Yun-Tung Lau, Ph.D. 劉潤東博士

學歷 Academic Qualification

- M.S., Technology Management, University of Maryland University College, 1997 (美國馬里蘭大學學院 技術管理碩士)
- Ph.D., Physics, Massachusetts Institute of Technology, 1988 (美國麻省理工學院 物理博士)
- B.S., Physics, Sun Yat-Sen University, 1984 (廣州中山大學 物理學士)

簡歷

劉博士在澳門長大和完成中學，於廣州中山大學得物理學士，88年於美國麻省理工學院取得物理博士後，在美國馬里蘭大學和太空總署「歌達航天中心」任研究員，曾獲頒美國「國家研究院」獎研金。研究項目包括等離子體物理、太陽物理、混沌和非線性現象。他現任美國Leidos公司（前國際科學應用公司）高級軟件工程師/技術副總裁，帶領跨公司技術團隊，研究和發展企業軟件架構，應用於指揮和控制系統、產品數據管理、電子商務、工程模擬等，以廣博的實戰經驗，給客戶提供切實可行的技術指導和解決方案，為企業軟件架構、對象技術和開放標準的國際級專家。

劉博士是兩項美國專利的第一發明人，至今已發表科學專業論文近30篇，主筆大型客戶咨詢報告36份。他的專業教科書Object-Oriented Design and Architecture，2000年在美國出版，並獲SAIC科技出版獎。該書的中文版《UML對象設計與編程》，翌年在北京出版，被中國科學院軟件技術研究所推薦為大專院校教材。

劉博士熱衷於支持中港澳教育事業，自1999年起擔任美國科技教育協會技術顧問，義務設計和開發軟件，讓協會項目經理，能高效率地管理近二萬中國鄉村少年助學金和五千多圖書室。他從事科普寫作，介紹最新科學技術，屢在香港《明報月刊》等刊物發表。由他主編的《跨世紀科學》系列叢書，深入淺出地介紹太空、生物、醫療、技術等多個領域的發展，被列入香港中學生課外讀物表。劉博士多次在澳門和廣東地區給大專和中學生做講座，并被評為澳門濠江中學第一期校友精英。

Summary of Professional Qualification

I have 27 years of progressive experience in large-scale software architecture, design and development, and basic scientific research. I have demonstrated leadership and technical management skills for enterprise architecture, full-cycle software development and systems engineering. I have solid teaching and mentoring experience as a seminar speaker, guest lecturer, and mentor.

Over the past 17 years, I have gained international recognition as an expert and thought leader on enterprise architecture, service oriented architectures, and related open standards through many externally funded projects at Leidos Corporation (formerly Science Applications International Corporation), a FORTUNE 500 scientific, engineering, and technology company. As Senior Software Scientist/Vice President of Technology, I wrote competitive proposals for contract studies, led technical team to develop IT strategies for clients, recruited, mentored, and supervised technical staff, and prepared briefings and reports. I served on multi-company review boards (e.g. with IBM and Oracle) for major proposals and panels for technical working groups/R&D projects.

At Leidos/SAIC, I functioned as Principle Investigator (contractual technical lead) and led externally

funded contract studies/consulting projects. In a highly competitive environment, I have maintained a 100% win rate on all proposals with me being the PI or contractual technical lead. Some samples are:

- "Joint Command and Control Architecture" 2010 to present (funding level: approximately $1.5M USD per year) [Technologies: SOAP/REST services, cloud computing, widget]
- "Service-Oriented Architecture (SOA) for Net-Centric Capability Pilot and Net-Enabled Command and Control" 2004 to 2009 (~$1M USD per year) [Technologies: Virtualization, enterprise service bus, Web portal and servlets, Web service standards]
- "Net-Centric Enterprise Services Architecture" 2003 to 2005 (~$2.4M USD per year) [Technologies: SOA, TLS, PKI, XML, XSLT, SAN, NAS, server farm and clustering]
- "Information and Data Architecture for Bureau of Consular Affairs/Travel Document Issuance" 2003 to 2007 (~$1M USD per year) [Object-Oriented Design, N-Tier architecture]

I also mentored university students who worked as interns (see page 10). I provided guidance on their applied research projects and gave short courses/seminars to students and company staff on software design, architecture, system engineering, and emerging information technologies. This included the use of my book "Object-Oriented Design and Architecture", which was designated as a course reference by universities (e.g. by Oxford University, Dept. of Computer Science). I have a proven track record of innovation, with two US patents (below) and innovative project solutions (see page 7).

Previously, I was a research scientist at the University of Maryland and NASA-Goddard Space Flight Center (GSFC) for eight years. I performed basic research in nonlinear science and chaos, plasma physics, and solar physics. I have published extensively in refereed journals and gave invited talks and presentations at many international conferences. I also served as a referee for many scientific journals, including Nature, Nuclear Fusion, Physics of Plasmas, Physical Review Letters, Astrophysical Journal, Solar Physics, and Journal of Geophysical Research.

PATENTS, PUBLICATIONS, AWARDS, AND INVITED TALKS

Categories	Summary (1986 to present)
Patents	♦ Primary inventor of two US patents
Books	♦ Sole author of two books (one published in US, one in China) ♦ Chief editor of a popular science book series (five books published in Hong Kong; author of two main chapters)
Papers in Refereed Journals	♦ Software design and architecture: three ♦ Nonlinear science and chaos: five ♦ Plasma physics and solar physics: 20
Consulting Reports	♦ Major technical reports from 1997 to present: 36

Patents [http://www.patentstorm.us/inventors/Yun_Tung_Lau-1471696.html]

- **Y.-T. Lau**, R. Chipman, K. Kuchipudi, and P. Poon, "Database Management System," September 2008 (US Patent Nos. 6976036, 7424492)
- **Y.-T. Lau** and M. Nagy, "Data ranking with a Lorentzian fuzzy score," March 2004 (US Patent No. 6701312)

Books

- **劉潤東**,《UML 對象設計與編程》, 北京希望电子出版社, 2001 年 [272 pages]
- **Y.-T. Lau**, "The Art of Objects: Object-Oriented Design and Architecture," Addison-Wesley (Reading, MA) 2000 [363 pages]
- **劉潤東**,《跨世紀科學》系列主編, 香港天地圖書出版社, 1996 年(該系列共五本書)

Awards

- Net-Enabled Command and Control Program "Shooting Star" Award – for exceptional technical service on architecture and development guidance, October 2008
- Certification of Appreciation - for superior contribution to Net-Centric Capability Pilot, October 2004
- SAIC Executive Science & Technology Council Publication Award, March 2001 (Technical book - "The Art of Objects: Object-Oriented Design and Architecture")
- The U.S. National Academy of Sciences/National Research Council (NAS/NRC) Research Associateship Award, April 1991 to March 1993
- The Center of Theoretical Physics Fellowship Award, University of Maryland, September 1988 to March 1991

Papers in Refereed Journals - Software design and architecture (3)

1. **Y.-T. Lau**, "Reference Metrics for Service-Oriented Architectures," CrossTalk, December 2007.
2. **Y.-T. Lau**, "A Unified Service Description for the Global Information Grid," CrossTalk, August 2007.
3. **Y.-T. Lau**, "Service-Oriented Architecture and the C4ISR Framework," CrossTalk, September 2004.

Papers in Refereed Journals - Nonlinear Dynamics and Chaos (5)

1. **Y.-T. Lau**, "Global Aspects of Homoclinic Bifurcations of Three-dimensional Saddles," *Chaos, Solitons, and Fractals*, 3, 369 (1993).
2. **Y.-T. Lau**, "Large-period Turbulent Solutions of the Kuramoto-Sivashinsky Equation," *Physics Letters A*, 169, 329 (1992).
3. **Y.-T. Lau**, "The Cocoon Bifurcations in three-dimensional systems with two fixed points," *International Journal of Bifurcation and Chaos*, 2, 543 (1992).
4. **Y.-T. Lau** and J. M. Finn, "Dynamics of a three-dimensional incompressible flows with stagnation points," *Physica D*, 57, 283 (1992).
5. **Y.-T. Lau**, J. M. Finn, and E. Ott, "The Fractal Dimension in Non-hyperbolic Chaotic Scattering," *Physics Review Letter*, 66, 978 (1991).

Papers in Refereed Journals - Plasma Physics and Solar Physics (20)

1. **Y.-T. Lau** and J. M. Finn, "Magnetic Reconnection and the Topology of Interacting Twisted Flux Tubes," *Physics of Plasmas*, 3, 3983 (1996).
2. J. F. Drake, **Y.-T. Lau**, A. Zeiler, "Local negative shear and the formation of transport barriers," *Physics Review Letters*, 77, 494 (1996).
3. **Y.-T. Lau**, "A Linear Analysis For Edge-localized Mode Precursors," *Plasma Phys. Controlled Fusio*n, 38, 1393 (1996).
4. **Y.-T. Lau** and E. Siregar, "Nonlinear Aflven Wave Propagation in Solar Winds," *Astrophysical Journal*, 465, 451 (1996).
5. **Y.-T. Lau**, "Density Edge Localized Mode in Rotating Plasmas," *Nuclear Fusion*, 36, 965 (1996).
6. T. M. Antonsen, J. F. Drake, P. N. Guzdar, A. B. Hassam, **Y.-T. Lau**, C. S. Liu, and S. V. Novakovskii, "Physical mechanism of enhanced stability from negative shear in tokamaks," *Physics of Plasmas*, July (1996).
7. **Y.-T. Lau** and R. Ramaty, "Evolution of Energetic Protons in Twisted Magnetic Loops," *Solar Physics*, 160, 343 (1995).

8. **Y.-T. Lau**, "Nonlinear Dynamics of Twisted Magnetic Flux Tubes," *Physics of Plasmas*, 2, 4442 (1995).
9. **Y.-T. Lau**, J. F. Drake, P. N. Guzdar and A.B. Hassam, "Disintegration of Ion Banana Orbits in Tokamak Edge Plasmas," *Nuclear Fusion*, 35, 605 (1995).
10. **Y.-T. Lau**, "Magnetic Nulls and Topology in a Class of Solar Flare Models," *Solar Physics*, 148, 301 (1993).
11. **Y.-T. Lau**, T. Northrop, and J. M. Finn, "Long-term Containment of Energetic Particles in Coronal Loops," *Astrophysical Journal*, 414, 446 (1993).
12. **Y.-T. Lau** and J. M. Finn, "Fast Dynamos with Finite Resistivity in Steady Flows with Stagnation Points," *Physics of Fluids B*, 5, 365 (1993).
13. J. M. Finn and **Y.-T. Lau**, "Magnetohydrodynamic Equilibria in the Vicinity of an X-Type Neutral Line Specified by Footpoint Shear," *Physics of Fluids B*, 3, 2675 (1991).
14. **Y.-T. Lau** and J. M. Finn, "Three-dimensional Kinematic Reconnection of Plasmoids," *Astrophysical Journal*, 366, 577 (1991).
15. S. M. Kaye, N. Asakura, B. LeBlanc, C. Kessel, **Y.-T. Lau**, J. Manickam, S. Paul, and S. Sesnic, "Characteristics of High-Frequency ELM Precursors Edge Stability in the PBX-M Tokamak," *Nuclear Fusion*, 30, 2621 (1990).
16. **Y.-T. Lau**, "Edge Microtearing and Drift Instabilities in DIII-D Tokamak Plasmas," *Nuclear Fusion*, 30, 934 (1990).
17. **Y.-T. Lau** and J. M. Finn, "Three-dimensional Kinematic Reconnection in the Presence of Field Nulls and Closed Field Lines," *Astrophysical Journal*, 350, 672, (1990).
18. **Y.-T. Lau**, "Three-dimensional Equilibria in DRAKONs," *Nuclear Fusion*, 28, 1223 (1988).
19. **Y.-T. Lau**, "An Easy Method for Converting Equations Between SI and Gaussian Units," *American Journal of Physics*, 56, 135 (1988).
20. **Y.-T. Lau**, "Neoclassical Flux-friction Relations In Arbitrary Closed-end Plasmas," *The Physics of Fluids*, 30, 3517 (1987).

Major Technical Consulting Reports from 1997 to Present (36) [Dr. Lau being the lead author]

1. "Joint Command and Control Systems Architecture Report for Fiscal Years 2012 and 2013," September 2012
2. "Technical Standards Profile for Joint Command and Control," February 2012
3. "Joint Command and Control Objective Architecture Development," February 2012
4. "Joint Command and Control Transition Architecture Report," September 2011
5. "Architecture Compliance Guidance document for Joint Command and Control," June 2011
6. "Joint Command and Control Architecture Compliance Process," May 2011
7. "Application of Deep Packet Inspection Technology," December 2010
8. "Private Cloud and Its Application to Command and Control Systems," August 2010
9. "Recommendations on REST-style Web service Implementation," April 2010
10. "Net-Enabled Command Capability Developer's Handbook," July 2009
11. "Net-Enabled Command Capability Systems Engineering Process Standard Operating Procedure (Steps 1 through 7)," November 2009
12. "Net-Enabled Command Capability Systems Engineering Plan," June 2009
13. "Net-Enabled Command Capability Preliminary/Critical Design Review Templates," February 2009
14. "Net-Enabled Command Capability Service Level Agreement Template," May 2008

15. “Recommendations on the Usage of Standards for Net-Enabled Command Capability Increment 1,” May 2007
16. “Enterprise Architecture Strategy for Net-Centric Enterprise Services,” June 2006
17. “A Strategy for Migrating toward the Net-Enabled Command Capability Technical Transition Architecture,” May 2006
18. “Web Service Design Best Practices,” April 2006
19. “Systems Engineering Activities in the context of Managed Services,” January 2006
20. “Enterprise Service Bus for Service-Oriented Architecture,” January 2006
21. “Approach for Developing Key Interface Profile,” December 2005
22. “Deployment Strategy for Net-Centric Enterprise Services,” October 2005
23. “Net-Centric Capability Pilot Software Design Description,” September 2004
24. “Net-Centric Capability Pilot Software Requirements Specification,” September 2004
25. “Net-Centric Capability Pilot Conventions for Web Service Development,” July 2004
26. “Horizontal Fusion Enterprise Services Pilot Interface Design Description,” November 2003
27. “Strategy on Version Management of Services,” July 2003
28. “Impacts of Biometrics on Adjudication and Inspection,” January 2003
29. “Future Systems Architecture for Passport Services,” December 2002
30. “Replacement of the Data General System,” April 2002
31. “Force Planning 21 Systems Design,” January 2001
32. “DII-IC Technology Survey and Strategy,” June 2000
33. “Common Operating Environment Anywhere - Vision for the Next Generation,” August 2000
34. “Advanced Petroleum Reservoir Simulator System Requirements Definition Document,” August 1999
35. “System Design Document for the Universal Catalog Gateway,” January 1998
36. “Software Design Document for the Ontology Management System,” October 1997

Papers in Conference Proceedings

1. **Y.-T. Lau,** M. King, W. J. Okon and D. Kye, “Architecture Modeling Approach for Net-Centric Enterprise Services,” *International Command & Control Research & Technology Symposium*, June 2005 [*www.dodccrp.org/events/10th_ICCRTS/CD/papers/060.pdf*]
2. **Y.-T. Lau**, “A Linear Analysis For Edge-localized Mode Precursors,” *IAEA Fourth H-mode Workshop*, Princeton, NJ, USA, September 1995.
3. **Y.-T. Lau** and R. Ramaty, “Trapping of Protons in Twisted Magnetic Loops,” Proceedings of the Workshop on High Energy Solar Phenomena, Waterville Valley, New Hampshire, 1993, eds. J.M. Ryan & W.T. Vestrand (AIP, New York, 1994), p. 71.
4. **Y.-T. Lau** and J. M. Finn, “The Magnetic Field Structures of a Class of Fast Dynamos,” in *The Cosmic Dynamo*, pp. 231-235, Proceedings of IAU symposium 157, Potsdam, 1992, eds. F. Krause, K.-H. Radler, and G. Rudiger (Kluwer, Dordrecht, 1993).
5. **Y.-T. Lau** and J. M. Finn, “Three-Dimensional Kinematic Reconnection of Plasmoids with Nulls,” in *Electromechanical Coupling of the Solar Atmosphere*, pp. 71-78, AIP Conference Proceedings 267, eds. D. S. Spicer and P. MacNeice (AIP, New York, 1992).
6. J. M. Finn and **Y.-T. Lau**, “Current Sheet Formation in Two-dimensional Reconnection,” *Bull. Am. Phys. Soc.*, 34, 2060 (1989).
7. M.J. Gerver, K. Brau, J. Kesner, B. Lane, **Y.-T. Lau** and G. Shuy, “DRAKON Equilibrium and Transport Studies,” the 28th annual APS meeting (1986).
8. **Y.-T. Lau** and M.J. Gerver, “Axial Eigenmodes of Ion Loss-cone Instabilities in the TARA Plug

and Anchor," the Sherwood theory conference (1986).

9. J. Kesner, M. Gerver, B. Lane, **Y.-T. Lau**, and R.S. Post, "Magnetic Divertor Stabilized Confinement Devices," the Sherwood theory conference (1986).

Selected Invited Talks and Keynote Lectures

1. "澳門資訊企業人材發展," Invited talk at the Symposium hosted by 澳门人才發展委員, Macau Polytechnic Institute, Macao, February 2015
2. "Joint Command and Control Systems Architecture," Invited talk at the Command and Control Plan/Build Conference, Suffolk VA, USA, February 2012
3. "Virtualization, SOA, and Cloud Computing (虛擬服務到雲端)" 澳门大学电机及电子工程系講座, University of Macao, August 2011
4. "Architecture Compliance Assessment Process," Invited talk at the Command and Control Plan/Build Conference, Suffolk VA, USA, January 2011
5. "REST-style Web service Implementation Guidance," Invited talk at the JC2 Architecture Working Group, Fairfax VA, USA , March 2010
6. "Models/Views for Joint Command and Control Architecture," Invited talk at the JC2 Architecture Working Group, Fairfax VA, USA , April 2009
7. "Quantifying Service-Oriented Architecture Performance," Invited talk at the Command and Control Program and Policy Directorate, Washington DC, USA , April 2008
8. "Predictive Modeling for Multi-Agency Application Processing," Invited talk at the Bureau of Consular Affairs, Washington DC, USA , December 2007
9. "Approach for developing Service Level Agreements," Invited talk at the NECC Systems Engineering Group, Fairfax VA, USA , November 2006
10. "Architecture Analyses with Executable Architecture Models," Keynote lecture at the Net-Centric Enterprise Services Architecture Conference, Fairfax VA, USA , March 2005
11. "An Approach for Architecture Performance Analysis," Invited talk at the Net-Centric Enterprise Services Architecture Working Group, Fairfax VA, USA , August 2004
12. "Impacts of Biometrics on Adjudication and Inspection," Invited talk at the Bureau of Consular Affairs, Washington DC, USA , January 2003
13. "Migration Strategy for Passport Records Management system" Invited talk at the Bureau of Consular Affairs, Washington DC, USA , April 2002
14. "比較中西方教與學的方法," 美国科技教育协会特邀講座, 北京師範大學, 2000 年 7 月
15. "互联网应用的发展动向," 教育部电子科技大学講座, 广东中山市中山学院, 1999 年 7 月
16. "太陽探秘、網上尋幽," 澳門教育暨青年司特邀講座, 1998 年 9 月
17. "Three-dimensional Kinematic Reconnection," European Geophysical Society XIX General Assembly, Grenoble, France, April 1994
18. "Magnetic Reconnection and Chaotic Scattering," Invited talk at Aix Marseille University, Marseille, France, April, 1994
19. "Ion Banana Orbits in Tokamak Edge Plasmas," Invited talk at Los Alamos National Laboratory, Los Alamos NM, USA, March 1994
20. "Disintegration of Ion Banana Orbits in Tokamak Edge Plasmas," Dept. of Energy Transport Task Force Workshop, Dallas, TX, USA, March 1994
21. "Long-term Containment of Energetic Particles in Coronal Loops," Invited talk at Naval Research Laboratory, Washington DC, USA, March 1993
22. "Fast Dynamos in 3D Chaotic Flows," Invited talk at Department of Physics, University of Texas at Austin, TX, USA February 1993

23. “Long-term Particle Trapping in Coronal Loops,” Invited talk at NASA-Goddard Space Flight Center, Greenbelt MD, USA, February 1992
24. “Fast Dynamos in Steady Flows with Stagnation Points,” Invited talk at Los Alamos National Laboratory, NM, USA, November 1992
25. “Large-period Turbulent Solutions of the Kuramoto-Sivashinsky Equation,” Invited talk at Naval Research Laboratory, Washington DC, USA, October 1992
26. “Cocoon Bifurcations,” Invited talk at University of Postdam, Germany, September 1992
27. “The Magnetic Field Structures of a Class of Fast Dynamos,” International Astronomical Union Symposium on Cosmic Dynamo, Potsdam, Germany, September 1992
28. “Three-dimensional Magnetic Field Structures in Fast Dynamos,” American Geophysical Union Meeting, Montreal, Canada, May 1992
29. “Fast Dynamo with Finite Resistivity in Flows with Stagnation Points,” U.S.-Russian Conference on MHD Stability and Dynamos, University of Chicago, USA, May 1992
30. “The Cocoon Bifurcations in three-dimensional systems,” Univ. of Maryland, College Park, MD, USA, April 1992
31. “Reconnection in Resistive MHD,” Gordon Conference on Solar Plasma and MHD, NH, USA, August 1991
32. “Kinematic Reconnection of Plasmoids with Nulls,” Workshop of Electromechanical Coupling of Solar Atmosphere, Capri, Italy, May 1991
33. “Magnetic Reconnection in Three Dimensions,” Invited talk at Princeton Plasma Physic Laboratory, Princeton, NJ, USA, May 1990
34. “Three-dimensional Kinematic Reconnection,” University of Maryland, College Park, MD, USA, October 1989
35. “Microtearing modes and L/H transition in DIII-D,” Invited talk at General Atomics, San Diego, CA, USA, December 1988

PROFESSIONAL EXPERIENCE

Leidos Corporation (formerly Science Applications International Corporation), Reston VA, USA, Senior Software Scientist/Vice President of Technology, June 1997 - present

As Senior Software Scientist/Vice President of Technology, I have been at the forefront of the Enterprise IT Services industry. I played a leadership role in developing IT strategies and solutions for clients, wrote competitive proposals for contract studies, recruited, mentored, and supervised technical staff, and prepared briefings and reports from the studies. I served on multi-company review boards for major proposals (e.g. with IBM, Oracle, CSC, Raytheon, and Lockheed Martin) and panels for technical working groups (e.g. for open standards).

I have served as chief engineer for contracts with over 120 subprojects (e.g. Chief Engineer for DII Integration Contract, valued at US$258M, 1997–2002). I oversaw technical progress and integration across subprojects, interacted with technical leads and principle engineers within and outside the company, and provided guidance on technical strategy and planning. I contributed to numerous competitive proposals by providing architecture know-how and guidance. I participated in corporate system engineering and strategy groups, analyzed and evaluated new technologies, and developed technical whitepapers. Representative products from these activities are reference architectures, logical and physical architecture models, system design documents, and systems engineering plan.

I functioned as Principle Investigator (contractual technical lead) and led externally funded contract studies/consulting projects with members from multiple companies. In a highly competitive industry environment, I have maintained a 100% win rate on all proposals with me being the technical lead. Some representative projects are:

Projects *[Roles]*	Characteristics	Significant Outcomes & Impacts
Joint Command and Control Architecture (2010 to present) *[Chief Architect]*	♦ 50+ large global systems with a mixture of legacy systems and service-oriented architecture ♦ Applications ranging from sensor data collection, messaging, visualization, planning, supply chain management, collaboration, reporting, database for structured data, to metadata for unstructured data	♦ Annual Systems Architecture Report (~150 pages) utilizing innovative architecture models ♦ Guidance for progressive migration to service-oriented architecture & cloud computing ♦ Proactive and focused measures on dependencies and testing in large-scale complex software systems
Service-Oriented Architecture for Net-Centric Capability Pilot and Net-Enabled Command and Control (2004 to 2009) *[Chief Architect]*	♦ Web services based on SOAP and REST styles ♦ Virtualization using VMWare hypervisor and tools for virtual machines ♦ Application of WS-*, URN, and related open standards	♦ An innovative tiered and layer reference architecture ♦ Design for 27 business service groups and 8 enterprise services ♦ Successful implementation of services and demonstration at milestone activities
Net-Centric Enterprise Services Architecture (2003 to 2005) *[Chief Architect]*	♦ Architecture modeling for Enterprise Services based on operational scenarios	♦ Successful design, implementation, and deployment of seven enterprise services ♦ A creative approach for developing executable architecture models using UML/SysML
Information and Data Architecture for Bureau of Consular Affairs/Travel Document Issuance (2003 to 2007) *[Lead Engineer]*	♦ Modernization of legacy database applications ♦ Annual volume of 20 million applications ♦ Data exchanges with multiple federal and local government agencies	♦ An innovative "person-centric" information and data architecture using the Federal Enterprise Architecture framework ♦ Successful migration of legacy systems ♦ Identification of significant accuracy constraint on the use of biometric technologies
Advanced Petroleum Reservoir Simulator System (1999 to 2000) *[Lead Engineer]*	♦ Contract study for a major south American oil and gas company ♦ Study performed by a 19-person international team of physicists and engineers ♦ Evaluation of legacy HW/SW	♦ A modernization plan for the reservoir simulation system ♦ Utilization of massive parallel computing platforms ♦ Identification of system capacity and performance requirements
MISTI – a web-based supply chain management system (1997 to 2000) *[Lead Engineer]*	♦ Web application using HTML / VBScript / ASP ♦ Automated data collection using XML ♦ Object-oriented database design	♦ A full-function MISTI prototype installed at a major oil service firm ♦ An innovative fuzzy search engine and soft-classing technique, which formed the basis of my US patents

BTG Inc., Fairfax VA, USA, Senior Systems Engineer, October 1996 – June 1997

Led the design and development of image processing software on Windows NT and Unix systems.

Analyzed requirements, performed object-oriented design and data modeling, scheduled tasks, and organized demos and briefings for clients. Analyzed the performance and optimized multithreaded algorithms. Developed "Mosaic", a MPEG video image processor with support for multiple still image formats (NITF, JPEG, GIF, TIFF). Developed a high-level design of visible/FLIR/SAR software for image feature extraction and exploitation.

NASA-Goddard Space Flight Center, Greenbelt MD, USA, Research Scientist, February - October 1996

Functioned as lead developer through a NASA contract. Responsible for software development, integration, optimization, and delivery for remote sensing data processing. Worked with C/C++/Perl on multiple platforms (PC, Sun, HP, 4-R10000 Silicon Graphics) in a client-server environment. CM tool: SCCS. Accomplishment included:

- Software Development - designed and coded satellite data (infrared imagery) processing software. Developed drivers to validate software modules. Coordinated with data modeling, configuration management, and operation teams.
- Version 1 Software Testing - developed sophisticated Perl scripts (800 lines) to perform large-volume (22 GB) image data (HDF) processing. Streamlined the process by unifying separate program modules.
- Software Optimization - achieved five-fold speed-up in a geolocation mapping software using creative computational and mathematical techniques.

Univ. of Maryland/NASA-GSFC, College Park MD, USA, Research Associate, July 1993 - February 1996

Principal Investigator for a NASA-GSFC Grant, titled "Theoretical Study of Three-Dimensional Reconnection and Fast Dynamo". R&D activities included:

- Software Development - designed and developed software (C++/C/Fortran on Unix, 4500 lines) for astrophysical research. Worked with a team of six programmers and researchers. Involved in full life cycle software development (from initial design to version 2). Integrated advanced algorithms to 3D simulation software on Cray supercomputers.
- 3D Image Visualization - designed and integrated a set of object-oriented software (C/C++, 2300 lines) for visualizing 3D data on X/Motif GUI.
- Management - coordinated research efforts of university and NASA scientists. Wrote progress reports and scientific publications in refereed journals. Presented results at professional conferences.
- Wrote proposals to government agencies. Served as reviewer for NASA proposals and referee for many professional journals (e.g. Nature).

NASA-Goddard Space Flight Center/ Greenbelt MD, USA, Research Associate. April 1991 – June 1993

Performed basic research in plasma physics and solar physics at NASA and University of Maryland under a U.S. National Academy of Sciences/National Research Council (NAS/NRC) Research Associateship Award. Coordinated programming work with a team of four researchers. Presented results at professional conferences. Also reviewed proposals for NASA Space Physics Division. Accomplishment included:

- Designed and developed a Monte Carlo simulation for solar particle motion (C/Fortran on Sun; 1200 lines) in collaboration with NASA scientists
- Developed the "Topo3d" software for 3D plasma simulation (C/C++ on SGI, Convex)
- Developed "Dynloop", a 3D simulation software (C on DEC & Cray; 3100 lines with parallel codes).

Univ. of Maryland, College Park MD, USA, Research Associate, September 1988 – March 1991

Performed basic research in plasma physics, nonlinear science, and chaos under a Center of Theoretical Physics Fellowship Award. Designed and developed efficient algorithms to solve complex equations. Worked on various platforms (PC, DEC, Sun, IBM, VAX, Cray) under Unix/VMS/DOS. Studied analytically and numerically the stability properties of laboratory plasmas. Computed fractal dimensions using novel numerical techniques. Performed original research with a group of scientists. Served as the organizer for the weekly plasma physics seminar.

TEACHING AND MENTORING EXPERIENCE

Leidos Corporation (formerly SAIC), Reston VA, USA, 1997 - present

I served as a supervisor and mentor for university students who worked as interns. They included, for example, computer science students from the University of Maryland (College Park, Maryland), George Mason University (Fairfax, Virginia), College of William and Mary (Williamsburg, Virginia), and University of Virginia (Charlottesville, Virginia). I trained them to follow disciplined engineering practices in a team environment and guided them on R&D projects. An example project involved Web services that sent alerts via messaging services (via JMS or WS-eventing). I also advised the students on career development. Upon graduation, some were hired by companies such as Microsoft. In addition, I interacted with and consulted on MIT Media Lab student projects sponsored by the company.

I also mentored company staff on continued education programs (e.g. master degree). I gave short courses and seminars to students and company staff on object-oriented software design, architecture, system engineering, and emerging information technologies.

Univ. of Maryland, College Park MD, USA, 1990 – 1996

Gave guest lectures at various plasma physics courses at the Physics Department (both graduate and undergraduate levels).

COMMUNITY SERVICE EXPERIENCE

Education & Science Society (ESS), McLean, VA, USA, 1998 – present

Served as a volunteer lecturer and technical consultant since 1998 to support ESS' educational exchange programs between US and China. Gave lectures at ESS professional development conferences. Topics ranged from comparison between western and eastern education techniques, to project management for non-profit organizations.

Designed and developed an innovative program management tool for use by ESS Program Managers in the US. The software tool features in-memory objects, a zero-management database, and recently utilization of cloud storage in order to support a highly distributed group of Managers. Since its initial version in 1998, the tool has helped manage nearly 20,000 scholarships and 5000 libraries supported by a large base of international donors.

The Zigen Fund, New York, USA, 1998 – 2000

Served as the editor for the Zigen Fund's newsletter in the US. Helped manage the Fund's education support programs for primary schools in rural China.