Fundamentals of Kalman Filtering — A Practical Approach

11-12 October 2010

Presenter: Mr Paul Zarchan

Technology Park Conference Cetnre, Mawson Lakes, SA

The course will be conducted from 9.00am to 5.00pm. Morning tea will be available at approximately 10.00am to 10.30am, lunch from 12.30pm to 1.30pm and afternoon tea at approximately 3.00pm to 3.30pm.

Registration Fee:
AU$1320 (including GST)

Group and PhD student discounts available. Please enquire.

For details of further courses please see our web site:
www.nicta.com.au/short_courses
or contact the NICTA Industry Education Manager.

About *Fundamentals of Kalman Filtering — A Practical Approach*

In this intensive **2-day** course a pragmatic and non intimidating approach is taken in showing participants how to build both linear and extended Kalman filters by using numerous simplified but non trivial examples. Sometimes mistakes are intentionally introduced in some filter designs in order to show what happens when a Kalman filter is not working properly. Design examples are approached in several different ways in order to show that filtering solutions are not unique and also to illustrate various design tradeoffs. The course is constructed so that participants with varied learning styles will find the courses practical approach to filter design to be both useful and refreshing.

Managers, scientists, mathematicians, engineers and programmers at all levels who work with or need to learn about Kalman filtering. No background in Kalman filtering is assumed. The heuristic arguments and numerous examples will give managers an appreciation for Kalman filtering so that they can interact effectively with specialists. Engineers and programmers will find the detailed course material and many source code listings invaluable for both learning and reference.

Brief Course Outline

Numerical Techniques: Presentation of required background for working with Kalman filters;

Method of Least Squares: How to build a batch processing least squares filter;

Recursive Least Squares Filtering: How to make batch processing least squares filter recursive;

Polynomial Kalman Filters: How to apply Kalman filtering and Riccati equations with several examples;

Kalman Filters in a Non Polynomial World: How polynomial Kalman filters perform when they are mismatched to real world;

Continuous Polynomial Kalman Filter: Examples of how continuous filters can be used to help understand discrete filters;

Extended Kalman Filtering: How to apply extended filtering and Riccati equations to a practical example; Showing what can go wrong with several different design approaches;

Drag and Falling Object: Designing two different extended filters for this problem;

Cannon Launched Projectile Tracking Problem: Developing extended filters in the Cartesian and polar coordinate systems and comparing performance; Comparing extended and linear Kalman filters in terms of performance and robustness;

Miscellaneous Topics: Detecting filter divergence in the real world and a practical illustration of inertial aiding.

About the Presenter

Mr Paul Zarchan has more than 40 years of experience designing, analyzing, and evaluating missile guidance systems. He has worked as Principal Engineer for Raytheon Missile Systems Division, has served as Senior Research Engineer with the Israel Ministry of Defense and was a Principal Member of the Technical Staff for C.S. Draper Laboratory. Mr. Zarchan is currently a Member of the Technical Staff at MIT Lincoln Laboratory and is working on problems related to missile defense.

About NICTA and Short Course Program

National ICT Australia (NICTA) is Australia's ICT Centre of Excellence and was established to drive innovation through high quality research, research training and technology transfer. As a world-class research institute NICTA uniquely combines excellence in research, education, commercialisation and collaboration. We are working to ensure that Australia is well placed to benefit from the significant opportunities that ICT research delivers.

NICTA is funded by the Australian Government as represented by the Department of Communications, Information Technology and the Arts and the Australian Research Council through *Backing Australia's Ability* and the ICT Centre of Excellence program. NICTA members are the Australian Capital Territory Government, the New South Wales Government, the University of New South Wales and the Australian National University.

NICTA short courses offer scientists, engineers and managers technical training with a leading edge in areas such as telecommunications, transport, security, defence, logistics, e-government, mining, finance and biotechnology.

There will be ample opportunities for discussion and questions and answers. Morning and afternoon tea/coffee and a light lunch will be provided. Extensive workshop materials will be made available to participants.

How to register

Please complete the registration form below and

- Fax it to +61 8 8343 8711 or
- Scan and email it to industryeducation@nicta.com.au.

Send the form as soon as possible to secure your place.

For further information please contact
Anne-Marie Eliseo
Industry Education Manager
Telephone: +61 8 8343 8710
Email: anne-marie.eliseo@nicta.com.au

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 Introduction to Fundamentals of Kalman Filtering — A Practical Approach on 11–12 October 2010.

PLEASE PRINT Date:

Title: First Name: Surname:

Position: Organisation/Division:

Postal Address:

Telephone No: Facsimile No: Email:

Dietary preference:

Course Fees: ☐ Full fee: AU$1320 (incl. GST)

Method of Payment (please tick)

☐ **Cheque** (payable to National ICT Australia Ltd))
Please 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
when payment is made

BANK	Commonwealth Bank of Australia
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