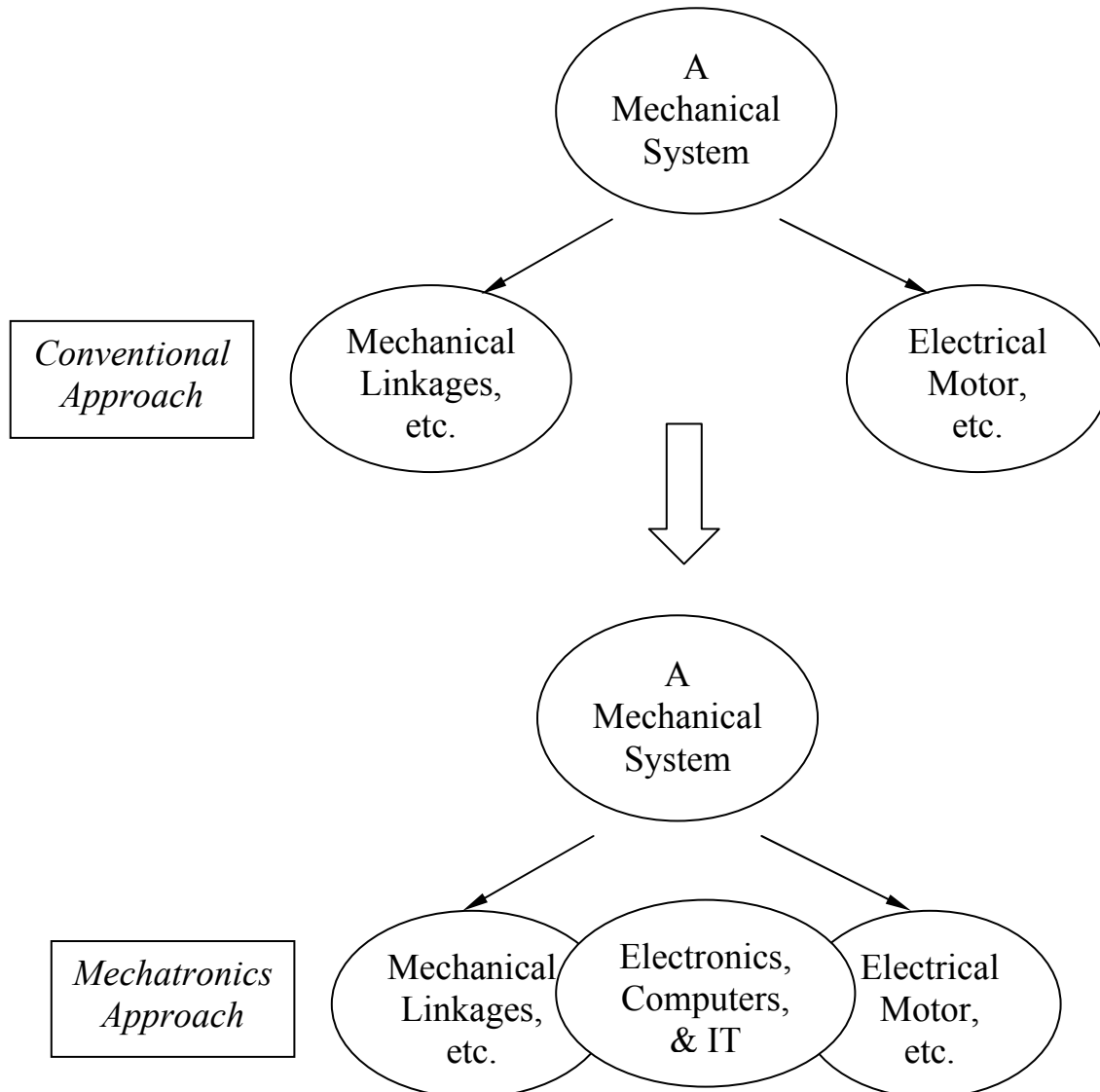


Figure 2 Conventional and mechatronics design approaches.

During the presentation, the following topics will be covered:

- How the systems were decided to set-up the Mechatronics Lab. in the Department of Mechanical Engineering at IIT Delhi;
- Development of
 - A CNC XY Positioning System (Fig. 1);
 - An Intelligent Conveyor System (Fig. 2);

- Description of the systems available in the Lab. (Brochure, 2004). For examples, Figs. 1-4;
- Video of a workshop in the Lab.



Figure 1 A CNC XY positioning system



Figure 2 An intelligent conveyor system



Figure 3 Basket-ball like Thai Takraw-ball playing robot participated in DD-Robocon'03

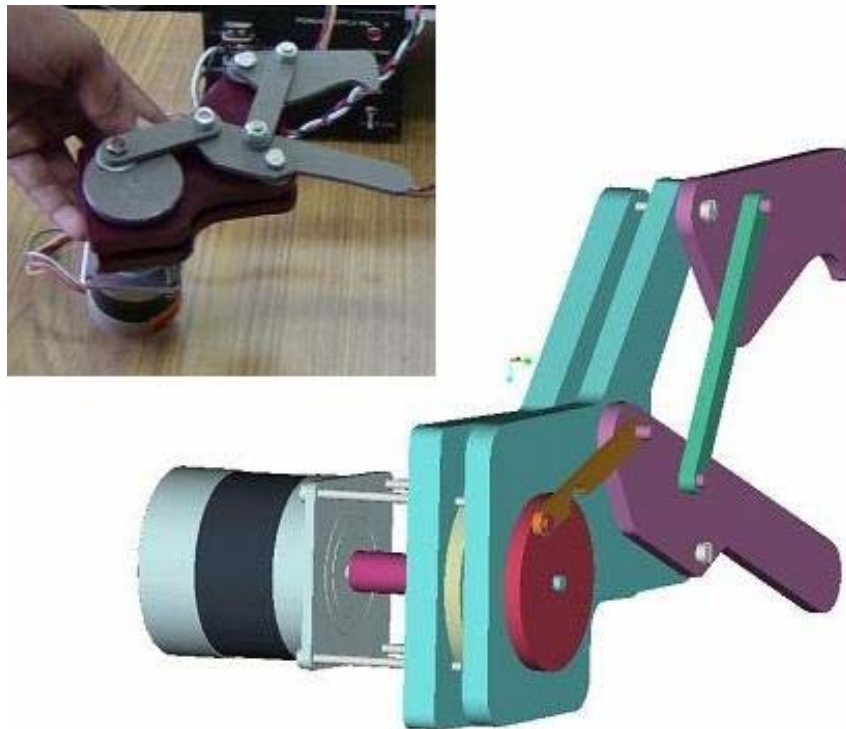


Figure 4 A gripper designed and developed in a B. Tech project (Best Project'04)

References (Copies enclosed)

1. Hewit, J.R., “Mechatronics: An Introduction,” (Source unknown)
2. Kyura, N., and Oho, H., 1996, “Mechatronics—An industrial perspective,” IEEE/ASME Transactions on Mechatronics, Vol. 1, No. 1, Mar., pp. 10-15.
3. Brochure, 2004, Mechatronics Lab. Brochure, Dept. of Mech. Eng., IIT Dlehi.