Thomas Henderson Kerr III, 11 Paul Revere Rd, Lexington, MA 02421-6632.
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EDUCATION: Ph.D. in E. E./Stochastic Control and Estimation Theory; University of Iowa, Iowa City Feb.'71 3.96/4.00
MSEE/Control Systems; University of Iowa, Iowa City Feb.'69 3.91/4.00
BSEE (Magna cum Laude) /Electrical Engineering (solid state electronics) Howard University, Washington, DC; Jun. '67 3.65/4.00

EMPLOYMENT HISTORY:

TeK Associates	7/92-Present	Principal Engineer/Chief Programmer/Owner/CEO
(Northeastern University Graduate School of Engineering)	(1/90-6/95)	(taught Optimal Control in the evening)
Lincoln Laboratory of MIT	10/86-7/92	Member of Technical Staff
Intermetrics, Inc. [now L3]	11/79-8/86	Systems Engineer/Senior Analyst
The Analytic Sciences Corporation (TASC)	2/73-10/79	Member of the Technical Staff
General Electric (Corporate Research and Development Center, Schenectady, NY)	2/71-2/73	Control Engineer
University of Iowa	2/68-2/69	Research and Teaching Assistant
Howard University	1/67-8/67	Research Assistant

As an R&D engineer, he is a Senior Member of both the Institute of Electrical and Electronics Engineers (IEEE) and the American Institute of Aeronautics and Astronautics (AIAA), and has been a member of the Institute of Navigation (ION) since 1981. He has worked in the estimation area for over 30 years: first on DoD (Poseidon/Trident) submarine INS and on Air Force aircraft Navigation INS (failure detection and reconfiguration in Navigation systems within owncraft position and attitude determination); has some sonar/sonobuoy evaluation Independent Validation and Verification (IV&V) experience; has done Global Positioning System (GPS) integration Development Test and Evaluation (DT&E) in submarines and served as independent monitor of Magnavox and Rockwell International GPS receiver competition for NADC/NOSC and investigated use of GPS in novel applications as well. He has experience with NAVSAT and Navy JTIDS. He has also worked in strategic Radar target-tracking; and in some aspects of tactical and strategic Electronic Warfare (EW) pattern recognition applications. The common thread is that almost all of his previous experience was in Kalman filter signal processing or related estimation theory applications. Also see www.Google.com/profiles/KalmanFilterMaven.

As an algorithm and signal processing specialist, he generally focuses on system aspects related to optimal estimation and Kalman filtering and associated models, in particular, to requisite further processing of state estimates related to detection and tracking. He has more recently (within the last 10 years) joined SPIE, MAA, ASA, ACM, and Microsoft's Developer Network (level 2). He's a life member of ADPA/NSIA (now ADIA).

Experience in Navigation and Kalman Filtering:

For Arête Associates' Navy AROSS program in 2003, developed a Kalman filter-based covariance analysis program in MatLab™ and used it 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 INS candidate. For four years (1997-2001), participated in the development of the next generation Upgraded Early Warning Radar (UEWR) target tracking filters for National Missile Defense as a consultant, first, for The MITRE Corporation (via Gemini Industries '97-'98), then directly for XonTech ('98-'99), and, subsequently, directly for Raytheon ('99-'01). He has personally developed Cramer-Rao lower bound evaluation analysis and corresponding MatLab software for gauging nonlinear filter performance and has contributed on other tracking issues such as specifying and documenting

(preliminary PowerPoint presentations, then Software Requirements Specifications for) both Extended Kalman Filters and the Batch filter and wrote the tracking Notebook and other final reports and memos. As part of associated modeling considerations, he also investigated use of the Lambert algorithm versus Levenberg-Marquardt least squares fitting and variations thereof in determining when to include the second zonal harmonic of gravity to account for the oblateness of the earth and when it can be ignored for UEWR. He also gained experience with the Interactive Multiple Model (IMM) estimation approach.

For airborne data collection and navigation, specified a procedure for pre-flight mission planning and data patch preparation/grooming via INS/GPS waypoint insertion and retro-reflector pre-placement to designate anticipated swath row boundaries of sensor footprint and recommended additional use of colored balloons (and other special end-of-row markers) to signal aircraft to initiate 3 minute 180^{o} turns for back-sweep coverage of adjacent rows for parsimonious but adequate row overlap in multi-sensor data recording.

As a member of Group 53 at Lincoln Laboratory concerned with passive and active infrared target tracking and pattern recognition (e.g., distinguishing Howitzers from tanks and armored personnel carriers) and image processing, looked into aspects of parallel processing research for Kalman filters as well as into Neural Network (NN) theory and applications and in particular the opportunity for using Kalman filters to expedite NN learning in place of standard backpropagation. Group 53 had a flight facility for gathering IR measurement data and laser range data on targets in different geographical areas, at different altitudes, from different aspect angles, using alternative optical and radar sensors (for later ATR algorithm tuning by others). I applied my Kalman filter/navigation theory background to primarily perform investigation to recommend particular navaid use (type and frequency of fixes) out of candidate VOR/DME, GPS, or surveyed retro-reflector locations (as viewed from the onboard imaging equipment in real-time) to support tight accuracy goals in using the airborne LASERNAV II Inertial Navigation System (INS) during data collection missions of the test aircraft over Electronic Terrain Board data patches so that swaths of the down-looking sensor have sufficient location accuracy to avoid blatant gaps in measurement coverage but, conversely, don't overlap too much (thus avoiding overly redundant data recording). Specified a procedure for pre-flight mission planning and data patch preparation and grooming via INS/GPS waypoint insertion and retro-reflector pre-placement (to expedite later scene alignment) to designate anticipated swath row boundaries of sensor footprint and introduced use of colored balloons (and other special end-of-row markers) to signal aircraft to initiate 3 minute 180^{o} turns for backsweep coverage of adjacent rows

At Intermetrics Inc., pioneered failure detection/redundancy management/decentralized filter formulations as developed under Integrated Communications, Navigation, and Identification for Avionics (ICNIA) for the Advanced Tactical Fighter (ATF). Critiqued Kalman filter design and performance of early Magnavox version of Precise Integrated Navigation System (PINS), as was being developed for Minesweepers. Developed test plans, procedures, checklists, guidelines, and rationale for evaluating shipborne performance of four commercial SatNav receivers for Naval Ocean Systems Center (NOSC). Performed test and evaluation of GPS Phase II integration on attack submarine SSN701 *La Jolla* and the susceptibility of its BRA-34 antenna to detection by enemy surveillance in its use of GPS. Also worked on Navy JTIDS RelNav Kalman filters.

At TASC, worked on INS failure detection algorithms for C-3 Poseidon and C-4 Trident SSBNs. Also worked on computing best strategy of alternating usage of a variety of external navaids (e.g., Loran, Navsat, bathemetry) to minimize SSBN exposure to enemy surveillance while maintaining adequate NAV accuracy to support mission.