

RESUME: Thomas H. Kerr III, Ph.D. dba TeK Associates

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Secret DoD Clearance for 30+ years

PROFESSIONAL Over 35 years experience as a **systems engineer** in a variety of defense-related systems, being

EXPERIENCE: called upon to first **conceive of novel mathematical algorithms and prototype solutions to problems** posed by Department of Defense Navy and Air Force customers for various **Kalman filter** (optimal and sub-optimal estimation) applications in **Inertial Navigation**, and for using other nav aids such as NavSat, Global Positioning System (GPS), and in **radar target tracking** (after first **simulating its behavior to appropriately set parameters through rigorous trade-off analyses**). After conceiving of the solutions, he then **designed and implemented these ideas in software**, and ultimately tested them (using, first, standard unit tests, then integration tests, and, after any subsequent changes, invoking a sequence of regression tests specially tailored to confirm that no desired prior functionality had been clobbered by the latest changes). Prior to the 1990's, his prototype implementations were typically done in **FORTRAN 66/77** or in **IBM's PL/1** language and then later manually converted to **assembly language** (by others) for real-time implementation; however, now his initial implementations are in the higher level languages: **MatLab™ 6.5** and/or its **Simulink™ 5.0** adjunct (then afterwards he converts these prototypes using a **MatLab-to-C** compiler for cross-platform transportability). An alternative that he still frequently uses is implementation of parts of the solution in **Absoft™ 6.3** or **Digital Visual Fortran™ 90/95**. He usually uses **Microsoft Visual Basic™ 3.0-6.0** and **Access '97/2K** for implementing the Graphical user Interfaces (GUI) since VB's "App.Activate" and "shell" commands can be used to run other new or legacy software executables and *.bat files (and even run old legacy **DOS** files without any DOS screen appearing as a tip off to the end user). As an experienced consultant, he has been called in to **debug programs written by others** and to **write Software Requirement Specifications** in his specialty area. He also has experience writing **proposals** in response to Commerce Business Daily (CBD) and Small Business Innovation Research (SBIR) program solicitations. He is a **seasoned presenter** of findings, as personally prepared and conveyed via **PowerPoint™**. He has published 130+ peer-reviewed journal papers and company reports summarizing new and innovative results. He's a Senior Member of both IEEE and AIAA and is a 20+ year ION member (also 8 in MSDN).

2004 To Present

For TeK Associates: Further developed and refined software for TeK Associates primary product: TK-MIP™ as we convert from a pure service company to one offering a product.

- Served as Web Master in creating content for our Web Site: www.TeKAssociates.biz
- Wrote four technical papers in the estimation and Kalman filtering area as further advertising of our technical expertise in this same area as our software product. Two have already been accepted for publication, the other two are still under review. One has already appeared.
- Took course in National Instrument's **ATEasy™** in order to be able to use this to complete TK-MIP by enabling it to receive sensor measurement data from a variety of PC ports and using a variety of different protocols.
- Wrote TeK Associates' Business Plan. Will enter it into a Business Plan competition in 2006.

2003

For Arête Associates' Navy AROSS program, developed a Kalman filter-based covariance analysis program in MatLab™.

- Used covariance analysis program mentioned above to perform a quantitative analysis of the relative pointing accuracy provided by each of several alternative candidate INS platforms of varying quality (and cost) by using high quality GPS [P(Y)-code, differential, or kinematic] fixes at a high rate to enhance the INS with frequent updates to compensate for degradations incurred with time due to inherent gyro drift rate characteristic of each of several INS candidates being evaluated.

2002

For Boeing Company:

- Prepared a proposal (as specifically solicited) to improve the tracking filter used for NMD/GMD in the application below. Published two papers as an outgrowth of that work.

June 1999 To
October 2000

**Wrote specialty “tracking” segments of Software Requirements Spec.
for Updated Early Warning Radar (UEWR)**

**With a direct TeK Associates sub-contract from: Raytheon, Sudbury, MA
RADAR SYSYEM CONSULTANT specializing in Tracking Issues**

- Participated in the **development** (and **debug**), and **refinement** of parameters in the **implementation** and **test** of various candidate Extended Kalman Filters (EKF’s) for UEWR, as implemented in **Fortran** on several different UNIX platforms and targeted for eventual C/C++ implementation. Proto-types were first in **MatLab™ 5.3** and **Fortran** on PC for our experiments.
- Wrote an **M/S Word** memo “On use of Lambert algorithm versus use of Levenberg-Marquardt algorithm for EKF Track Initiation (TI)”.
- Participated in the writing (**M/S Word™**) of the **Software Requirements Specification** (SRS) for Raytheon’s Batch Least Squares (BLS) Algorithm, RVCC EKF, RUV EKF, Interactive Multiple Model (**IMM**) Filter, and **TI**.

December 1998
To May 1999

Performed System Analysis Studies of UEWR

**As a subcontractor to: XonTech, Inc. (Lexington, MA), the original LSI
RADAR SYSYEM CONSULTANT specializing in Tracking Issues**

- Exercised the same **CRLB** evaluator for gauging tracking accuracy that had been previously implemented below for MITRE, and applied it to XonTech’s more realistic **TD/SAT™** simulations and compared results to Extended Kalman Filter (EKF) results.
- Prepared and delivered **M/S PowerPoint™** presentation of the above results.
- Became familiar with parameter settings of XonTech’s **TD/SAT** and associated corresponding UEWR radar performance.
- Single-handedly wrote the 150 page UEWR Analysis Design Notebook on Tracking, summarizing the tracking behavior established to date for UEWR.

May 1997
to August 1998

Performed System Analysis Studies of UEWR

As a contract engineer to: MITRE (Bedford, MA)

RADAR SYSYEM CONSULTANT specializing in Tracking Issues

- Designed and developed a Cramer-Rao Lower Bound (**CRLB**) evaluator (an area of my prior published 1974 and 1989-’90 expertise) for gauging tracking accuracy and personally implemented this evaluation tool in **MatLab™ 4.2**.
- Documented the **CRLB** implementation and User instructions.
- Exercised this **CRLB** tool to **evaluate** expected performance of best possible tracking algorithms over a variety (40) of specified trajectories, as viewed by different Early Warning Radar locations and their respective characteristics.
- Wrote a TeK Associates’ final report (in **LaTeX**) and then as a MITRE final report (in **M/S Word**) summarizing the results of these **CRBL** evaluations.
- Wrote a White Paper (in **M/S Word**) for MITRE considering both **CRLB** and other aspects that affect tracking accuracy for UEWR.
- Wrote (in **LaTeX™**) and delivered a published peer-reviewed paper on all the above aspects at *AIAA Ballistic Missile Defense Organization (BMDO) Conference and Workshop* at Colorado Springs in August 1998.

October, 1992
To Present

Designed, Developed, Implemented, Tested, and Documented TK-MIP™

Client: Myself, doing business as (dba) TeK Associates

CEO/Chief Programmer/acting Advertising & Marketing Manager

- Design of comercial **TK-MIP™** software for the PC as a way to quickly and cost-effectively implement various Kalman filter design options as a prototype so that user avoids the need to do any programming whatsoever.
- Developed several closed-form test cases to Verify and Validate **TK-MIP™** and that can be similarly used for any other software of this type.
- Implemented **TK-MIP** Graphical User Interface (**GUI**) in **Visual Basic (VB) 3.0**, with other critical portions implemented in **VB 5.0** and **6.0** (so that they are truly compiled identically to output of **M/S VC/C++** for speed).

- Performed **unit and integration testing** of **TK-MIP™**. Performed thorough **regression tests** after every major change.
- Prepared two levels of selectable **on-line user guide** for **TK-MIP™** to prompt and support both the novice and experienced user.
- Did publicity and marketing: published successful applications in peer-reviewed professional IEEE, SPIE, AIAA, and Institute of Navigation journals (in GPS use for airborne image collection for mapping; for image enhancement and multi-sensor data fusion; for simplifying iterated EKF implementation). Had a total of 9 technical publications in 2001. Four in 2005. Used Microsoft Word and PCTex LaTeX to prepare these documents. Created my own artwork and graphics, as needed.

Feb. '71 to Aug. '92 Control Engineer, GE R&DC for 2 years; Member of Technical Staff: at TASC 6 years, at Intermetrics Inc. 6 yrs., at Lincoln Lab. 6 yrs., taught Optimal Control in the evenings for four years ('90-'95) in graduate ECE Dept. of NU. From '73 to '92, was exclusively in navigation (INS/Loran/GPS) and radar work for DoD for a variety of different platforms including SSBNs, CVs, SSNs, F-23 ATF (all in an R&D design and/or simulation and test capacity).

EDUCATION From '71-Present: has taken numerous (~80) Continuing Education Courses and Short Courses since his highest degree. **University of Iowa, Iowa City:**

- Ph.D. in E. E./Stochastic Control and Estimation Theory in February 1971.
- MSEE/Control Systems in February 1969.

Howard University, Washington, DC:

- BSEE (Magna cum Laude) /Electrical Engineering (solid state electronics) in June 1967.