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Hands-On Introduction to LabVIEW for Scientists and Engineers, 2nd ed., by John Essick and published by Oxford University Press, 2001 Evans Road, Cary, NC 27513 (2012), $33.20, pp. xiii + 601, paperback, ISBN: 978-0199925155.

Overview: There are numerous books about programming in LabVIEW, but none that have such a focused applicability to the college-level science lab as this one. It is immediately apparent that the author is not primarily a "LabVIEW Professional," but a teacher with enormous experience in using LabVIEW to teach undergraduate physics courses. This book would be an excellent text for a short course on computer interfacing and LabVIEW for undergraduates; it could also serve as a useful supplement to a broader course on laboratory techniques and/or computer programming.

Strengths: The greatest strength of this book is Essick's pedagogical approach. There is an enormous amount of detail within LabVIEW. There are multiple ways of doing things, lots of control options, and picky details regarding wire colors and how to connect one thing to another. Judging by other LabVIEW books, it's easy to get bogged down in the coverage of these details and end up with a book on LabVIEW programming. This is not a book on LabVIEW programming: it's a book on using LabVIEW as a tool to do interesting things that—almost incidentally—provides the reader with practical knowledge of LabVIEW programming. Essick begins with the complete basics, assuming nothing but that the reader has a working copy of LabVIEW on his/her computer. From there, he builds all the way to state machines and writing VISA instrument drivers. Throughout the book, each new concept or structure or control is presented as a way of doing something related to the current lab-oriented task.

For a good example of this, consider his first few chapters. Probably the most fundamental structure in LabVIEW is the "while" structure and he starts the reader with that. But rather than starting with the "while" and then supplying examples of how it can be used, Essick starts with the problem of generating a sinusoidal plot, and then presents the "while" as a solution to the problem. The reader gets roped in to the problem, gets detailed instructions on how to solve it, and as a side effect learns that that particular structure is how to do any repetitions in LabVIEW that lack a pre-defined number of iterations and the unusual paradigm behind LabVIEW programming and how to make waveform charts. In the subsequent two chapters, Essick builds on the same problem and improves on its solution by introducing the "for" structure and then the MathScript node. He also introduces more powerful graphing techniques and clears up a large collection of those little details that make LabVIEW both powerful and challenging, all without seeming to introduce new topics.

The material is broken into very reasonably sized chunks. The chapters are short and well-focused, with a good collection of problems at the end of each. One particularly nice feature is that the first few of those end-of-chapter problems are a "do it yourself" set that could be used as lab exercises if appropriate for the course.

The hardware chosen for his examples ranges from high-end National Instruments expansion cards to the least-expensive student USB-based interfaces, and when hardware limitations require alternate programming techniques on the low-end hardware, he gives examples and full explanations for the entire range of hardware capabilities. As sample hardware for the VISA driver programming examples, Essick quite reasonably uses the relatively inexpensive (and very capable) Agilent 34410A DMM; but if that particular instrument is not available to you, his explanations are broad enough to be of use for just about anything using the IEEE 488.2 standard.

Weaknesses: This is such a superb book that I hate to quibble about anything, but if I channel my "inner whiny undergraduate" the complaint he makes is that there is too much repetition of some examples. There is a feeling of *déjà vu* by the time one gets to chapter 11 and sees, once again, the digital oscilloscope. I personally would also like to see more about other forms of curve fitting.

In fairness to the author, though, both of these "weaknesses" are an almost unavoidable side effect of the pedagogical approach that is the great strength of the book. The chapter 11 oscilloscope, for example, is a much more capable instrument, using more powerful LabVIEW techniques, than the oscilloscope from chapter 4. Essick uses the limitations in the previous version as a springboard to the new techniques that are the real learning goal. Similarly, his coverage of curve fitting is in response to the Steinhart-Hart equation for measuring temperature with a thermistor. He thus avoids presenting curve fitting as a goal in itself, and other types of curve fitting are presented in the associated problem set.

Overall: I teach three courses that are closely related to the material in this text: Computational Physics, Electronics for Scientists, and Advanced Lab for physics majors. In the latter two, the first edition of this book has proven to be a valuable supplemental resource. I introduce LabVIEW in the electronics course, where we use the National Instruments ELVIS II interfaces for nearly every lab exercise. There, students who struggle with the unique programming paradigm of LabVIEW are encouraged to go through the first few chapters of Essick on their own. In Advanced Lab, students focus more on data collection with LabVIEW, where the later chapters are an excellent resource. I also use Essick's PID temperature controller as one of several PID exercises from which the students can choose. But I've never taught a course where this book would be the primary textbook. For Computational Physics, it's important that students learn a more general programming language, so I teach Python. For Electronics and Advanced Lab, LabVIEW is an ancillary topic: useful in the lab, but not central to the course.

Reviewing this second edition, though, has made me seri-

ously consider options. Could I create a new course on my campus, "Laboratory Interfacing"? Perhaps a January intersession course, or a summer class if I couldn't fit it into our already crowded curriculum? And if the book's good enough that I'm considering building a class around it, well, that's a good book!

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MicroReviews by the Book Reviews Editor

• ***A Short History of Physics in the American Century,*** by David C. Cassidy and published by Harvard University Press, Cambridge, MA, pp. ii + 211 (2011), $29.95, hardback, ISBN 978-0-674-04936-9.

Early in the century the nation was electrified, leading to a powerful state just prior to WWII when powerful science administrators began funneling vast sums of money to physics departments for work on the nuclear bombs, the race to the Moon, high-energy physics, bigger and bigger accelerators, faster computers, communication (the Internet), solid-state physics (the transistor), and so on. This caused a brain drain of physicists from around the world, leading eventually, though, to cutbacks in federal, military, and corporate largess, changing the nature of many departments, and leading to a much-reduced lead in many areas of physics as physics entered the 21st century. DOI: 10.1119/1.4872431

• ***Cosmological Constants: Papers in Modern Cosmology,*** edited by Jeremy Bernstein and Gerald Feinberg and published by the Columbia University Press, New York, NY, pp. xv + 328 (1986), $30.00, hardback, ISBN: 0-231-06376-8.

This is a very valuable collection of 25 papers of cosmological significance that have been redone (translated, if necessary) in a common format (that of the *Astrophysical Journal*) with some renumbering of equations, some changing of notation to conform with current usage, and correction of typographical errors with a bit of commenting on errors without correcting the original. DOI: 10.1119/1.4872432

• ***101 Incredible Experiments for the Weekend Scientist,*** by Rob Beattie and published by Metro Books, 387 Park Ave. South, New York, NY 10016, 128 pages (2007), $6.98 (Barnes & Noble Bargain Priced) hardback, ISBN: 978-0-7607-9495-1.

Very nice collection of experiments with equipment lists that you can do cheaply, supplemented with instructions on setting up your own safe laboratory.

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• ***Trophy Wives Don't Need Advanced Physics: Dubious Words of Wisdom from Physics Students,*** by Boris Korsunsky and published by Pi Press, New Orleans, LA 70118 (pipress@yahoo.com) (2009), 113 pages, $12.00 paperback, ISBN 978-0-9677074-4-0.

If you can stand "Franklin invented a stove that used physics to burn stuff; before him, the stoves only used chemistry," you will probably like most of the rest of the book!

DOI: 10.1119/1.4872434

Note from the Book Reviews Editor:

Recently, there has been considerable interest in extra-solar system stars and planets and since this Book Reviews Editor has had a long-time interest in aeronomy and the detection of bodies within and without our solar system, he intends to MicroReview several books that will provide a background for some of these recent discoveries.

• ***Moons and Planets: An Introduction to Planetary Science,*** by William K. Hartman and published by Wadsworth Publishing Company, Inc., Belmont, CA 94002 (1973), pp. xi + 404, hardback, LC: 70-170777. (Now in its 5th edition and published by Brooks/Cole (2004) at $150.00, ISBN: 978-0534493936.)

This first edition is still valuable as a starting point introducing the reader to origin theories, stellar formation, planetary formation (including interiors, surfaces, and atmospheres), comets, asteroids, meteorites and some of the geophysics that will necessarily increase as one gets into the discoveries of the last 40 years and ending with a 13th chapter on habitable planets and life. DOI: 10.1119/1.4872435

• ***Planets Beyond: Discovering the Outer Solar System*** by Mark Littman and published by John Wiley & Sons (1988), $22.95, pp. xiv + 286, hardback, ISBN: 0-471-61128-X.

I carefully reviewed this book when it came out, line-by-line, thoroughly enjoying the history, the satellite fly-bys of the outer planets with photographs, the projected paths of our satellites (now having come to pass), thoughts on Planet X, and the analyses of what could be accomplished with the instruments then available. DOI: 10.1119/1.4872436

• ***Planetary Atmospheres,*** by F. W. Taylor and published by Oxford University Press, Great Clarendon St., Oxford, OX2 6DP (2010), $39.49, xiv + 261, paperback, ISBN: 978-0-19-954741-8.

Of limited interest to most of our readers, this senior-level text for a select group of aeronomy students does contain a great deal of information garnered from several familiar satellites, along with descriptions of measurement techniques and the use of models. DOI: 10.1119/1.4872437