System Theory and Practical Applications of Biomedical Signals

Gail Baura
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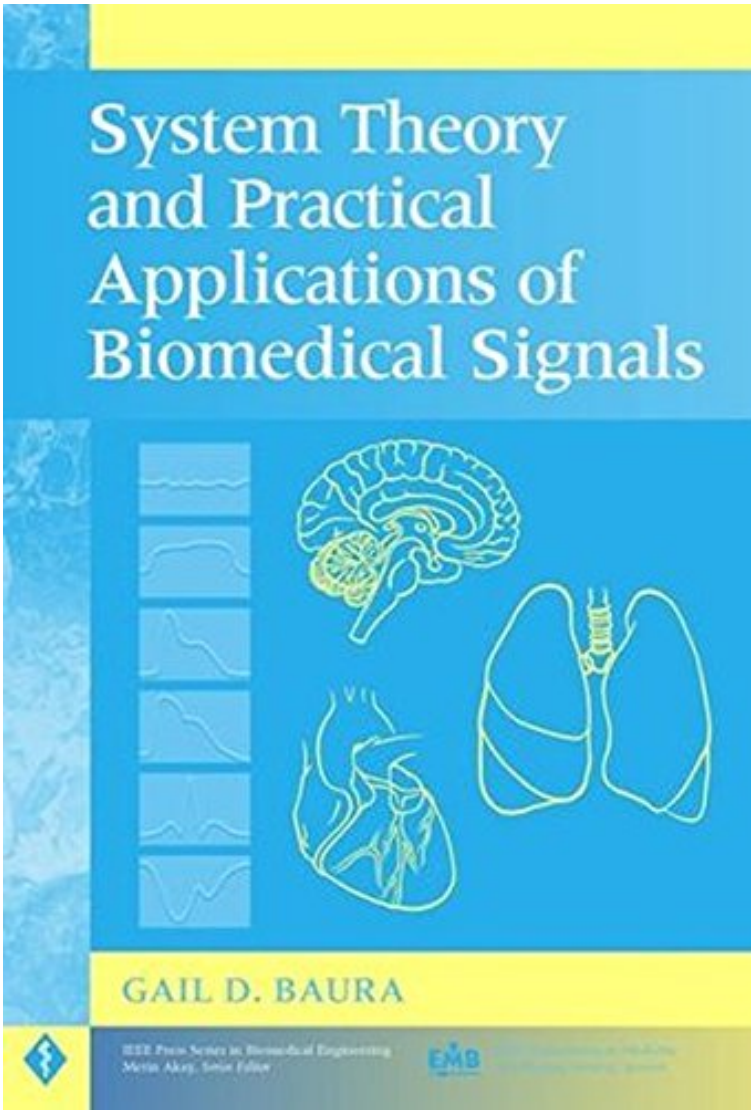

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System theory is becoming increasingly important to medical applications. Yet, biomedical and digital signal processing researchers rarely have expertise in practical medical applications, and medical instrumentation designers usually are unfamiliar with system theory. System Theory and Practical Applications for Biomedical Signals bridges those gaps in a practical manner, showing how various aspects of system theory are put into practice by industry. The chapters are intentionally organized in groups of two chapters, with the first chapter describing a system theory technology, and the second chapter describing an industrial application of this technology. Each theory chapter contains a general overview of a system theory technology, which is intended as background material for the application chapter. Each application chapter contains a history of a highlighted medical instrument, summary of appropriate physiology, discussion of the problem of interest and previous empirical solutions, and review of a solution that utilizes the theory in the previous chapter. Biomedical and DSP academic researchers pursuing grants and industry funding will find its real-world approach extremely valuable. Its in-depth discussion of the theoretical issues will clarify for medical instrumentation managers how system theory can compensate for less-than-ideal sensors. With application MATLAB exercises and suggestions for system theory course work included, the text also fills the need for detailed information for students or practicing engineers interested in instrument design. An Instructor Support FTP site is available from the Wiley editorial department: ftp://ftp.ieee.org/uploads/press/baura

"this is a useful addition to the library of those who are involved in product development of technologies using complex signal processing." (Biomedical Instrumentation Technology, May/June 2004) "...an excellent contribution to the current literature...well written..." (IEEE Engineering in Medicine and Biology, July/August 2002) "The approach chosen by Dr. Baura is original and is to be congratulated for its ambitiousness. I would recommend the book to existing biomedical engineering experts working in environment where solving practical problems is the issue...in addition it could be very useful as a class text..." (IFMBE News, No. 61, July 2003)From the Back CoverA volume in the IEEE Press Series in Biomedical Engineering Metkin Akay, Series Editor Endorsed by the IEEE Engineering in Medicine and Biology Society A valuable synthesis of system theory and real-world applications for biomedical instrumentation System theory is becoming increasingly important to medical applications. Yet, biomedical and digital signal processing researchers rarely have expertise in practical medical applications, and medical instrumentation designers usually are unfamiliar with system theory. System Theory and Practical Applications for Biomedical Signals bridges those gaps in a practical manner, showing how various aspects of system theory are put into practice by industry. Written from the perspective of an industry insider who actually made useful products based on the theory, this pragmatic guide combines traditional DSP and compartmental modeling, as well as pairing in-depth discussions of practical medical instrumentation applications and system theory. Biomedical and DSP academic researchers pursuing grants and industry funding will find its real-world approach extremely valuable. Its in-depth discussion of the theoretical issues will clarify for medical instrumentation managers how system theory can compensate for less-than-ideal sensors. With application MATLAB exercises and suggestions for system theory course work included, the text also fills the need for detailed information for students or practicing engineers interested in instrument design.About the AuthorGAIL D. BAURA received a BSEE from Loyola Marymount University in 1984 and an MSEE and MSBME from Drexel University in 1987. She received a PhD in Bioengineering from the University of Washington in 1993. Between these degrees, Dr. Baura worked as a loop transmission systems engineer at ATT Bell Laboratories. Since graduation, she has served in a variety of research positions at IVAC Corporation, Cardiotronics Systems, Alaris Medical Systems, and VitalWave Corporation. Dr. Baura is currently Vice President of Research at CardioDynamics. Her research interests are the application of system theory to patient monitoring and insulin metabolism.