

## Ruby B. Lee

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### Professional Preparation:

- Stanford University, Ph.D. in Electrical Engineering (minor in Computer Science), June 1980
- Stanford University, M.S. in Computer Science and Computer Engineering, June 1975
- Cornell University, A.B. (with distinction), College Scholar program, June 1973.

### Appointments:

- Forrest G. Hamrick Professor in Engineering and Professor of Electrical Engineering, with an affiliated appointment in Computer Science, Princeton University, September 1998 - present. Director of Princeton Architecture Laboratory for Multimedia and Security (PALMS).
- Consulting Professor of Electrical Engineering, Stanford University, 1995-1998, Consulting Associate Professor of Electrical Engineering, Stanford University, 1989-1995.
- Hewlett-Packard Company, Sept. 1981 - Aug. 1998 (full-time employment concurrent with above consulting professor appointments). Chief architect, '92-'98. Lead Architect, '89-'91. Manager, microprocessor design '86-'89. Lead microprocessor designer, '84-'86. Computer architect, '81-'84.
- Acting Assistant Professor of Electrical Engineering, Stanford University, 1980-1981.

### Five related publications:

1. Ruby B. Lee, Ronald L. Rivest, M.J.B. Robshaw, Z.J. Shi, and Y.L. Yin, On Permutation Operations in Cipher Design, to be published in *the Proceedings of the International Conference on Information Technology Coding and Computing*, April 2004.
2. John P. McGregor, David K. Karig, Zhijie Shi, and Ruby B. Lee, A Processor Architecture Defense against Buffer Overflow Attacks, *Proceedings of the IEEE International Conference on Information Technology: Research and Education*, pp. 243-250, August 2003 (Best Student Paper Award).
3. John P. McGregor and Ruby B. Lee, Architectural Techniques for Accelerating Subword Permutations with Repetitions, *IEEE Transactions on Very Large Scale Integration Systems*, **11**(3): 325-335, June 2003.
4. Ruby B. Lee, David K. Karig, John P. McGregor, and Zhijie Shi, Enlisting Hardware Architecture to Thwart Malicious Code Injection, *Proceedings of the International Conference on Security in Pervasive Computing* (SPC-2003), LNCS 2802, pp. 237-252, Springer Verlag, March 2003.
5. Ruby B. Lee, Zhijie Shi and Xiao Yang. Efficient Permutations for Fast Software Cryptography. *IEEE Micro*, **21**(6): 56-69, December 2001.

### Five other publications:

1. Zhijie Shi, Xiao Yang and Ruby B. Lee, Arbitrary Bit Permutations in One or Two Cycles, *Proceedings of the IEEE International Conference on Application-Specific Systems, Architectures and Processors* (ASAP 2003), pp. 237-247, June 2003.
2. A. Murat Fiskiran and Ruby B. Lee, PAX: A Datapath-Scalable Minimalist Cryptographic Processor For Mobile Environments, to be published in *Embedded Cryptographic Hardware: Design and Security*, Nova Science Publishers, NY, USA.
3. Ruby Lee. Subword Parallelism with MAX-2. *IEEE Micro*. **16**(4):51-59. August 1996.
4. Vasudev Bhaskaran, Konstantine Konstantinides, Ruby Lee, John Beck. Algorithmic and Architectural Enhancements for Real Time MPEG-1 Decoding on a General Purpose RISC Workstation. *IEEE Transactions on Circuits and Systems for Video Technology*. **5**(5): 380-386. October 1995.
5. Ruby Lee, Precision Architecture, *IEEE Computer*. **22**(1): 78-91. January 1989.

### **Synergistic Activities:**

1. International impact on the computer industry:
  - Chief architect of the cross-divisional security architecture team at Hewlett-Packard responsible for defining the security architecture for e-commerce and extended enterprises (1997-1998).
  - Chief architect for the inter-disciplinary multimedia architecture team at Hewlett-Packard (1992-1996). Introduced the computer industry's first real-time, high-fidelity MPEG streaming video and audio product, implemented entirely in software on a low-cost desktop (January 1994). Pioneered multimedia instruction set architecture that is now implemented in all commercial microprocessors, enabling ubiquitous digital multimedia processing in computers.
  - Founding architect for the initial definition (1981-1982), and evolution through several generations of the PA-RISC architecture for processors and systems. PA-RISC processors have shipped worldwide in business servers and technical workstations for the last 17 years.
  - Co-leader of an Intel-HP architectural team that defined multimedia and parallelism features for IA-64, now called the Itanium Product Family – Intel's new 64-bit processor for servers.
2. Technology transfer and influence:
  - Scientific Advisory Board member of Mindspeak (2001-), Fullcomm (2000), Inductive Devices (2001-2002); Founder of Teleputers, LLC (2001-); Consultant of HP, PicoTurbo, Silicon Magic.
3. Assisting under-represented groups:
  - President's task force on the Status of Women in Science and Engineering (2001-2003)
  - Faculty hiring committee for Underrepresented groups in Science and Engineering (2000, 2001)
4. Advisory Board member for the Center for Cultural Policy Studies (2000-).
5. Associate Editor-in-Chief of IEEE Micro; Editorial Board member of IEEE Security and Privacy.
6. Keynote Speaker; Program Chair for conferences.

### **Honors and Awards:**

- Elected Fellow of IEEE, Nov 2002, "for contributions to general-purpose processor architectures".
- Elected Fellow of ACM, Oct 2001, "for pioneering multimedia instructions in general-purpose processor architecture and innovations in the design and implementation of the instruction set architecture of RISC processors".
- Granted 115 U.S. and international patents on instruction-set architecture, pipeline design, cache hints, multimedia architecture and arithmetic, coprocessors and multiprocessors.
- Phi Beta Kappa, Alpha Lambda Delta
- Who's Who in the World, Who's Who in America, etc.

**Recent Collaborators:** Dr. Sujoy Basu (HPL), Dr. Vasudev Bhaskaran (Epson), Dr. Pradip Bose (IBM), Prof. Neil Burgess (Cardiff University, U.K.), Prof. Michael Flynn (Stanford), Prof. Yu-Hen Hu (U. of Wisconsin), Wan-yen Hsu (HP), Dr. Jerry Huck (HP), Dr. Alan Karp (HPL), Dr. Fred Kitson (HPL), Dr. Raj Kumar (HPL), Michael Mahon (HP), Dr. Tom Malzbender (HPL), Dale Morris (HP), Dr. Hans Mulder (Intel), Prof. Ron Rivest (MIT), Prof. Matt Robshaw (Royal Holloway University of London), Prof. Michael Schulte (Univ. of Wisconsin), Prof. Michael Smith (Harvard), Dr. Vanish Talwar (HPL), Dr. Yiqun Lisa Yin (consultant).

**Thesis Advisor:** Prof. Michael Flynn, Stanford University.

**Recent Ph.D. students:** Alice Yu (2001, Stanford University). Daniel Zucker (1998, Stanford University). *Recent Masters students:* S. Specht (2003), M. Miyazaki (2002), A. Bubshait (2001), J. Bracken (2000); *Recent Senior Thesis:* L. Lo (2003), M. Cohen (2002), A. Cunningham (2002), I. Lampl (2002), G. Ramayanaran (2002), K. Hirakawa (2000), M. Yun (2000).

**Current Ph.D. students:** J. Dwoskin, A.M. Fiskiran, Y. Hilewitz, D. Karig, J.P. McGregor, N. Potlapally, Z.J. Shi, Z. Wang, X. Yang.