



Tracking and Data Fusion

Dr Branko Ristic, *DSTO, Australia*
Dr Ba-Ngu Vo, *University of Melbourne, Australia*

Conference Centre
Technology Park Adelaide
Mawson Lakes SA

How to register

Please fill out the registration form overleaf if you wish to register for 1 or 2 courses and/or a field trip to the HFSW Radar site.

Presenter: Dr Branko Ristic

DSTO
Australia



Branko Ristic has been involved in R&D projects related to signal processing, estimation, tracking and data fusion for more than 20 years.

Dr. Ristic received all of his degrees in electrical engineering: PhD from QUT 1995, M.Sc. Belgrade University 1991, B.Eng. University of Novi Sad 1984. Since 1996, he has been with DSTO, where his role has been to lead, coordinate and participate in research on target tracking and multi-sensor fusion in support of various ADF projects. During his career he has published extensively, and given several invited talks in Europe, USA and Australia.

Guest Speaker: Dr Ba-Ngu Vo

The University of Melbourne
Australia



Dr Vo is a senior lecturer at the Department of Electrical and Electronic Engineering, the University of Melbourne. He received the B.Sc/B.E degree (with first class honours) and

Ph.D degree from Western Australia, in 1994 and 1997, respectively. His research interests are stochastic geometry, random sets, multi-target tracking, optimization and signal processing. Dr Vo played an important role in the development of the theory of target tracking using random sets and presented several invited talks and lectures on the subject.

Course Fees

- AU\$ 1122 (register by 1 May 2008)
- AU\$ 1320 (register by 25 Aug 2008)

20% discount will be given if registered for 2 courses during Radar Week

Student scholarships available, please enquire.

About

Tracking and Data Fusion

This two-day short course is based on the tutorial that was prepared with Dr Alfonso Farina (Scientific Director, SELEX, Italy). The course is a thorough overview of tracking and data fusion for surveillance systems with applications both to defense and civilian systems. Filters are the basic building block of radar defense systems that track targets, provide surveillance, avoid collisions, and guide flight. The most common type of filter is the Kalman filter (KF). For most applications the KF is reliable and efficient, but it is limited to a relatively restricted class of linear Gaussian problems. To solve problems beyond this restricted class, nonlinear filters (such as EKF, UKF, particle filter, IMM) are used. This course introduces the latest advances in nonlinear filters, data association techniques and tracking system designs and examines their application to ballistic missile tracking, GMTI tracking, tracking through the blind Doppler zone and others.

Target Audience

The course is prepared for engineers and scientists working in radar and sensor networks, computer vision and wireless applications.

Brief Course Outline

State estimation for stochastic dynamic systems: optimal Bayesian estimator, linear filters, nonlinear filters, hybrid state estimation, IMM filter, case studies.

Data association: gating, (global) nearest neighbour algorithm, (joint) probabilistic data association, multiple hypotheses tracking, multi-dimensional assignment, mixture reduction data association.

Tracking system design issues: management of track life stages (initialisation, termination), tracking coordinate systems, performance prediction and evaluation and electronic counter-counter measures.

Multiple sensor tracking and fusion: fusion architectures, information graphs, distributed fusion, track association and fusion, registration of multiple sensors.

Sensor management: the role of sensor management, optimisation criteria, look-ahead optimisation techniques, case studies.

Decision support systems: representation of uncertain attributes and knowledge, combination of evidence, evidential networks, local computation algorithms, applications to target ID and threat assessment.

Selected applications: ballistic missile tracking, GMTI radar tracking, angle-only tracking, tracking using TDoA measurements, track-before-detect, bi-static radar tracking, video tracking, wireless sensor networks.

Literature survey

Course Outcomes

The course will help to develop more accurate and reliable filter designs and more precisely predict these designs' performance.

Registration Form and Tax Invoice* ABN 62 102 206 173

*Upon completion of this form, including the relevant payment, this form will become a Tax Invoice.

Please register me for Tracking and Data Fusion on 10-11 September 2008.

PLEASE PRINT

Date: _____

Title: _____ First Name: _____ Surname: _____

Position: _____ Organisation/Division: _____

Postal Address: _____

Telephone No: _____ Facsimile No: _____ Email: _____

Dietary preference: _____

Course Fees: Early bird fee: AU\$1122 (incl. GST)
(Register before **May 1st, 2008.**) Full fee: AU\$1320 (incl. GST)
(Register before **Aug 25th, 2008.**)

Please also register me for:

One of the following Radar Week courses on 8-9 September 2008:

- Surveillance Radar Systems
- Signal Analysis Techniques: Time, Frequency, and Spatial Algorithms

Total fees for 2 courses: AU\$1795 (incl. GST)
(with 20% discount) (Before **May 1st, 2008.**) AU\$2112 (incl. GST)
(Before **Aug 25th, 2008.**)

- Radar Week Dinner (7:30pm, 9 September 2008). Cost: AU\$ 120 (incl. GST)
- Field trip to the HFSW Radar site (12 September 2008). Cost AU\$ 220 (incl. GST)

Total Amount: AU\$ _____

Method of Payment (please tick below):

- Cheque (payable to National ICT Australia Ltd)
Forward the cheque and a copy of THIS registration form to:
Anne-Marie Eliseo, Industry Education Manager, NICTA, SPRI Bld, Mawson Lakes Boulevard, Mawson Lakes SA 5095, Australia.

Credit Card: Credit Card No.: _____ Expiry Date: _____

Visa Master Card Name on card: _____

Amount: AU\$ _____ Signature: _____ Tick if receipt required

Email address of card holder: _____

Electronic Funds Transfer
Please advise by email to Annette Van Bramer
annette.vanbramer@nicta.com.au
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FAX the form to +61 - 8 - 8302 3115 or EMAIL it to industryeducation@nicta.com.au

Enquiries: Anne-Marie Eliseo, Industry Education Manager, ph: +61 8 8302 3928, email: industryeducation@nicta.com.au.

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