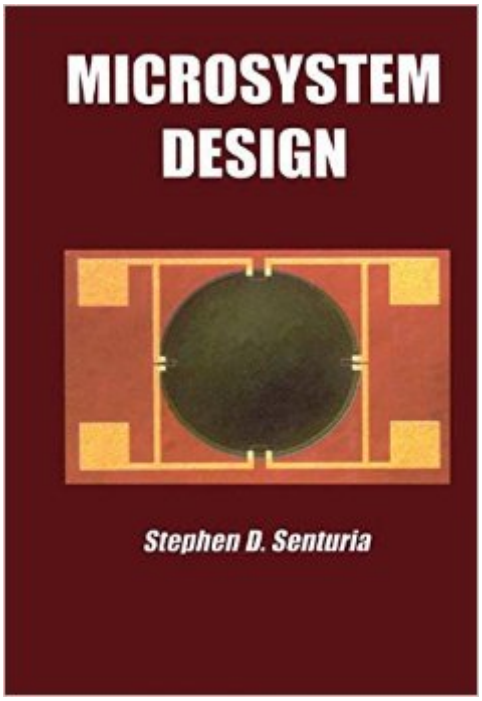
Microsystem Design



Synopsis

It is a real pleasure to write the Foreword for this book, both because I have known and respected its author for many years and because I expect this bookâ ™s publication will mark an important milestone in the continuing worldwide development of microsystems. By bringing together all aspects of microsystem design, it can be expected to facilitate the training of not only a new generation of engineers, but perhaps a whole new type of engineer â " one capable of addressing the complex range of problems involved in reducing entire systems to the micro- and nano-domains. This book breaks down disciplinary barriers to set the stage for systems we do not even dream of today. Microsystems have a long history, dating back to the earliest days of mic- electronics. While integrated circuits developed in the early 1960s, a number of laboratories worked to use the same technology base to form integrated sensors. The idea was to reduce cost and perhaps put the sensors and circuits together on the same chip. By the late-60s, integrated MOS-photodiode arrays had been developed for visible imaging, and silicon etching was being used to create thin diaphragms that could convert pressure into an electrical signal. By 1970, selective anisotropic etching was being used for diaphragm formation, retaining a thick silicon rim to absorb package-induced stresses. Impurity- and electrochemically-based etch-stops soon emerged, and "bulk micromachining" came into its own.

Book Information

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Customer Reviews

In 23 chapters, Senturia brings together a dizzying array of fields of engineering necessary to design micro-electro-mechanical systems (MEMS) and examples of MEMS products. For instance, he covers Euler beam theory, the Navier-Stokes equation, micromachining, feedback circuits, and electronic noise, and then anchors these topics with a gyroscope and a DNA amplifier, among other devices.Senturia's approach to some chapters strikes me as a little idiosyncratic, but he does convey the principles quite well. His love for the material shines through in a way that many authors cannot manage.Unlike books on single topics, this text cannot be used as a definitive guide to anything. Because Sentuira only has only 30 pages or so for each of the very broad topics that he covers, he doesn't cover any of them in much depth. However, the reader does get a sense of the issues that each physical domain presents. For those who need to know more, Senturia provides a short list of further reading in each chapter. I think of this book as a comprehensive starting point that can help me determine what further investigation I need.Aesthetically, the text is somewhat lacking. The small pages are cramped compared to those of larger-format texts, and the figures are subpar.

The book tries to cover many different topics at the same time and sometimes makes a quite messy work. However, the book has very good chapters and not so good ones. It provides a good introduction on MEMS fabrication, but a more interested reader will find difficult to fabricate MEMS with the given information. Chapters 5,6,7 and 8 are excellent, but chapters 9, 10,11 and 12 are incomplete and not easily understandable for a Electrical Engineer graduate student. Chapter 13 begins with general equations to be simplified considerably later, giving the impression to the reader that he has learned only a little about fluids. Chapter 11 is quite confusing and chapter 12 lack examples in 2D and 3D lumped models.

The book tries to cover different aspects and fields involved in the microsystems design (MEMS).The book scope is very broad in a sense that makes it miss essential details and concepts.It may work as a first introduction to the subject for students approaching the subjects for their first time, but it can't serve as a reference. It is simply very shallow and the topic is too broad to be lumped in a single book.

The first book to analyze MEMS devices in depth by renowned pioneer Dr. Senturia. Published nearly two decades ago, the book is a bit long in the tooth and would benefit from update in manufacturing methods and newer devices. Still the book is quite readable introduction to MEMS.

This book is definitely a must-have for anyone interested in MEMS design. It’s one of the classic references on microsystems that everyone should have read at least once.The sections on mathematical modeling are especially good, and the set of detailed examples at the end are clear and illustrative.To name some drawbacks, the chapter on fabrication is maybe a bit out of date, and more solved practical exercises are missing.

This book is a good graduate level MEMS book, but do not think that you will be able to design a MEMS chip after just reading. I bought this one as a part of MEMS Design course at Northeastern University. MEMS students should be familiar with pSpice circuit simulation and Matlab in order to even start thinking of designing MEMS. Microfabrication, the way it is explained here, is very brief, and not very useful.

A good senior in physics or electrical engineering would be able to use this as either a textbook or a self-study book as an introduction to MEMS. Could you go off and build a new device after reading this book? Probably not, but you could go off and work with a group of more experienced individuals and built a device. This would get you up to speed.The text’s coverage is somewhat uneven, in places it seems overly detailed, and in others too sparse. However, one of my colleagues (and another reviewer) identified completely different over- and under-coverage sections, so I’m going to consider it to be personal taste as much as anything else.In short, it’s a good, but not perfect text. It gets five stars though for being the best there is at the moment.

I am a beginner on MEMS technology. I found this book useful when I borrowed it from lib. I will definitely want to get one of it myself.

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