

# **From Industrial Electronics to Industrial Informatics**

**Okyay Kaynak**  
**UNESCO Chair on Mechatronics,**  
**Bogazici University, Istanbul, Turkey**

If we had a look at the industrial developments that took place in the 20th century, the first half could be said to be hardware dominated in the sense that the improvements in productivity and product quality were mostly due to improvements in "the hardware." The operational speed and the accuracy of the industrial machinery steadily increased, mostly due to the improvements in the precision of the mechanical parts. Along the same lines, the early second half could be said to be software dominated. It was the software used in microprocessor based control systems that enabled a production line to operate faster and more accurately. Even the improvements in industrial machinery (the hardware) were due to the possibilities offered by Computer-Aided Design and Manufacturing. The era of industrial electronics got started around this period, industrial automation in the form of mechanical controls and switches, slowly giving way to electronic controls and signal processing. The last few decades of the century, on the other hand, are characterized by the fusion of different technologies, the first example of which may be (going back almost to the start of the century) electromechanics, then optoelectronics, then mechatronics, then telematics, then bioinformatics, and so on. As a result of this, the boundaries between industrial sectors and academic disciplines have eroded very rapidly. In the new millennium, it is very difficult to put clear boundaries between industrial sectors, between products and services, between producers and users, between IT, communications, media, consumer electronics and even between IT and non-IT industries. The area of industrial automation and control has had its share of the changes too. It is easy to see how dominant IT has become in industrial electronics if one considers the changes in time spent by an engineer in designing a controlled drive system:

- Before the 1960s: 80% for designing a control system with mechanical switches.
- After the 1960s: 80% for designing power electronics converters.
- After the 1980s: 80% for designing digital hardware and software.
- Currently: 90% for software and IT!

After the introduction described above, the presentation will discuss the evolution of the manufacturing paradigms, especially the changes observed in the manufacturing industry during the last decade. The goals of the Intelligent Manufacturing Systems Consortium will be highlighted with special emphasis on Holonic Manufacturing Systems with some demonstrations.

In the closing parts of the presentation, the state-of-the-art reached in industrial informatics with examples and a perspective on the future will be presented, pointing out the challenges that the manufacturing industry will have to face by the end of the next decade.