



Tracking and Data Fusion: A Handbook of Algorithms

By Yaakov Bar-Shalom, Peter K. Willett, Xin Tian

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This book, which is the revised version of the 1995 text **MULTITARGET-MULTISENSOR TRACKING: PRINCIPLES AND TECHNIQUES**, at double the length, is the most

comprehensive state of the art compilation of practical algorithms for the estimation of the states of targets in surveillance systems operating in a multitarget environment using data fusion.

This problem is characterized by measurement origin uncertainty, typical for low observables.

The tools for design of algorithms for the association of measurements and tracking are presented. Explicit consideration is given for measurements obtained from different sensors under realistic assumptions --- lack of synchronicity and different detection and accuracy characteristics. Several real-data examples are given to illustrate the techniques discussed.

The modeling accounts for target maneuvers, non-unity detection probability, false alarms, interference from other targets and the finite resolution capability of sensors. The problems of track initiation, maintenance and multisensor data fusion are considered. The optimization of certain signal processing parameters based on tracking performance is also discussed. The latest results on measurement extraction for unresolved targets, sensor management and data fusion are included.

Many of these techniques have applications to state estimation when using multiple sensors in control systems, autonomous vehicle navigation, robotics and wireless communication.

An extensive index is provided with all the indexed terms highlighted in the text for the convenience of the reader.

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Editorial Review

About the Author

Yaakov BarShalom

was born on May 11, 1941. He received the B.S. and M.S. degrees from the Technion, Israel Institute of Technology, in 1963 and 1967 and the Ph.D.

degree from Princeton University in 1970, all in electrical engineering.

From 1970 to 1976 he was with Systems Control, Inc., Palo Alto, California. Currently he is Board of Trustees Distinguished Professor in the Dept. of Electrical and Computer Engineering

and Marianne E. Klewin Professor in Engineering at the University of Connecticut. He is also Director of the ESP (Estimation and Signal Processing) Lab.

His current research interests are in estimation theory, target tracking and data fusion. He has published over 400 papers and book chapters in these areas and in stochastic adaptive control. He coauthored the monograph Tracking and Data Association

(Academic Press, 1988), the graduate texts Estimation and Tracking: Principles, Techniques

and Software (Artech House, 1993), Estimation with Applications to Tracking and Navigation:

Algorithms and Software for Information Extraction (Wiley, 2001), the advanced graduate texts

MultitargetMultisensor Tracking: Principles and Techniques (YBS Publishing, 1995), Tracking and Data Fusion (YBS Publishing, 2011),

and edited the books MultitargetMultisensor Tracking: Applications and Advances (Artech House, Vol. I, 1990; Vol. II, 1992; Vol. III, 2000).

He has been elected Fellow of IEEE for "contributions to the theory of stochastic systems and of multi target tracking". He has been consulting to numerous companies and government agencies, and originated the series of MultitargetMultisensor Tracking short courses offered via UCLA Extension, at Government Laboratories, private companies and overseas.

During 1976 and 1977 he served as Associate Editor of the IEEE Transactions on Automatic Control and from 1978 to 1981 as Associate Editor of Automatica. He was Program Chairman of the 1982 American Control Conference, General Chairman of the 1985 ACC, and CoChairman of the 1989 IEEE International Conference on Control and Applications. During 1983-87 he served as Chairman of the Conference Activities Board of the IEEE Control Systems Society and during 1987-89 was a member of the Board of Governors of the IEEE CSS. He was a member of the Board of Directors of the International Society of Information Fusion

(1999--2004) and served as General Chairman of FUSION 2000, President of ISIF in 2000 and 2002 and Vice President for Publications in 2004-11.

In 1987 he received the IEEE CSS Distinguished Member Award. Since 1995 he is a Distinguished

Lecturer of the IEEE AESS and has given numerous keynote addresses at major national and international conferences. He is corecipient of the M. Barry Carlton Award for the best paper in the IEEE Transactions on Aerospace and Electronic Systems in 1995 and 2000 and recipient of the 1998 University of Connecticut AAUP

Excellence Award for Research. In 2002 he received the J. Mignona Data Fusion Award from the DoD JDL Data Fusion Group. He is a member of the Connecticut Academy of Science and Engineering.

In 2008 he was awarded the IEEE Dennis J. Picard Medal for Radar Technologies and Applications.

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