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Michael Kobold, P.E., Ph.D.

Education

Ph.D., Ocean Eng, Florida Atlantic U dissertation: Background Structure Functions, May 2024
Certificate, ASW, Naval Postgraduate School (Anti-Sub. Warfare) The Presidio, Jun 2011
M.S., Electrical Eng (optics, ATR, RF) Air Force Inst, of Tech,, WPAFB, Ohio, Sept. 2006
M.S., Physics (optics & Aero) University of Michigan, Ann Arbor, Michigan May 1994
B.S., Physics and Math University of Texas, Arlington, Magna Cum Laude Dec. 1984

Licensure

Professional Engineer (Mechanical Engineering). License Number 6201043854 (Michigan)

Clearance

Currently Secret. Top Secret information & granted access to sensitive compartmented information based on single scope background investigation completed 14Jan05. Debriefed to Secret 30Mar09.

Patents

US 9197822 Array Augmented Parallax Image Enhancement System & Method 24Nov15
US 9208386 Crowd State Characterization System and Method 8 December 2015
US 11431421 Caustic Expander & Local Waveguide to Improve Acoustic Comms 30aug22
US 11653125 Method [to Collect] Field-Based Data to Reduce Collected Data Error 16my23

Skills and Expertise

Automated Target Recognition, optics, sensors, EO/IR/LADAR/RADAR, Laser Vibrometry, **RF reflectarray & conventional antennas**, **adaptive** optics, *image processing* **through turbulence**, hydrodynamics, hull fouling analysis, and expression of proteins. *Underwater Acoustic* ***communication***, and *adaptive* acoustic comms; parallel processing of ATR and simulation; structural analysis, impact, sonic fatigue, dynamics, acoustics; Matlab, LaTeX, MathCad, Mathematica, and only commercially used structural codes such as NASTRAN, Patran, I-DEAS, old ABAQUS, and DYNA. [Interest in & some work with: xMidas, OPNET, nn, LabView, vxWorks, FPGA's, LEEDR, ANCHOR & HELEEOS].

Work Experience

Aug. 2009 – present US Navy civil service optics scientist & structural vibration engineer
NSWC PCD Code S-32 Panama City, Florida



Visited this 30 W laser communications demo in 2013 at the Kennedy Space Center small one mile range for the Center for Research in Electro-Optics and Lasers (CREOL) in Orlando. This Booze-Allen H. (BAH) test was run by colleagues Dr. Pedro Encarnación and Dr. Keith Blanks. The facilities are now with the Center for Directed Energy.



Equipment in "fish" like these provided data for acoustic communications analysis and wavefront propagation studies in conjunction with measurements from casts of sound speed profile instruments leading to the dissertation.

Optical and microwave, classical and metasurface antenna modulation. Remote classification of seabed sediment. Radiolocation and Complex Ambiguity Functions for Precision Time and Navigation. Laser vibrometry and other sensors for seismic responses. Automated target recognition (ATR). Underwater (UW) acoustic communications (aComms) to estimate range and throughput through naturally inhomogeneous sound speed profile (SSPs statistics using tech from atmosphere-based optical comms that is part of MODTRAN, LEEDR or HELEEOS for UW acoustic communication. Produced structure functions and acoustic coherence widths for aComms forecasting and other results, showed the relationship of the latter to coherence break-up range. Showed why *randomized* SSPs can over-estimate range compared to natural tidal variations. See dissertation. ATR using polarimeters, UV, IR and EO and target recognition using FX imaging – success recognizing aged buried objects. Synthetic aperture sonar beamforming. Signal processing applications included shader functions related to persistent surveillance and plenoptic depth of field issues. Technical reports include atmospheric imaging at low height for shallow depression angle laser vibrometry of the ground, simulation of soil vibration above buried objects, and seismic spectral-based attenuation calculations based on geophysics methods – the use of the log of ratios of PSD's with respect to wavespeed and range differences. Signal-processing related to laser line scan to image further into seawater. Systems engineering on an instance of Bluefin-type sensor systems. Passive and semi-active sensing of vibration to remotely recognize containers. Showed target spectral elimination in laser vibrometry is not a problem for ID of vibration modes of manufactured (realistic) vehicles. Produced tool for hydrodynamics of simulated biological coatings. Sensor window material: Raman frequencies and atomic mode shapes for impurities of sintered/HIP'd powered sensor windows, and electron affinities.

April 2009 – July 2009 UCF CREOL OSE 6525 & sabbatical: Optical & Quantum Coherence
Univ. of Central Florida, Center for Research in Electro-Optics and Lasers Orlando, FL
Working from a Mandel & Wolf textbook, gratis work included passive assist to the BAH Laser effort.

June 2008 – Mar 2009 BAE Systems - Technology Solutions & Services (AFTAC)
Remote Sensing Research, Modelling & Simulation, Data Analysis PAFB, FL
DSP engineer for multidisciplinary signal processing at PAFB/AFTAC; Liaison for South American installations; Generated two BAE technical papers for crowd statistical mechanics / remote sensing and optical communication research.

Publications listed on third page.

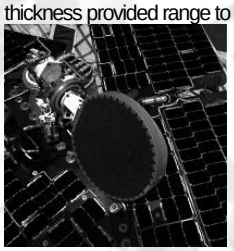
Navy patent 9208386 uses enthalpy-entropy states measured from crowd data collected at AFRL for UAV surveillance studies.

Work on the Airborne Laser during classes at the Air Force Institute of Technology led to the technology used for the 2024 dissertation in Ocean Engineering.

2001 – June 2008 General Dynamics – Advanced Info. Systems (USAF/NASIC, AFRL/SN)
Remote Sensing Research, Modelling & Simulation, CID systems WPAFB, Ohio

RF signal processing (ambiguity), radar, EO, IR, & laser return phenomenology; GPS transmission 4π sr patterns; AFOSR remotely sensed vehicle dynamics; DARPA IXO SASO SPEYES acoustics, statistical mechanics of vibration signatures & crowd behavior using prior to Navy work on entropy that led to patent 9208386; Cooperative ID integration; Vehicle Intent analysis using remote sensing & structural dynamics; Radiometry for anti-aircraft missile plume threat warning analysis using *Matlab*; Multi-spectral, optical flow, & spectrum assessments, IR calibration; Image processing algorithms, SIMD parallel processing, Requirements Eng. Algorithms: Workflow, wireless communications simulation (Matlab based on OPNET), Warfare Modeling & Simulation software development, ATR; MASINT Sys. Engineering – Space-Based Infrared System, NASIC (subcontracted to Ball Aerospace and Technologies Corp.); Acoustic and Laser cross-spectral covariance for target ID and acoustic time lags. Research involves alternative hardware and algorithms**.**

High-Gain Antenna (HGA) Gimbal verification on the Mars Explorer Rovers Spirit & Opportunity. This HGA is a patch element antenna whose thickness provided range to Earth.



2000 - 2001 Ball Aerospace & Technologies Corp.
Senior Structural Engineer Boulder, Colorado

NASA satellite imaging programs, NPOESS and JPL's Mars Explorer Rover (MER photo is the watermark of this résumé). SDRC I-DEAS simulation, including random vibration, MSC/NASTRAN and Matlab, Satellite instruments space physics and optics. The reflectarray High Gain Antenna Gimbal (HGAG) worked well for both Spirit and Opportunity. Program Manager Satish A. Krishnan (now at Raytheon) and JVacchio at jpl.nasa.gov. NPOESS SESS magnetometer and Langmuir probe Space Physics, system analysis; National Polar-orbiting Operational Environmental Satellite System (NPOESS) Cross-tracking infrared sounder (CrIS) Vibration, MER HGAG 60g landing shock validation.

1997 - 2000 Northrop Grumman Corporation (Joint STARS)
Senior Structural Engineer Melbourne, Florida

USAF Joint STARS. Stress, Sonic Fatigue analysis (NASTRAN, PATRAN, "C", UNIX shell post-processors for NASTRAN, MathCad, Matlab). SGI IRIX, Shell scripts for Finite Element Analysis Systems integration; aerodynamic effects including sonic fatigue, vibration, noise; Stress, design changes, BOLD, FEA, corrosion, damage tolerance, crack propagation; Familiar with FAA procedures, military specs, Boeing stress reports, SEI4, Configuration Management (CM) system maintenance; Radar Systems software, problem tracking, metrics; BCWP, ACWP, effects on earned value, CM – build process issues; Joint STARS class library definition and build process documentation (CM); Conformal load-bearing RF, radiation patterns, selection, and location of slot antenna.

Structural, radio, and radar work on Joint STARS antenna integration into the E-8C.



1985 – 1997 General Motors Corporation (GM Truck)
Senior Structural Analyst Pontiac, Michigan

Stress, Vibration and Noise Lead Structural Analyst for NASTRAN FEA for Delphi on GM Corporate structural analysis and acoustics committees, I-DEAS, PATRAN, "C", UNIX, MSC/NASTRAN, HKS/ABAQUS, LST/DYNA, Comet/Acoustics, calculations per Roark. Simulation, structural analysis, hiring, supervision, mostly nonlinear analysis, acoustics analysis test (B&K) and boundary element analysis for acoustics, hand calculations, optimization, design sensitivity, mfg. design direction, Crash-worthiness, occupant simulation, side-impact air bag deployment door, CAE integration. Structural modification of body-in-white for mobility targets (noise and vibration); Suspension component FE modeling and analysis, UNIX, "C", NASTRAN. FROM 1986 TO 1990: Engineering Systems Engineer, Electronic Data Systems (division of GM), Engineering Analysis Support. Program Management, $5M P&L, computer (NASTRAN, FEM, storage). Doubled goals by mid-year; services for GM design groups on a contractual basis; I-DEAS; MSC/NASTRAN Structural analysis support: FEA, FEM, and consulting; Automated Electrical Engineering Systems, welding transformer, kick-less cable selection; Image processing coding for Automated Intelligence P5000 inspection system**.**

1990 – 1991 (between GM assignments) Computer Sciences Corp., Falls Church, VA
Structural Analyst/Supercomputer Consultant Warren, Michigan

Technology Assessment for Army engineering applications at the US Army Tank Automotive Research, Development and Engineering Center (TARDEC), Warren Michigan, using Cray2 and Connection Machine technology (UNIX, "C", FORTRAN90, PATRAN ABAQUS, internal Army code for metal fatigue, DADS multi-body, UNICOS, calculations per Roark); UNIX/FEA services: M1A2, Track and Chassis Group, ABAQUS stress and dynamics; Thermal (CO_2 laser) photo-acoustic imaging theory and simulation.