

Career Portfolio
For
Peter G. Raeth

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Cover Letter

7 November 2011

Thank you for this opportunity to write to you about my potential for assisting a career guidance organization, and my value to those who seek to explore and pursue career options.

Since 1974, when I completed my first consulting assignment, I have been building a career in computer engineering. I am completing that career by acting as a senior research engineer in computational science. My background includes 21.5 years military service as a computer research scientist, R&D manager, personnel supervisor, and branch chief.

After teaching for five years as an adjunct I have come to realize that there is a lot I have to offer to people who want to get on a good career track. While I could enter full retirement having solved a few more technical problems, the question remains, "If people with long and successful career experience do not offer to guide those who are struggling to find a productive path for themselves, who will?"

To that end, I began my entry into career guidance with the CareerMentor website, <http://InformationAnthology.net/CareerMentor>. This website offers my own and others' insights drawn from experience. This website led to opportunities to give talks in local schools. An employer even paid me to give the talk at the Rochester Institute of Technology. Ultimately, the website led to an invitation from a non-profit based in Harare, the capital of Zimbabwe Africa (The Greatness Factory Trust) to give a series of talks at their career guidance conference.

Wanting to expand my view of career guidance, I am completing a course in Career Development Facilitation. When the course is over, I will apply for the Global certification (GCDF) since my existing background covers the necessary education and experiences.

How might I aid a career guidance organization? The areas of activity include assisting at events; team formation and leadership; talks on career reality and job hunting; selecting and giving career assessments. An example of my work is found in the mobile career center concept briefing I prepared for the CDF course. This briefing includes considerable detail, including a cost estimate, floor plan, and use options. The most important attributes I offer are creativity, intuition, determination, and ability to learn. I am the kind of person you come to when you are serious about getting something accomplished.

I would very much enjoy meeting with you to discuss the thrust of your organization and how I might contribute.

Best Regards,

Peter G. Raeth, Ph.D.
Senior Research Engineer

Resume

Summary

Peter G. Raeth, Ph.D.

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Beavercreek Ohio 45431-4115

peter_raeth@ameritech.net
<http://InformationAnthology.net/CareerMentor>

Career Development Facilitator

Program Manager * Team Leader * Speaker * Content Developer * Author * Automation Expert

**Creative, Intuitive, Determined Leader - Decades of professional and mentoring experience.
A person you call on when you are serious about getting something accomplished.**

Goal-Driven Professional with experience and achievements in multiple domains spanning 35 years. Highly-Focused person who consistently takes on new projects and tasks from scratch to achieve success. Mentor and team leader who knows how to organize and guide group efforts, and to assist individuals to grow. Published Author and content developer. Speaker who exposes career reality while showing people how to get on a good career track. Event sponsors consistently say, "You told them what they needed to hear."

Ph.D. in computer science. Several program management certifications. Currently working on certification as a Global Career Development Facilitator. Conference speaker. Transitioning technical experience into career development domain via active web programming to assist job hunters. Book editor and contributing author. Video editor. Brings content to publication. Concept development, exploration, and exposition. Team Leader. Someone who gets things done and reaches important goals.

Core Capabilities

<ul style="list-style-type: none">• Program Manager• Speaker• Author and Content Developer• Seminar and Conference Presentations	<ul style="list-style-type: none">• Team Leader• Process Automation Specialist• Content Development and Publication• Teacher, Mentor, Enabler, Facilitator
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Relevant Professional Experience

2011 – Present: Member of the Board, The Greatness Factory Trust, a career-development non-profit based in Harare, the capital of Zimbabwe Africa. Mentor to volunteers, productization of Trust’s writings and videos.

2008 – Present: CareerMentor Website (<http://InformationAnthology.net/CareerMentor>). Host, Content Developer, Webmaster.

2002 – 2008: Adjunct faculty. University of Phoenix and (2008) Sinclair Community College.

1997 – Present: Research engineer. Experience in team formation and leadership. Mentor to interns and younger employees. Success guide during open-ended industrial research and development.

1979 – 1997: Officer USAF. Experience in program management, supervision, leadership, research and development management. Mentor to younger officers, enlisted, civilians.

1977 – Present: Author and Editor. Publication in peer-reviewed literature, conference and seminar presentations, concept development and exposition, talks on career development and conducting R&D.

References

Name of Reference:	Email Address:	Phone Number:
Mr. Gary Whitted	gwhitted@ball.com	937-429-5005
Title:	Type of Reference:	Number of Years Known:
Program Manager	Professional	5
How do you know this reference?:		
<p>He and I worked closely together during my time with Ball Corp. He provided program manager services to R&D projects for which I was PI. I also assisted, on occasion, in the technical aspects of his other projects.</p>		

Name of Reference:	Email Address:	Phone Number:
Dr. John Malas	john.malas@wpafb.af.mil	937-798-8215
Title:	Type of Reference:	Number of Years Known:
Research Scientist	Professional	1.5
How do you know this reference?:		
<p>As a member of his project team, I provide computational design and software evolution for high-performance machines.</p>		

Name of Reference:	Email Address:	Phone Number:
Mr. Rabison Shumba	rabison@rabisonshumba.com	263914-1622920, 263912-405799
Title:	Type of Reference:	Number of Years Known:
CEO - Greatness Factory Trust	Professional	2
How do you know this reference?:		
<p>He and I are both concerned with helping to raise the next generation of professionals. We carry on a ongoing conversation relative to his work in Zimbabwe Africa. I provided a detailed review of his three books and accepted his invitation to give a series of talks at a conference he hosted. He has helped me to become educated on the issues impacting career development in his country.</p>		

Quotes

Sean McGhee, Contract Engineer, Army Research Laboratory, sean.m.mcgee.ctr@mail.mil

"Dr. Raeth is doing exemplary work on this project. The project has to be performed by a distributed team, the members of which do not have access to all hardware platforms. This is certainly not an ideal situation. Yet, Dr. Raeth has applied sound reasoning and objective thinking to solve numerous technical problems on both the HPC systems and our mobile robots".

Dr. John Malas, US Air Force civilian researcher, Air Force Research Laboratory, John.Malas@wpafb.af.mil

"Peter, the effort is going very well. I am very pleased with your contributions to date and appreciate your support. The computational side of the research we are involved with is absolutely critical to the success of the effort."

Michael Doukas, Senior Operations Research Analyst, US Air Force, <http://www.linkedin.com/in/michaeldoukas>

It was my privilege to have Peter Raeth work for me on a number of projects in support of the Air Force and Navy missions. As an Air Force officer he was outstanding. He showed complete loyalty to me and the clients we were servicing under interagency agreements. He was open-minded to possible solutions and ever ready to be helpful in whatever role he was called upon to fill. His computer and engineering background made him a valuable asset to my project team and in leading his own teams.

Gary Crossley, Student, Hanahan, studied with Peter at Hanahan, <http://www.linkedin.com/pub/gary-crossley/10/41/205>

Peter and I were students together at Hanahan High School in the late 1960's. His "Building Your Career" website is full of practical advice and suggestions on how to succeed in the workplace. It is ironic that each of us have migrated to a love of career information. Peter's love of his avocation and occupation is a testimony to his career success!

Dr. George Mikulski, Adjunct Professor, University of Maryland University College, studied with Peter at Nova Southeastern University, <http://www.linkedin.com/in/gmikulski>

I studied for several years with Dr Raeth. He was a leader and encouraged us to publish and to do well.

Technical Activities

Summary

Dr. Peter G. Raeth is a senior staff scientist. He joined High-Performance Technologies, Inc on 12 Oct 09 and is assigned to the signal and image processing group at the supercomputing center at Wright-Patterson AFB Ohio. Dr. Raeth has a wide background that includes sensor data exploitation, computing technology for throughput improvement, machine learning, adaptive automation, machine vision, and anomaly detection in datastreams. He also has experience in modeling, simulation, and passive radar signal identification, cockpit decision aids, computer performance analysis, and datastream analysis. He has gained additional experience in blackbox software test planning, signal analysis, pattern recognition, sensor and data fusion, parallel/distributed/cluster processing, and client/server processing. His experience includes 17 years as an officer, computer research scientist and scientific analyst, United States Air Force (out of 21.5 years active military service). This includes 5 years in industrially funded organizations. He received a BS in Electrical Engineering from the University of South Carolina and an MS in Computer Engineering from the Air Force Institute of Technology. A doctorate in computer science was awarded by Nova Southeastern University. He completed an Air Force career in 1997. Besides staff billets at Headquarters Air Force Systems Command and Air Force Materiel Command, his assignments included duties in Electronic Warfare flight test support (3246th Test Wing), radar signal passive identification (Sensors Directorate, Air Force Research Laboratory), and pilot decision aids (Flight Dynamics Directorate, Air Force Research Laboratory). Just after leaving the service, Dr. Raeth worked with Simulation Technologies, Inc performing duties in distributed simulation, distributed processing, and software blackbox testing. He has given lectures and published articles, papers, and reports on adaptive automation since 1977. He is editor and a contributing author of the book, "Expert Systems: A Software Methodology for Modern Applications", published by the IEEE Computer Society in 1990. In 1991 he was awarded a research fellowship in neural networks at the University of Dayton Research Institute. In 2000 he was awarded third-place in the National Aerospace and Electronics Conference best-paper competition. In 2001 he received Ball Corporation's top award, the Award of Excellence. He maintains a website on career development in an effort to help raise the next generation. Dr. Raeth is a member of the electrical engineering honor societies Tau Beta Pi and Eta Kappa Nu, and the community service honor society Omicron Delta Kappa. He has twice won the Armed Forces Communications and Electronics Association's gold medal. His web site on adaptive automation was selected in 1998 as a Science Site of the Week by the National Academy Press. He is a lay minister at his church and enjoys trap, skeet, and sporting clays. His reading and movie pleasure is science fiction. Dr. Raeth holds a current DoD TopSecret clearance. His SCI could be easily reactivated.

Details

From 10/09 to present High Performance Technologies, Inc, Senior Staff Scientist

Provides expertise in computational throughput improvement. Specializes in signal and image processing (SIP) domain. Enables computation on large volumes of data.

Evolved and implemented open-source software for parallel Matlab programming. Installed on several HPC systems in DoD's network. Assists users who want to improve throughput for Matlab codes. Activity started as a technology demonstration and built a growing user community. Single-process code analysis alone provides up to 50% throughput improvement. Process partitioning carries this even further.

Developed means of initiating HPC data processing from active data sources located remotely. This continuous data flow between data generators and HPC processing has opened the doors to a huge latent user population.

Works cross-domain to provide computing expertise to users outside SIP. Works hand-in-glove with domain experts to ensure accurate representation of theory for computer implementation.

Conducts outreach activity that draws new users to the HC community. Creates technology demonstrations that illustrate the power of HPC. Technology push activities are tightly focused on users needs and provides results in terms of users' domains.

Acts as the Matlab technical contact for all DoD HPC DSRCs.

Developed means of creating, managing, and operating on matrices whose memory span more than one node. Integrated this capability into customer codes.

From 01/98 to 10/09 Ball Aerospace & Technologies Corp., Senior Research Engineer

Provided algorithm and heuristic design, and technology development / insertion expertise to sensor data exploitation projects. Acted as company's subject matter expert for practical applications in adaptive automation and parallel/distributed/cluster processing technologies. His accomplishments include:

- Led IR&D team that merged machine vision with spectral analysis. Project funded at \$285K. Project produced the following:

- true-color representations of spectral scenes having appropriate wavelength data
 - color analysis
 - texture analysis
 - object identification
 - size analysis
- team also made advances in other areas
 - image resolution
 - sub-pixel detection
 - atmospheric correction
- Oriented all work toward automated workflow resulting in a smooth transition of theory to production reality via standard analysis-tool plug-ins.
- End result mitigated level of human data visualization required.
- All methods fully automated while allowing for human supervision and interaction.
- Made use of spectral information that is typically ignored within traditional workflows.
- Performed non-typical calculations on spectral data from machine vision perspective.

New business was established through his initiatives.

- After hearing of a potential customer's throughput issues with MatLab/Simulink radar models, he leveraged his R&D results to illustrate a solution path.
- Total project funding was \$250K.
- Met customer's strict solution requirements in classified environment.
- Wrote programs that write Simulink models to facilitate model partitioning.
- Led team of technical experts in radar modeling and computer programming.
- Rigorous approach ensured quality solutions and customer confidence.

Established funded IR&D program to expand sensor data analysis throughput.

- received funding of \$265K in first year, \$200K in second year
- demonstrated 18x speedup on 20 node cluster
- led kick-start documentation team for corporate remote-access cluster
- built local cluster at zero capital outlay from surplus equipment
 - two companies paid for remote-access to this cluster
 - also used for internal R&D projects
- led applications team that demonstrated sensor data analyses on cluster systems
- worked with established funded programs to improve their computing capabilities
- maintained Windows/Linux portability of all cluster software
- developed interface for readily connecting legacy code to cluster systems
- team achieved up to 94% runtime reductions in sensor data analysis throughput
- moved company from strategic analysis to tactical analysis time frames
- opened doors for network computing reliability, availability, and continuity
- expanded cluster concepts to improve cost and operational efficiency

- looked beyond workstation hardware to other commodity computing equipment
- enabled product offerings regardless of space/size/speed requirements
- developed cluster processing methods for IDL and MatLab 5th generation languages

Member of IR&D proposal review team.

- provided input on all IR&D proposals
- member, mentor, or PI on several IR&D projects
- assisted in transitioning new computing technology to other operational locations
- worked closely with business development and proposal teams in local and other operations to provide technical input and concept development

Much sought-after resource for developing and transitioning computational methods to operational use.

- expert at converting Windows-centric code for Unix/Linux builds
- developed common adaptor plug-in that allows easy insertion of third-party analysis methods into premier analysis tool
- became an essential resource in recovery from third-party software issues. For example: Two projects were delivered to in non-functional condition after one year of third-party work. Starting essentially from scratch, needed only one month each to bring the projects to closure. Another project was delivered to us in a non-functional condition after three months third-party work, recovered that project in one week.
- Worked closely with third-party developers to identify and correct errors in their code that manifested themselves when their code was integrated with operational tools. This greatly smoothed the integration of new code with primary sensor data analysis tool and facilitated the quick creation of new analysis capability.
- Research and development of a new adaptive method for finding unspecified anomalies in unspecified data streams.
- produced several successful demonstrations with voice, video, and infrared data
- met or exceeded detection accuracy of company's standard anomaly detection model, the company's model is based on deep physics knowledge yet his model knows nothing except the incoming data values
- published several peer-reviewed papers and one dissertation
- formed a small team of people within the company to evolve and promote this technology for practical defense and commercial application, this team engages technical, marketing, presentation, and business specialists

Designed and deployed workbench for evaluating material identification accuracy and reliability.

- combined identification methods with material placement masks to provide statistical reports on detection accuracy and operational reliability
- three other projects adopted this workbench for their own purposes
- working with experts in the theory of spectral analysis, helped to establish a fully-automated means of developing material-detection signatures. Continued to improve this method. While needing only 20 minutes of computer time, the method approached the capability of manually developed signatures that each took months to develop.

Research and development of a method for matching unknown spectra to a database of known material signatures.

- includes the generation of taxonomic classification signatures based on laboratory spectra, allowed company to unify individual spectral samples of the same material
- transitioned earlier work in signal classification and database search
- produced a detailed technical report and published a peer-reviewed paper
- Drawing on results from his doctoral research, developed and implemented means of automatically developing wavelength-acceptance thresholds. Threshold is based on the number of spectral features appearing in a wavelength histogram bin (a module also written by himself). Enables automated elimination of wavelength ranges within which features are accepted. This time-saving innovation has proven to be a good enabler to development of baseline signatures for material identification and classification.

Demonstrated convincingly that the company is a major contributor to the customer via software reuse. Showed that the company achieves results in this area that are beyond industry standards. The exposition was very objective, making use of the customer's standard software cost model and the company's cost evaluation process.

- developed a briefing on this topic and posted it on the company intranet
- made his reusable modules available to the general company community
- a module of his was used by four different projects for a cost savings of \$160,000
- other uses of his code saved the customer an additional \$95,000
- a team he led saved another project \$208,000
- successfully converted the company's legacy atmospheric correction code to PC-Windows computers; required the joining of Fortran, C, DOS batch scripts, external executables, and Visual C++; essential was his ability to work with many diverse people in the computer and analyst communities
- designed and implemented corrections to legacy anomaly detection code; released 80mb of online memory with no increase in disk utilization or execution time, this represents 16% of the total online memory available

Worked successfully hand-in-glove with one of our most active and important customers. In this assignment he received extremely brief verbal requirements and was expected to perform all other activities from design through implementation and test. This rapid prototyping cycle repeated itself continuously. His results were very successful and enabled the customer to introduce many new spectral analysis capabilities. This has resulted in that customer inviting him to join a government/contractor technology development and insertion team that is researched and transitioning new spectral analysis capability for day-to-day intelligence production.

Made transition of third-party code to standard analysis tools a routine activity. It did not matter what language the code was written in, nor the coding style. New code was readily and quickly adapted. A case that illustrates the value of this accomplishment is a sudden operational need identified by the customer that involved four blocks of code that had to be made to work with their main-line tool. Three blocks of code were finished in a matter of hours. The fourth block took longer because it involved a reconfiguration of the customer's equipment. In all, less than a man-week was absorbed in the transition.

Showed the value of adaptive material classification techniques during an assessment of the utility of data from the Hyperion sensor. The customer was able to identify regions of interest or spectra of unknown classification. His classification tool works automatically, without human interaction, and delivers highly accurate classifications. This enables the process of putting a name on material that stands out as an anomaly in the scene or for areas of interest highlighted by the analyst. Combined with his hierarchical reasoning tool, company was able to deliver classifications at various levels of detail, from man-made/natural through specific materials.

Prepared and presented a briefing on the tools developed by the spectral R&D group over the last six years. Showed convincingly that there is a definite relationship between the tools themselves and between the tools and the customer's operational requirements. This briefing clearly showed the value of the work that groups has been doing and was a good step in our efforts to grow that group.

- Supported urgent operational missions to analyze infrared collects. Quickly transitioned R&D tools that are specifically requested by the analysis team.
- Assisted junior government programmer in creating a spectra data ingest tool for operational image analysts. Saw what the programmer was trying to accomplish and prepared a standard version of code already written that the programmer could easily integrate with his own code. Saved that project several weeks of work and helped to bring an important data preparation and management tool online far more quickly than would have been possible otherwise.
- Very objective when reviewing his own work in the error tracking process. Takes a highly conservative approach that ties the error to its source in a provable way. This gave company great confidence when told an error is due to customer or subcontractor results. For example: debugged a very subtle error in the customer's code that was

preventing it from being used in other than stand-alone applications. Traced the error to the physics assumptions made prior to the code being written. Designed and implemented a fix. The result was code that is highly reliable regardless of the data it is running or the circumstances under which it is being used.

- To facilitate algorithm testing, developed and implemented an automated process for generating like signatures from a baseline signature. The user interface offers several parameter settings that determine the number of signatures and type of signature modifications to be made. This module has greatly decreased the time needed to implement a test design.

Drawing from the published literature, established break-through technology for detecting and measuring bit-streams buried deep in noise.

Offered keen support to new technical people hired by Ball. Very familiar with resources within the company and via external sources. Proactive insights helped several people get the projects up and running quickly. A good example is a requirement to perform computational fluid dynamics, a very processing-intensive activity. Saved the customer considerable funds over purchasing appropriate computing hardware, and months of project schedule, by recommending the use of the local high-performance shared-resource computer facility maintained by Wright-Patterson AFB. That facility not only has the required computers but also has appropriate software.

As last assignment with company, laid groundwork for their entry into innovative cyber network defense work in network traffic anomaly detection. Thrust was based on DARPA's research results and their identification of capability gaps.

From 02/97 to 12/97 Simulation Technologies, Inc.

Technical Project Leader

During this brief assignment, I was involved in three major areas:

- High Level Architecture (HLA) distributed simulation
- Distributed and parallel computing
- Blackbox software testing

Had the following results:

High Level Architecture

- Prepared a formal HLA object model of the company's Integrated Unit Simulation System (IUSS), a very large simulation of the individual soldier and small-unit combat. This task was completed one month ahead of schedule.
- Implemented the HLA Run-Time Infrastructure (RTI) for PC-NT computers. The RTI is a

software backbone that enables a common LAN of PCs or Unix machines to play in an HLA distributed simulation.

- Developed and conducted two basic HLA demonstrations
 - One demonstration was of two countries building up weapons stockpiles. The country with the larger stockpile would attack the country with the smaller stockpile when the smaller stockpile grew to within a given range of the larger stockpile. The software simulating each country ran on its own computer.
 - The other demonstration was of a wing operations center. The wing's console was driven by information provided by its various airbases. Each airbase model was initialized by its own database and ran on its own computer.
 - Both demonstrations were tolerant of individual participant computers crashing and being restarted. They also employed a combination of DOS and Windows consoles.
- Developed automated process for directly translating the simulation object model into the .fed file required by the RTI. This success was expanded by his brief white paper that proposed the development of an automated process that would directly translate the simulation object model into the overhead computer code required by the RTI.

Distributed and Parallel Computing

- This area of activity enabled the company to add processing horsepower to its individual simulations without additional capital expenditure for hardware. By employing the Parallel Virtual Machines (PVM) software backbone, Unix, PC-95, and PC-NT computers on a common LAN can be made to look like a single multi-processor computer.

Blackbox Software Testing

- Developed and applied formal blackbox testing methods on a large ground combat simulation that had never been through any kind of formal software testing. This type of testing examines a software product through the user interface. Whitebox testing works at the code level.
- Developed the testing process from scratch to include test planning in the following areas: policy, installation, documentation, new functionality, limited system test, and full system test. These documented plans were given their first trial during actual beta testing for a major release. An iterative process served to ensure their continual improvement. The result was a test process that ensured formality without being overly restrictive or expensive.
- Prepared a short briefing and bibliography to inform the programming team on the test development process.
- A final benefit of this task was the development of a project set that served as a baseline for regression testing.

Military Service

This summary covers the years as an officer. Originally, I started as an enlisted person at age 18.

**From 10/92 to 3/97 Flight Dynamics Directorate, AFRL Laboratory
Chief, Pilot/Vehicle Interface Technology Branch (Major, USAF)**

In this assignment, Dr. Raeth led a team of 25 engineers and scientists (10 government and 15 contractor) in the development of advanced cockpit display formats, display controls, and aircrew decision aids. He was responsible for \$35 million in budget and facilities, including five cockpit evaluation systems used by 70 research personnel. So successful was this facility that it was used by Wright Laboratory for 200 technology demonstrations per year. Over 800 people per year were accommodated, including foreign and US dignitaries. The facility was featured on US and South American national television, as well as in several Air Force videos. His own and his branch's research was applied to the satisfaction of more than 100 formal warfighting deficiencies. During this period, Dr. Raeth achieved the following:

- Initiated \$16 million uninhabited combat aerial vehicle program. This program united Wright Laboratory and industry in the Air Force's first program to develop mission-flexible operator-vehicle interfaces for unmanned aerial vehicles performing lethal missions.
- Guided development of air-to-air missile targeting and missile escape decision aid technology. This program received very favorable attention from the Air Force Science Advisory Board and the F-22 program office. This program joined two government organizations with three civilian companies and successfully demonstrated technology that provides increased pilot situation perception and reduced workload, and acts as a force multiplier. Simulations demonstrated 14% higher kill rates for friendly forces when they are outnumbered even 4-to-1. Also leveraged results from the \$70 million Army Rotorcraft Pilots Associate and \$50 million Air Force Pilots Associate programs.
- Directed organization developing decision aids to be added to Defense Mapping Agency digital landing charts. Simulations demonstrated altitude deviations were reduced 45%, airspeed deviations reduced 25%, and workload reduced 70%.
- Worked with outside funding sources to directly respond to operational commands' needs, thereby doubling his budget. Also worked with industry and academia to provide work-study, visiting faculty, technology sharing, and facilities sharing opportunities to effectively increase manpower 78%. These increases were achieved in spite of a 30% reduction in allocated manpower and funding.
- People in his organization were consistently winning awards. In one 12-month period they won 7 awards.
- Conducted workshops in cockpit decision aid technology that were attended by people from five countries, four government agencies, and three universities.
- Directed Wright Laboratory, Armstrong Laboratory, and NASA team developing cockpit voice control. Simulations demonstrated 97% accuracy in 115dB noise and 3G

maneuver forces environments, 40% workload reduction, and 60% increase in pilot head-up time. This program culminated in the Air Force's first-ever voice control flight test for transports and the establishment of a much sought after database of high-noise voice data collected in-flight.

- Directed team developing improved target designation capability. Provided technology that cut target designation time in half.
- Led team in T-38 display modernization program to reduce transition training cost 20%.
- Transitioned \$50 million Air Force Pilots Associate program to civilian transports via cooperative research and development agreement with major aircraft manufacturer. Transition of enhanced route management and cruise/climb systems shown to save 120 pounds fuel per flight hour and 200% reduction in route replanning time.
- Co-authored the script and led the production of a premier video documentary of division mission, facilities, and cockpit research. This documentary is being distributed all over the US and to allied nations.
- Developed automated workload allocation heuristic for cockpit applications. Heuristic based on situation attributes affecting pilot trust and projected pilot willingness to allocate workload to the automation. Transitioned academia's empirical and theoretical research into practical software implementation. Extensive technical report now in press via Dr. Raeth's personal cooperative research and development agreement with Wright Laboratory.
- Developed expert systems approach to the management of on-board and off-board information for situation awareness and decision aiding. This work continued his long-standing research into adaptable automation wherein the software does not change, just the database of domain knowledge. Published a detailed technical report on this subject.
- Worked with academia to develop hardware approaches that mirror the algorithms and heuristics used in decision aids and employ processing components already on the aircraft. This helped to establish advanced decision aids as a transitionable technology.
- Worked with academia to develop a missile trajectory prediction heuristic. This technology seeks to identify the missile's target and to give the pilot sufficient warning of a pending missile impact. While this research is in its early stages, initial simulations show a 1 second error in prediction of time of impact. The research continued beyond that point and is being documented in a technical report under Dr. Raeth's cooperative research and development agreement with Wright Laboratory.
- Instrumented missile trajectory prediction computer code for the collection of statistics on projections of time and location of impact. This instrumented software was made available to organizations conducting tests using models of friendly and enemy operational missiles.
- Worked with academia to develop hypermedia opportunities for the exposition of technical topics and the transition of technology. Sponsored two graduate students who published theses that laid a base line of requirements via extensive interviews and literature searches.

- Developed simulation that leveraged research from academia and demonstrated the feasibility of making real-time predictions of numeric sequences without prior knowledge of the changing control law, using the entire expanding data stream, and without knowing when the control law changed. This simulation led to two visiting faculty summer research sessions in missile trajectory prediction.
- Translated from one version of language to another so code could be used on high performance computer. Enabled MS student to complete thesis in neural network applications on time.

**From 10/91 to 10/92 Deputy Chief of Staff Office for Science and Technology,
Headquarters Air Force Materiel Command, October 1991
Deputy USAF Industry Research and Development Manager (Major)**

For this year, Dr. Raeth spearheaded initiatives for integrating USAF technology planning with industry research and development (IR&D). This activity enabled the Air Force to leverage 10,000 contractor research projects that were supported by \$150 million per year in DoD funds. The following results were achieved:

- Developed smooth process for the release of classified and unclassified information to industry in support of their IR&D projects. This was a significant result involving industry, government field organizations, headquarters, and intelligence communities. Co-authored Command policy in IR&D (AFMCR 550-17) and Air Force regulations governing release of intelligence (AFR 205-2). Presented these results at a national gathering of information release experts.
- Successfully defended the proprietary nature of industry research results. A Freedom of Information Act (FOIA) request demanded release of proprietary contractor data. This demand was initially supported by the Air Force legal and FOIA communities. Dr. Raeth researched the Federal Acquisition Regulations and documented countering citations. He also formed a team of industry and government lawyers to support his insistence that the information was not releasable. Had he not acted, a legal precedent would have been set, industry would have no longer released proprietary research results to DoD, and the opportunity to leverage those results would have been lost. This would have caused a significant interruption of communication between DoD and industry.
- Developed an IR&D project review process that saved the Air Force 900 travel days in its first year over the previous process.
- Developed database that enabled easy access to an industry survey conducted nationwide.

**From 10/88 to 10/91 Avionics Directorate, Wright Laboratory
Artificial Intelligence Program Manager (Captain, USAF)**

As program manager and research scientist, Dr. Raeth led a team of 15 government and contractor personnel in the application of adaptive automation technology to the passive identification of radar signals for application to electronic warfare threat alert systems. He also represented the USAF to the electronic warfare passive identification group of the International Technical Cooperation program, an organization of English-speaking nations. The following achievements occurred:

- Led research activities to improve the ALR-56M radar threat alert system. In three years went from basic research to writing a technology transition plan. Developed test facility that included the ALR-56M, bread-boards of the new hardware/software suite, and real-time simulation comparison capability. Credited with a 10-times improvement in speed and accuracy for passive radar threat recognition.
- Developed algorithms and heuristics that are easily deployed on parallel processing architectures. These systems require little or no software modification when changes in the threat database occur. Reduced cost of upgrades to major electronic warfare systems tenfold. The time required to identify uncooperative radar threats was decreased an order of magnitude.
- Used imaginative, yet legal, procurement methods to accelerate program 1.5 years in first six months. By combining this with the use of flight test discipline during research phase assessments, he shaved two years off the normal time required to get new technology into operational aircraft.
- Guided a team developing in-house simulators to generate mission oriented scenarios. This effort saved \$350 thousand in limited R&D funds and was critical to the testing of adaptive automation systems intended for insertion into radar threat alert systems on board combat aircraft.
- Co-Invented Stretch & Hammer Neural Network, a method for n-dimensional surface interpolation without regular grid. Published this work in two extensive technical reports.

**From 04/85 to 10/88 Deputy Commander Office for Electronic Warfare Flight Test,
3246th Test Wing
Chief, Electronic Warfare Technical Support Branch (Captain, USAF)**

For this assignment, Dr. Raeth directed technical support for 57 electronic warfare developmental test programs. These programs included the F-15 Tactical EW System, F-16 Airborne Self-Protection Jammer, B-1B Defensive Avionics System, and the ALR 74/56M Advanced Radar Warning Receiver Competition. He supervised ten government personnel and was the assistant program manager for the engineering support contract. He entered this job as

Assistant Branch Chief and was promoted to Branch Chief after the first week. The following accomplishments resulted:

- Led team that salvaged two-thirds of data from three flight test missions when the data was originally thought to be without value. This kept those missions from having to be reflown.
- Developed systems requirements and procurement methods that led to a 74% cost reduction in storage media and a \$220 thousand savings in computer hardware. An additional benefit was a savings of one manweek and one cpuweek per test program.
- Developed plan for locating the computer terminals and phone sets for the new LAN and digital telephone network, a \$200 thousand installation project.
- Planned and managed the construction a classified computer processing facility for the analysis of EW test data. Final cost was \$20 thousand below the original construction and installation estimate.
- Developed computer expert system that enabled previously unachievable automation of the analysis of complex EW test data.
- Increased by 35% the number of flight test programs supported by his organization.
- Completely revamped the time-billing philosophy of his industrially funded branch. Overhead billings reduced 75%.
- Developed automated process for tracking hours billed Vs projects supported for each staff member. Interfaced with official organizational man-hour database. Used this process to justify manpower requests and allocations.
- Established automated and administrative processes that decreased late technical reports 80%.
- Developed automated means of organizing and reporting collection data during Wing fund raising drive. Made extensive use of spreadsheet data input, graphics, tables, and recalculation capabilities. Significantly reduced workload since package produced reports for all organization levels.

**From 06/83 to 04/85 Deputy Chief of Staff Office for Computer Systems,
Headquarters Air Force Systems Command
Information Architecture Project Officer (Captain, USAF)**

In this assignment, Dr. Raeth translated management concepts in information architectures into implementable initiatives for contractor action. He assisted in the design of user interfaces, configuration management schemes, standards and conventions, and other policies in regard to the modeling methodologies and tools used by the \$10 million Information Integration program. As the Command's Productivity Principal, he managed the Command-wide effort to enhance productivity via information systems. The following results were achieved:

- Developed an automated task tracking system for his division that proved so successful that it was adopted as a directorate standard.
- Consummated an agreement with the General Services Administration that cut procurement time for contractor support 50%.
- Developed an Information Resources Management training program for the division's staff that optimized impact while minimizing cost. This program filled several shortfalls that were holding back progress.
- Initiated and co-authored an officer performance report writer's guide that eventually became the Command standard embodied in AFSCP 36-2, "OERs: A Guide for Rating Officials".
- Assisted in the development of the five year budget for the \$54 million Air Force Systems Command Info 90 program. Represented this program to the Command's Program Review Council for the FY84 POM.
- Introduced the use of automated statement of work generation tools to the division.

**From 12/80 to 06/83 Federal Computer Performance Evaluation and Simulation Center
Headquarters Air Force
Computer Simulation Development Officer (Lt. and Captain, USAF)**

Directly after commissioning in June 1979, Dr. Raeth was sent to the Air Force Institute of Technology to complete a Master of Computer Engineering. He received the first such degree issued by the Institute. FEDSIM was his first assignment after completing that degree. At FEDSIM he served as a consultant in simulation and data processing to the US Navy. He performed work in the areas of computer system simulation, computer system performance evaluation and prediction, and computer system design assessment. He was also an analyst on a project developing system sizing and analysis techniques to support capacity management. These achievements resulted:

- Developed an automated means of directly translating a computer system's log into a workload simulation model. This led to analyst workload reduction that enabled him to work on an addition project.
- Wrote an analysis of proposed approaches to the design of LANs. Identified a flaw in the proposal that would have prevented the proposed system from meeting the customer's needs. This report was so highly regarded by Naval Sea Systems Command that they funded an additional 18 man-month effort.

Publications

“Excerpts from the Holy Bible – Offering Fundamental Guidance on Personal, Professional, and Career Development” editor and contributing author, CreateSpace Publications, 2011, <https://www.createspace.com/3492411>.

“Introducing Tools for Defining and Operating on Distributed Matrices”, DoD High Performance Computing Modernization Program, Users Group Conference, June 2011.

“bcMPI – A Tool for M-Language Parallel Processing”, seminar, PETTT Annual Technology Transfer Conference, 2010.

“Matlab Parallel Processing Using Standard MPI Implementations”, with Jose Chaves. DoD High Performance Computing Modernization Program, Users Group Conference, June 2010.

“Merging Machine Vision with Spectral Analysis for Improved Object Detection”, with Charles Wamsley, Clinton Jenkins, and Clyde Spencer. IEEE Aerospace Conference, Jan 2010.

"Implementing a Philosophy for Transitioning Existing Software to Network Processing", Open Source Grid and Cluster Conference, May 2008.

"Improving Throughput for Temporal Target Nomination Using Existing Infrastructure", Proceedings: Intelligent Computing, Theory and Applications V; SPIE International Defense and Security Symposium; 9-13 April 2007.

"Predictive Anomaly Detection - A Data Reduction Step for Near-Earth Object Detection, Tracking, and Characterization", NASA Workshop on Near-Earth Object Detection, Characterization, and Threat Mitigation, publication without presentation, 26-29 June 2006.

“Target Nomination for Infrared Surveillance and Persistent Imaging”, Poster/Demo, International Conference on Intelligence Analysis, May 2005.

“Blind Signal Processing for Nominating Targets in Infrared Data Streams”, Military Sensing Symposia Specialty Group on Passive Sensors”, Feb 2005.

“Finding Events in Infrared Data Streams “, Presentation, Great Lakes Photonics Symposium, Jun 2004.

"Finding Unexpected Events in Staring Continuous-Dwell Sensor Data Streams via Adaptive Prediction", Doctoral dissertation presented to the faculty of Nova Southeastern University, 2003.

"Combining Fuzzy Logic and Voting Methods for Matching Pixel Spectra with Signature Databases" with Martin Pilati, SPIE Annual International Symposium on Aerospace/Defense Sensing, Simulation, and Controls (AeroSense), Apr 2002.

"Fault-Tolerant Extensible Approach to Improving Spectral Analysis Throughput" with Mikulski, Moffitt, and Wood, SPIE Annual International Symposium on Aerospace/Defense Sensing, Simulation, and Controls (AeroSense), Apr 2002.

"Column on Adaptive Systems", published every two weeks by CMP Publication's ChipCenter, <http://www.chipcenter.com/eexpert/praeth/archive.html>, May 1999 – March 2002.

"Finding Events Automatically in Continuously-Sampled Data Streams via Anomaly Detection", with Donald Bertke, Proc: National Aerospace and Electronics Conference (NAECON), Oct 2000. (3rd Place Best Paper)

"Adaptive Data Mining Applied to Continuous Image Streams", with Randall Bostick and Donald Bertke, Proc: IEEE/ASME Annual Conference on Artificial Neural Networks in Engineering (ANNIE), Nov 1999

"Transitioning Basic Research to Build a Dynamic Model of Pilot Trust and Workload Allocation", with John Reising, Journal of Mathematical and Computer Modeling, v 30, pp 149-165 (1999)

"Review of Bart Kosko's Book 'Fuzzy Engineering'", ACM SIGART Bulletin, Vol. 9, # 1, pp. 39-41 (summer 98)

"A Model of Pilot Trust and Dynamic Workload Allocation", with John Reising, Proc IEEE National Aerospace and Electronics Conference (Jul 97)

"Parallel Processing for Real-Time Rule-Based Decision Aids", with Chun-Shin Lin, Proc IEEE International Conference on Systems, Man, and Cybernetics (Oct 96)

"Prediction of Missile Trajectory", with Chun-Shin Lin, Proc IEEE International Conference on Systems, Man, and Cybernetics (Oct 95)

"A Scalable Framework for Adding Crisp Knowledge to Pilot/Vehicle Interfaces", with Anthony Montecalvo and James Noyes, Invited Paper, Proc IEEE International Conference on Systems, Man, and Cybernetics (Oct 94)

"Cockpit Decision Aids Via Trust-Enhancing Knowledge-Based Techniques", with Anthony Montecalvo and James Noyes, Invited Paper, Proc Joint GAF/RAF/USAF Workshop on Human-Electronic Crew Teamwork, Cambridge, England (Sep 94)

"A Basis Function Approach to Programming Concurrent Voting Systems to Perform Selection Tasks", with Steve Gustafson and Gordon Little, Mathematical Computer Modeling, Pergamon Press, Vol. 20, # 3, pp. 73-88 (Mar 94)

"The Affect of Personal and Business Standards on Sustained Research Funding" High Tech Communications for Developers (Jun 93)

"A Reading List of Practical Books in Expert Systems and Neural Networks" Neuron Digest (Jan 93)

"Standards in Artificial Intelligence from the Technology Users Point of View", Proc IEEE National Aerospace & Electronics Conference May 92. Presentations made to: World Conference on Expert Systems, Dec 91; American Association for Artificial Intelligence Annual Conference Workshop on Standards in Expert Systems, Jul 91; and Annual Conference of the International Association of Knowledge Engineers, Oct 90

"Applying Technology with NeuralWorks Professional II", Product Review, IEEE Computer Magazine (Jan 91)

"Expert Systems in Process Observation and Control, Parts I and II", AI Expert Magazine (Sep/Dec 90)

"An Experiment with 3-D Surface Maps to Illustrate Neural Network Performance", Proc IEEE/INNS International Neural Network Conference, Paris, France (Jul 90)

"Using 3-D Surface Maps to Illustrate Neural Network Performance", Proc IEEE National Aerospace and Electronics Conference (May 90)

"EXPERT SYSTEMS: A SOFTWARE METHODOLOGY FOR MODERN APPLICATIONS", Editor and contributing author with numerous coauthors, Book, Structured Reprints Collection, IEEE Computer Society Press (Feb 90)

"Two Expert System Shells for the First-Time Developer", Product Review, IEEE Computer Magazine (Nov 88)

"QFiler - A Disk Manager", Product Review, Newsletter of the Emerald Coast Computer Society (Oct 88)

"An Expert Systems Approach to Decision Support in a Time- Dependent, Data Sampling Environment (A Brief Discussion)", Proc IEEE National Aerospace and Electronics Conference (May 88)

"Artificial Intelligence, An Applications Oriented Approach; By Daniel Schutzer", Book Review, IEEE Expert Systems Magazine (Winter 87)

"Automating Goldenbird Analysis Via Expert Systems", with Patricia Johnson, Proc Annual Joint DOD Electronic Warfare Conference (May 87), Proc Association of Old Crows Joint Western-Mountain Region Technical Symposium (Apr 87)

"New AI Software for a Statistical Decision Support System", with Michael Harding, Proc 51st meeting of the Mississippi Academy of Science (Feb 87), Proc Winter Conference of the American Statistical Association (Jan 87)

"Functional Modeling for Logic Simulation", with John Acken, Proc Institute of Electrical and Electronics Engineers 18th Design Automation Conference (Jul 81)

"A Functional Level Preprocessor for Computer Aided Digital Design" Master's thesis presented to the faculty of the Air Force Institute of Technology, Published under Dept of Commerce DTIC/NTIS # ADA 100784 (Dec 80)

"An Interactive Computer Package for Active Filter Design", with William Barksdale, Proc Institute of Electrical and Electronics Engineers Southeast Conference (Apr 78)

"An Internal Consistency Estimate for Criterion Referenced Tests", with Greg Strasler, Proc National Council on Measurement in Education Annual Meeting (Apr 77)

Degrees
Certifications
Career Broadening

EDUCATION:	PhD Computer Science	Nova Southeastern University	2003
	MS Computer Engineering	Air Force Institute of Technology	1980
	BS Electrical Engineering	University of South Carolina	1979
	AS Electronics Engineering Technology	Trident Technical College	1975
	Research Fellowship in Neural Networks (5 months)		
	University of Dayton Research Institute		1990
	Certificate in Information Systems (3 graduate-course sequence)		
	University of Southern California		1985

CERTIFICATIONS

United States Air Force Officer Career Fields

Fully Qualified: Computer Research Scientist

Fully Qualified: Scientific Analyst

Fully Qualified: Communications/Computer Systems Programmer

USAF Acquisition Professional Development Program Certifications

Level III: Systems Planning, Research, Development, & Engineering

Level II: Program Management

Level II: Test Engineering

Level I: Acquisition Manager

Level I: Communications and Computer Systems

CAREER BROADENING

- 2011 – Present: Member of the Board, The Greatness Factory Trust, a career development non-profit based in Harare, capital of Zimbabwe, Africa.
- 2011: Video series editor, “Career Guidance Conference”, DVD 1/3 on market (<https://www.createpace.com/318579>), two more in process.
- 2011: Editor and contributing author of the book, “Excerpts from the Holy Bible – Offering Fundamental Guidance on Personal, Professional, and Career Development” (CreateSpace Publications, <https://www.createpace.com/3492411>).
- 2008 – Present: Maintain CareerMentor website to help raise the next generation of professionals (<http://InformationAnthology.net/CareerMentor>).
- 2002 – 2009 University of Phoenix: Taught undergraduate and graduate level courses in computer programming concepts.
- 2008 Sinclair Community College: Taught undergraduate courses in object-oriented programming.

- 1990: Editor and contributing author of the book, “Expert Systems: A Software Methodology for Modern Applications”, Structured Reprints Collection, IEEE Computer Society Press (Feb 90).

Awards

Recognition

- 1977 & 1979 Armed Forces Communications & Electronics Association Gold Medal
- 1978 Second student in history of engineering school to enter graduate level while still an undergraduate
- 1985 Air Force Achievement Medal
- 1985 Selected for the Computer Research Scientist USAF career field as the second of only 26 members
- 1986 3246th Test Wing Test Engineering Shaker and Mover of the Year
- 1990 \$300 Suggestion Award, "Date Consistency in Personnel Computer Products"
- 1990 Air Force Commendation Medal
- 1991 USAF Aeronautical Systems Center Nomination for USAF R&D Award
- 1994 Air Force Meritorious Service Medal (first award)
- 1994 One of only 10 Americans invited to address the European Workshop on Human-Electronic Crew Teamwork
- 1994 & 1995 Dayton Affiliate Societies Council, Region's Top 20 Technology Leaders
- 1996 Co-author "The Human-Electronic Crew, Can We Trust the Team", selected in top ten technical reports in USAF's Wright Laboratory for that year
- 1996 One of only 14 nominees for USAF Wright Laboratory Leadership Award
- 1997 Air Force Meritorious Service Medal (second award)
- 1998 Science web site of the week (Week 1, Dec 98), National Academy Press
- 2000 Third-Place Best-Paper IEEE National Aerospace & Electronics Conference
- 2000 Ball Aerospace & Technologies Corp, Customer Support Quarterly Award
- 2001 Ball Corporation Award of Excellence. Only 15 awarded per year in population of 12,000
- 2008 Ball-Dayton Whaler Award for participation in business development

Certificate Samples



The Trustees of the University
on the recommendation of the Faculty confer upon

Peter George Raeth

the degree of

Doctor of Philosophy

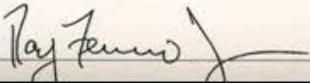
with all rights, privileges, and responsibilities thereto appertaining.

In Witness Whereof, the seal of the University
and the signatures of the President and the Dean are hereunto affixed.

Given at Fort Lauderdale, Florida,

March 31, 2003.




President



Presented by
NAECON BOARD
to
Peter G. Raeth
for
3rd Place Best Paper

**"Finding Events Automatically in Continuous
Sampled Data Streams via Anomaly Detection"**

**NAECON 2000
10-12 OCT 2000**






Ball Aerospace & Technologies Corp.

Peter Raeth

You Make a Difference

*In recognition of outstanding performance,
dedication and commitment*

2008 Outstanding Student Mentor


Signature

November 11, 2008
Date

Whaler Award


*Dayton Operations Quarterly Award
Presented to*

Peter Raeth

*for the Period of
October 2007 to Decmember 2007*



Ball Aerospace
& Technologies Corp.


Tom Reinhardt
Director, Dayton Operations



Peter Raeth

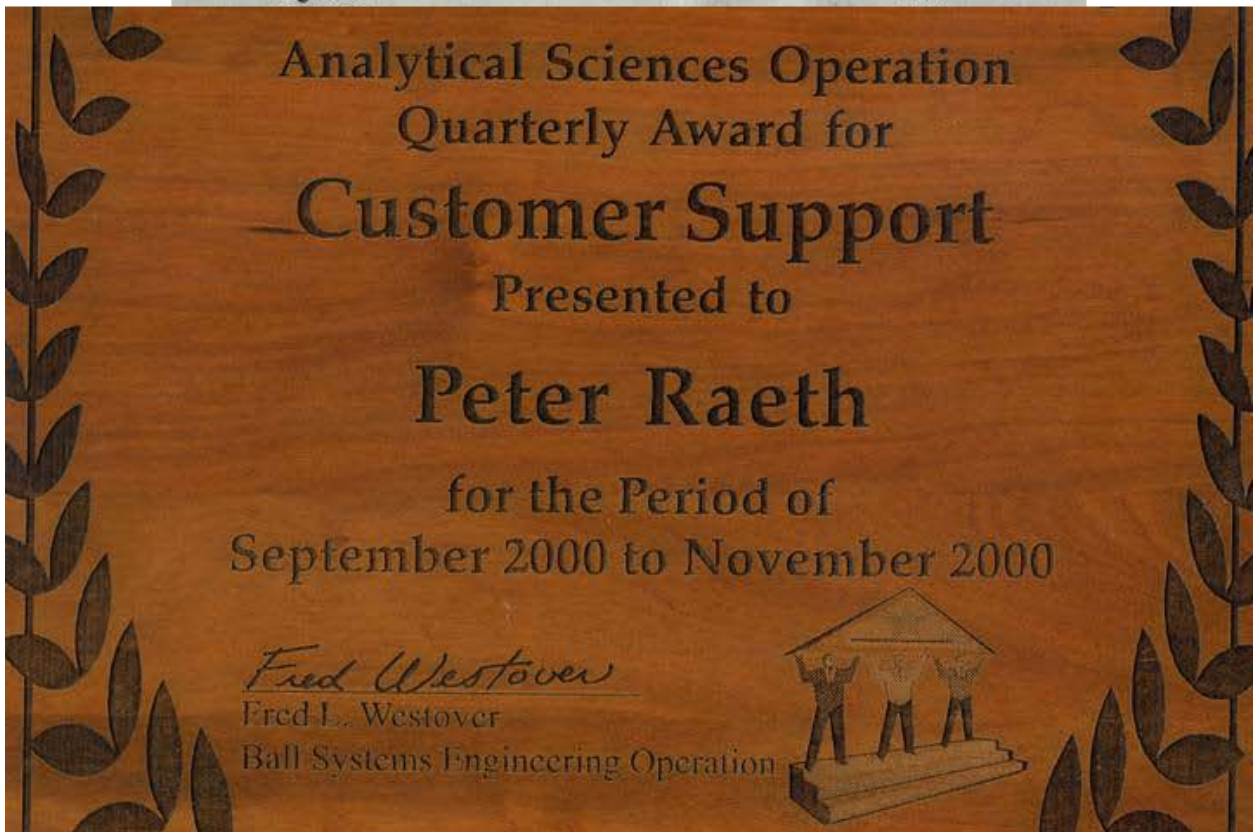
You Make a Difference

In recognition of outstanding performance, dedication and commitment as a team member of :

Superior Performance and Dedication to the MASINT Team for Ensuring National Security Mission Success

[Signature]
Signature

1 Sep 03
Date





THE UNITED STATES OF AMERICA

TO ALL WHO SHALL SEE THESE PRESENTS, GREETING:

THIS IS TO CERTIFY THAT
THE PRESIDENT OF THE UNITED STATES OF AMERICA
AUTHORIZED BY EXECUTIVE ORDER, 16 JANUARY 1969
HAS AWARDED

THE MERITORIOUS SERVICE MEDAL


TO

MAJOR PETER G. RAETH

FOR

OUTSTANDING SERVICE
10 NOVEMBER 1988 TO 1 JANUARY 1994

GIVEN UNDER MY HAND
THIS 20th DAY OF October 1994


JAMES A. FAIN, JR.
Lieutenant General, USAF
Commander



THE UNITED STATES OF AMERICA

TO ALL WHO SHALL SEE THESE PRESENTS, GREETING:

THIS IS TO CERTIFY THAT
THE PRESIDENT OF THE UNITED STATES OF AMERICA
AUTHORIZED BY EXECUTIVE ORDER, 16 JANUARY 1969
HAS AWARDED

THE MERITORIOUS SERVICE MEDAL

(FIRST OAK LEAF CLUSTER)

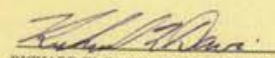
TO

MAJOR PETER G. RAETH

FOR

OUTSTANDING SERVICE
2 JANUARY 1994 TO 28 FEBRUARY 1997

GIVEN UNDER MY HAND
THIS 28TH DAY OF FEBRUARY 1997


RICHARD W. DAVIS, Brigadier General (S), USAF
Commander
Wright Laboratory





DEPARTMENT OF THE AIR FORCE

HEADQUARTERS AIR FORCE MATERIEL COMMAND
WRIGHT-PATTERSON AIR FORCE BASE, OHIO

JUN 1 1995

MEMORANDUM FOR WL/CC

22 June 1995

2210 8th Street., Suite 1
Wright-Patterson AFB OH 45433-7318

FROM: HQ AFMC/ST
4375 Chidlaw Road, Suite 6
Wright-Patterson AFB OH 45433-5006

SUBJECT: Appreciation, Major Peter Raeth

1. Please extend my sincere thanks to Major Peter Raeth for judging the Botany and Zoology categories for the Air Force at the 46th International Science and Engineering Fair. This was an extremely difficult assignment, given the number of entries, the level of knowledge of the students, and the short length of time to complete the judging. He met the challenge!
2. The Air Force made quite an impression at the fair. Science Service, Inc., the organizer of the event, placed the Air Force in the Grand Award Category because of our level of support in both judging and the value of our awards. The students expressed their appreciation for the Air Force (vocally and loudly) at the closing ceremony. The judges were really the ones who earned the respect of all of those involved as they worked in close contact with the students and fair officials.
3. Please forward to Maj Raeth the attached Certificate of Recognition from Science Service, Inc. He indeed deserves the recognition for exemplary work as a science fair judge. We are all proud of the admirable way he represented the Air Force!

RICHARD R. PAUL
Brigadier General, USAF
Director, Science & Technology

DEPARTMENT OF THE AIR FORCE

PRESENTS THE SUGGESTION AWARD OF

\$300.00

TO

CAPT PETER G. RAETH
3246TH TEST WING
EGLIN AIR FORCE BASE, FLORIDA

FOR

An award for EGL 880211, "Date Consistency in Personnel Computer Products," based on intangible benefits of moderate value and broad application as certified by AFCPMC/DPCIR.

CONFERRED THIS 12TH DAY OF FEBRUARY IN THE YEAR 1990



Elaine F. Best
ELAINE F. BEST,
Suggestion Program Manager