



# Intelligent Control Systems with an Introduction to System of Systems Engineering

Thrishantha Nanayakkara, Mo Jamshidi, Ferat Sahin

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From aeronautics and manufacturing to healthcare and disaster management, systems engineering (SE) now focuses on designing applications that ensure performance optimization, robustness, and reliability while combining an emerging group of heterogeneous systems to realize a common goal.

Use SoS to Revolutionize Management of Large Organizations, Factories, and Systems

Intelligent Control Systems with an Introduction to System of Systems Engineering integrates the fundamentals of artificial intelligence and systems control in a framework applicable to both simple dynamic systems and large-scale system of systems (SoS). For decades, NASA has used SoS methods, and major manufacturers—including Boeing, Lockheed-Martin, Northrop-Grumman, Raytheon, BAE Systems—now make large-scale systems integration and SoS a key part of their business strategies, dedicating entire business units to this remarkably efficient approach.

#### **Simulate Novel Robotic Systems and Applications**

Transcending theory, this book offers a complete and practical review of SoS and some of its fascinating applications, including:

- Manipulation of robots through neural-based network control
- Use of robotic swarms, based on ant colonies, to detect mines
- Other novel systems in which intelligent robots, trained animals, and humans cooperate to achieve humanitarian objectives

Training engineers to integrate traditional systems control theory with soft computing techniques further nourishes emerging SoS technology. With this in mind, the authors address the fundamental precepts at the core of SoS, which uses human heuristics to model complex systems, providing a scientific rationale for integrating independent, complex systems into a single coordinated, stabilized, and optimized one. They provide readers with MATLAB® code, which can be downloaded from the publisher's website to simulate presented results and projects that offer practical, hands-on experience using concepts discussed throughout the book.



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