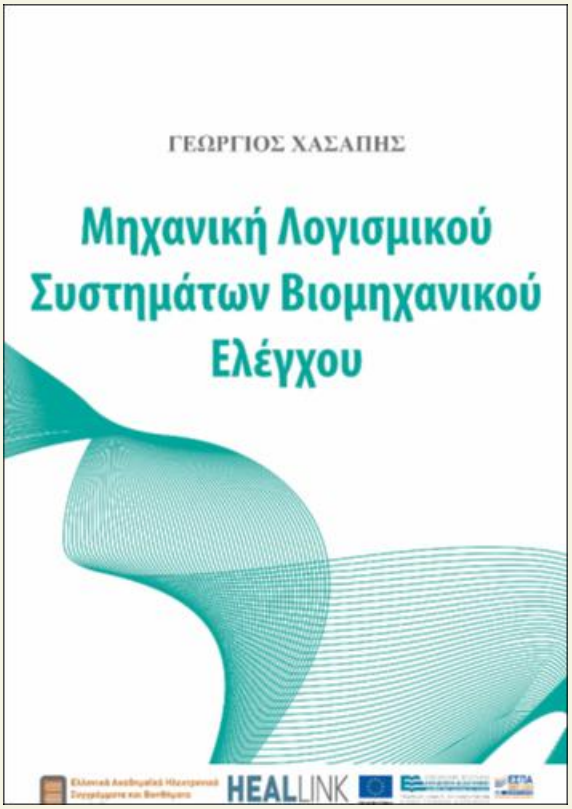

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Abstract

In general, the design and development of industrial automation and production control systems can be divided into two phases. The first phase involves finding control strategies and mathematical and heuristic algorithms that will implement these strategies, and the second phase involves designing specialized networks of intelligent instruments and computers and developing the relevant software that will implement the above strategies and algorithms. The first activity is covered by the subjects of automatic control systems theory, operational research, and optimization theories, while the second is covered by a branch of computer engineering and science that focuses on the design of specialized control system hardware and on finding methods and languages for developing the software for these systems. The textbook is aimed at undergraduate students of Electrical and Computer Engineering, Mechanical Engineering, Chemical Engineering, and Computer Engineering and Informatics, as well as professional engineers and other graduates of science schools who wish to learn how to design and program these specialized networks of intelligent instruments and computers. The above students, professional engineers, and scientists will learn: (a) how to design the software architecture of these specialized networks driven either by events (event driven) or following the more traditional technique of cyclic executive offered commercially by specialized computing units called Programmable Logic Controllers, (b) software development methodologies and related programming languages for control strategies and algorithms, as standardized by IEC 61131-3 and IEC 61499.

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