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EDUCATION

2009 PhD in Electrical and Computer Engineering (expected May 2009)

- **Thesis:** *Time-Based Video Transmission with Spatial Diversity over Wireless Networks*, Carnegie Mellon University.
- **Advisor:** Tsuhan Chen and Peter Steenkiste

2008 MS in Electrical and Computer Engineering from Carnegie Mellon University

1999 MS in Computer Science and Information Engineering from National Taiwan University

1997 BS in Information Management from National Taiwan University (graduated with honors)

RESEARCH EXPERIENCE

- **Research Assistant, Carnegie Mellon University** (2004 - Present)

- . Opportunistic Relaying over WLANs
Conducted research and developed an efficient opportunistic relaying protocol (PRO) for 802.11 WLANs based on MADWIFI. Implemented FlexMAC - a wireless protocol development and evaluation platform based on commodity hardware. Deployed the relaying system with video streaming services. Measured and assessed the performance via emulation testbeds and real-world experiments.
- . Time-based Adaptive Retransmission for Wireless Video Streaming
Conducted research and developed TAR, a Time-based Adaptive Retransmission strategy for providing high-quality video streaming services over WLANs. Built a prototype based on MADWIFI and HostAP.
- . Co-developed CMUseum
Led the project and co-designed a location-aware video streaming system (called CMUseum), which combines a ZigBee sensor network for location detection with a wireless video streaming system for delivering media contents.
- . Co-developed CMU H.263+ Codec
Programmed H.263+ features on top of an earlier H.263 version on both Linux/Windows platforms, including improved PB-frames mode, sliced structure mode, unrestricted motion vector, modified quantization, etc.
- . Other
Investigated performance of 802.11 rate adaptation algorithms in WLANs. Investigated advanced techniques for serving high-quality video in WiMAX networks. Co-implemented Secure AODV.

- **Research Assistant, National Taiwan University** (1997 - 1999)

- . H.323 Multimedia Conferencing System
Designed and implemented an H.323 video conferencing system. Designed a scheduling and synchronization scheme for real-time data transmission. Integrated G.723.1, G.729, and H.263 codec modules and T.120 subsystem into the overall system.
- . Network Protocol Analyzer
Integrated real-time streaming protocols Q.931, H.225.0, H.245, RTP/RTCP into the analyzer. Maintained the public releases.

WORK EXPERIENCE

- **Graduate Research Intern, HP Labs, Palo Alto, CA** (Summer 2005)
Conducted research and worked on adaptive video transcoding over 3GPP networks. Evaluated quality and performance of HP's video transcoding system. Improved the system by providing error resilience and better performance under various wireless channel conditions. Reprogrammed the system with multi-platform portability.
- **Technical Consultant, Broadband Business Unit, ASUSTeK Computer Inc., Taiwan** (02/2004 - 07/2004)
Provided consulting support for PacketCable EMTA/SMTA and SIP phone products. Supported worldwide customer relationship. Supported cable service providers and telecom companies in establishing VoIP networks. Supported CVG product shipping.
- **Software Engineer, IA Division, ASUSTeK Computer Inc., Taiwan** (06/2002 - 05/2003)
Developed PDA products (certified by Microsoft NSTL). Maintained cable voice gateway (CVG) product line. Co-defined factory test plans.
- **Deputy Manager, Broadband Communication Unit, ASKEY Computer Corp., Taiwan** (03/2002 - 06/2002)
Responsible for solution and component survey of ADSL modems, VoADSL modems, and voice gateways. Led NTT-bid voice gateway project. Provided on-site technical support.
- **Software Engineer, Broadband Communication Division, ASUSTeK Computer Inc., Taiwan** (07/1999 - 03/2002)
Led CVG project team (certified by CableLabs). Co-worked with hardware engineers for performance evaluation and tuning. Managed worldwide interoperability tests. Supported factory pilot run and defined mass production testing plans. Assisted sales division on presale affairs. Served as key vendor/customer contact window for technical issues.
- **Summer Intern, CyberLink Corp., Taiwan** (Summer 1998)
Performed benchmark testing on CyberLink's and competitors' multimedia products.

TEACHING EXPERIENCE

- **Teaching Assistant, Carnegie Mellon University** (Fall 2006)
18-544: Network Design and Evaluation
 - . Led labs and gave recitations in INTEL IXP 2400 networking processor programming.
- **Teaching Assistant, Carnegie Mellon University** (Fall 2005)
18-756: Packet Switching and Computer Networks
 - . Gave recitation lectures on network knowledge and queueing theory.
 - . Graded and assigned labs (OPNET), homework and exams.
- **Teaching Assistant, National Taiwan University** (Fall 1998)
Graduate-level course: Computer Networks
 - . Graded weekly homework and exams.
- **Lecturer, YEN TJING LING Industrial Research Institute, National Taiwan University** (Summer 1999).
 - . Lectured a series of classes on Windows NT and UNIX OS System Administration.

PATENT

- J. Apostolopoulos, M. Lu, W. Tan, and B. Shen, "Adapting Encoded Data to Overcome Loss of Data", filed for U.S. Patent: 11/413,929, April 2006.

INVITED TALKS

- Video streaming over wireless networks, 2007 First iCAST/CMU/TRUST Joint Conference, Taiwan (Jan. 2007)
- Efficient streaming media over wireless networks, The Institute for Information Industry (III), Taiwan (Jan. 2006)
- Content protection (digital watermarking) and multimedia streaming, CyLab, Carnegie Mellon University (April 2005)
- Video streaming over 802.11 WLANs with content-aware adaptive retry, HP Labs, Palo Alto, CA (Aug. 2005)

AWARDS AND SCHOLARSHIPS

- Research Fellowship, Carnegie Mellon University (2004-present)
- Research Fellowship, National Science Council, Taiwan (1997-1999)
- Honorary Student, waived from otherwise obligatory Graduate Entrance Examination (Jan. 1997)
- Mizhou Bank Fellowship (Dec. 1996)
- The President Awards (Top%5 in class), National Taiwan University (1993-1996)

ACADEMIC ACTIVITIES

- Public Relationship Officer: Carnegie Mellon Taiwanese Scholar Society
- Member: IEEE
- Member: WinECE, Women in Electrical and Computer Engineering
- Reviewer:
 - . IEEE Transactions on Mobile Computing (TMC)
 - . IEEE Transactions on Circuits and Systems for Video Technology (TCSVT)
 - . Journal of Visual Communication and Image Representation (JVCI)
 - . IEEE and ACM international conferences: ISCAS 2001-2004, ICME 2004-2006, INFOCOM 2006, PV 2007, ISCAS 2006, AICCSA 2008, MobiCom 2008.

TECHNICAL SKILLS

- Extensive hardware and software experience in networking and video processing technology.
- UNIX (FreeBSD, Linux) system and shell programming, Unix system administration, Cisco IOS router administration.
- OPNET process model development and performance analysis.
- Embedded operating systems: VxWorks, Nucleus, pSOS+.
- C, C++, MATLAB, SQL, WWW.

PUBLICATIONS

- M. Lu, Y. Chiu, and T. Chen, "Learning-based Relay Selection for Opportunistic Routing," in preparation.
- M. Lu, P. Steenkiste, and T. Chen, "Design and Implementation of an Efficient Opportunistic Relaying Protocol," submitted.
- M. Lu, P. Steenkiste, and T. Chen, "Using Commodity Hardware Platform to Develop and Evaluate CSMA Protocols," The Third ACM International Workshop on Wireless Network Testbeds, Experimental Evaluation and Characterization (WiNTECH 2008) in conjunction with ACM MobiCom 2008.
- G. Judd, X. Wang, M. Lu, and P. Steenkiste, "Using Physical Layer Emulation to Optimize and Evaluate Mobile and Wireless Systems," 5th Annual International Conference on Mobile and Ubiquitous Systems: Computing, Networking and Services (MobiQuitous 2008), Dublin, Ireland, July 2008.
- M. Lu, P. Steenkiste, and T. Chen, "Video Transmission over Wireless Multihop Networks Using Opportunistic Routing," Packet Video Workshop (PV2007), Nov. 2007.
- M. Lu, P. Steenkiste, and T. Chen, "Time-aware Opportunistic Relay for Video Streaming over WLANs," IEEE International Conference on Multimedia and Expo (ICME 2007), July 2007.
- M. Lu, P. Steenkiste, and T. Chen, "A Time-based Adaptive Retry Strategy for Video Streaming in 802.11 WLANs," Wireless Communications and Mobile Computing, Special Issue on Video Communications for 4G Wireless Systems, Jan. 2007.
- M. Lu and T. Chen, "CMUseum: A Location-aware Adaptive Retry Strategy for Video Streaming in 802.11 WLANs," IEEE International Conference on Multimedia and Expo (ICME), July 2006.
- M. Lu, P. Steenkiste, and T. Chen, "Video Streaming over 802.11 WLANs with Content-aware Adaptive Retry," IEEE International Conference on Multimedia and Expo (ICME), July 2005.
- T. Chen, M. Lu, J. Huang, "Design and Implementation of an H.323 Multimedia Conference System" Proceedings of 1999 Workshop on Distributed System Technologies and Applications, Tainan, Taiwan, May 1999.
- T. Chen, M. Lu, J. Huang, "Real-time Multimedia Synchronization on H.323 Multimedia Conference System", Proceedings of 1999 Multimedia Technology and Application Symposium, Kaohsiung, Taiwan, March 1999.

DEMOS/POSTERS

- K. Borries, X. Wang, M. Lu, G. Nychis, D. Stancil, and P. Steenkiste, "Repeatable and Fully Controlled Wireless and Mobile Experiments," ACM MobiCom, Demo, Sept. 2008.
- M. Lu, P. Steenkiste, and T. Chen, "FlexMAC: A Wireless Protocol Development and Evaluation Platform Based On Commodity Hardware," ACM MobiCom/WiNTECH, Demo, Sept. 2008.