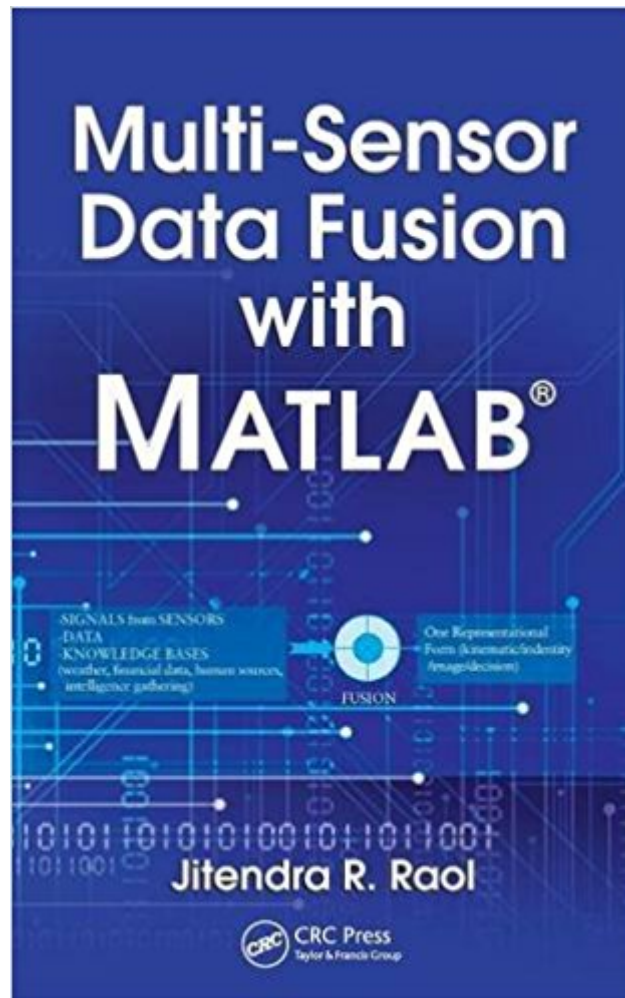




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# Multi-Sensor Data Fusion With MATLAB®



## Synopsis

Using MATLAB® examples wherever possible, *Multi-Sensor Data Fusion with MATLAB* explores the three levels of multi-sensor data fusion (MSDF): kinematic-level fusion, including the theory of DF; fuzzy logic and decision fusion; and pixel- and feature-level image fusion. The authors elucidate DF strategies, algorithms, and performance evaluation mainly for aerospace applications, although the methods can also be applied to systems in other areas, such as biomedicine, military defense, and environmental engineering. After presenting several useful strategies and algorithms for DF and tracking performance, the book evaluates DF algorithms, software, and systems. It next covers fuzzy logic, fuzzy sets and their properties, fuzzy logic operators, fuzzy propositions/rule-based systems, an inference engine, and defuzzification methods. It develops a new MATLAB graphical user interface for evaluating fuzzy implication functions, before using fuzzy logic to estimate the unknown states of a dynamic system by processing sensor data. The book then employs principal component analysis, spatial frequency, and wavelet-based image fusion algorithms for the fusion of image data from sensors. It also presents procedures for combining tracks obtained from imaging sensor and ground-based radar. The final chapters discuss how DF is applied to mobile intelligent autonomous systems and intelligent monitoring systems. Fusing sensors' data can lead to numerous benefits in a system's performance. Through real-world examples and the evaluation of algorithmic results, this detailed book provides an understanding of MSDF concepts and methods from a practical point of view. Select MATLAB programs are available for download on [www.crcpress.com](http://www.crcpress.com)

## Book Information

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The book of Dr.J.R.RAOL was awaited for researchers who deal with data fusion.It seems to complete the numerical solution gap of a series of book published by Artech House book Co.We can enumerate under examples title1. Bar-Shalom Yaakov and Xiao-Rong Li (Eds.) Estimation and Tracking Principles,Techniques and Software 19932. Bar-Shalom Yaakov (Ed.) Multitarget-Multisensor Tracking Advanced Applications 19903. Bar-Shalom Yaakov (Ed.) Multitarget-Multisensor Tracking Applications and Advances Vol.2 19924. Bar-Shalom Yaakov William Dale Blair (Eds.) Multitarget-Multisensor Tracking:Applications and Advances Vol.3 20005. David L. Hall Mathematical Techniques in Multisensor Data Fusion6. Richard R. Brooks S.S. Iyengar Multi-sensor Fusion Fundamental Applications and Software Prentice Hall PTR 1998

This book is NOT what it promised.What the authors did that each wrote a chapter or two by collecting various kalman or Kalman H-infinity based filters from published work and then copied and pasted them. They latter collected the same way, performance equations (say from IEEE papers) and put them there. Matlab is not as integrated as the cover says. Actually you can find better programs by visiting mathworks official site or by googling.This is not a way to write a book. I expected that they will write a coherent book, which derives all results from first principles and shows how to then use them in systematic way to fuse various type of information. This is not the case. The book is collections of some equations with reference where equations were original derived in brackets (i.e. research publications) and nothing more. Every student has access to such equations on university networks (or even on Wikipedia). In fact it is collection of mostly "kalman filtering equations of various sorts" which are NOT even derived but each equations preceded by some reference from where the actual equation comes from. In fact the chapter on performance begins with numbered dot points and some simple equations given just as someone copied them and pasted them. There are no derivations of any important results. About matlab, there are only graphs of those equations.Simple fuzzy logic (i.e. only type-1 fuzzy logic) is presented in a plain way which is available everywhere. Nonetheless some readers may like the handbook type collections of some basic likelihood fusion type results mostly based on kalman filtering framework and this may

be useful for them (hence the three stars). It does not teach or help understand fundamentals of information fusion or how to apply in as far as stochastic filtering framework is concerned. For readers who would like to have a coherent mathematical book which covers a general theory of information fusion, the best reference is "Aggregation Functions: A Guide for Practitioners: Studies in Fuzziness and Soft Computing, Vol. 221" by "Gleb Beliakov". While the book is a bit expensive, it is also a systematic treatment of all what constitutes "information fusion" (perhaps with the exception of Stochastic Geometric approaches such as Random Finite Sets for which Mahler's book is an excellent choice). It does however cover other forms of "non-additive" measures for data fusion using Choquet and more general Sugeno integrals. On fuzzy logic I highly recommend book by Jerry M. Mendel which covers a systematic (with full easy to follow derivations and with full rigor) type-1 and type-2 fuzzy logic theory and applies it to various applications. It also provides access to full matlab programs which are regularly updated. It is by far the most readable and understandable book on fuzzy logic theory. The title of the book is "Uncertain Rule-Based Fuzzy Logic Systems". I learned a lot from it. So unless you want certain collections of some past results published in IEEE journal papers, buy some other book on Data Fusion. I have no bias against authors or anything and I sincerely wish, I had the choice to say more positive things on this book, but unfortunately this book is NOT a "Fundamentals of Information Fusion" but rather a modest collection of published results, that too just plainly stated throughout its chapters.

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