Shantanu Rane

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Objective

To conduct theoretically sound, application-motivated research at the intersection of cryptography, signal processing, and information theory.

Experience

Palo Alto Research Center, Palo Alto, CA
Senior Member Research Staff 2014–present
Developing a broad vision for security and privacy research at PARC. Developing new theoretical and applied solutions to problems in privacy-preserving analytics.

Mitsubishi Electric Research Laboratories, Cambridge, MA
Member Technical Staff 2007–2010
Principal Member Research Staff 2010–2014

- Technical lead for projects in privacy preserving computation, secure biometrics, visual inference, and distributed video coding. Actively involved in preparing funding proposals, collaborations with business units within Mitsubishi Electric Corporation, **37** academic papers, **30** filed patents (**26** granted).
- Developed and programmed a SAR data compression scheme that led to a successful Mitsubishi Electric contract for onboard compression module of Advanced Land Observations Satellite (ALOS-2), scheduled launch in 2013.
- Instrumental in starting and leading research in Secure Multiparty Computation, a new research area at MERL. Received 2010 MERL Directors' Award for Contributions to Secure Computation.
- US National Body delegate in the ISO/IEC JTC1 SC37 Biometrics Subcommittee. Sole author of new work item proposal (NWIP) on evaluation of template protection schemes, Editor of working draft of proposed international standard.

Stanford University, Stanford, CA. 2001–2007
Graduate Research/Teaching Assistant

- Developed an error-resilient video coding framework called Systematic Lossy Error Protection (SLEP) based on distributed source coding. Included theoretical analysis, video modeling and optimization, H.264/AVC implementation.
- Ph.D. work resulted in **20** academic papers and **6** ITU-T/MPEG standards contributions and core experiments on H.264/AVC video standardization.

University of Minnesota, Minneapolis, MN. 1999–2001
Graduate Research Assistant

- Developed error-concealment scheme using image inpainting, which repairs damaged images using partial differential equations for fluid flow. Also conducted an evaluation of near-lossless compression of USGS digital elevation models.
- **4** academic papers and contributions to 3 science magazine articles.

Education

Ph.D., Electrical Engineering, Stanford University, GPA = 3.72 2007
M.S., Electrical Engineering, University of Minnesota, GPA = 3.93 2001
B.E., Instrumentation & Control, Pune University, Rank 1^{st} of 360 1999

Professional Activities

- Video Standardization: New contributions and core experiments in H.264/AVC video coding for the ITU-T/MPEG Joint Video Team (2006).
- Biometrics Standardization: INCITS/M1 US Biometrics standards and ISO/IEC JTC1 SC37 Biometrics Sub-Committee (2008 - present).
- IEEE Information Forensics & Security Technical Committee (2011–2013).
- Associate Editor, IEEE Signal Processing Magazine (2015 - present)
- Associate Editor, IEEE Trans. Information Forensics and Security (2012–2015).
- Associate Editor, IEEE Signal Processing Letters (2012–2014).
- Elevated to Senior Member, IEEE (2012).

Teamwork & Mentoring

- Proposal writer, Technical Co-Chair and Co-Organizer of IEEE International Workshop on Information Forensics and Security (WIFS 2014).
- At MERL, mentored 13 interns, and 3 visiting scientists who successfully filed patents and published in international academic conferences and journals.
- Co-supervised 3 Ph.D. theses, including winner of Springer Best Thesis Award at Carnegie Mellon University (2012).

Representative Publications
h-index = 22

Full list of papers & detailed CV available at http://ivms.stanford.edu/ srane

- S. Rane, Y. Wang, S. C. Draper and P. Ishwar, Secure Biometrics: Concepts, Authentication Architectures, and Challenges, *IEEE Signal Processing Magazine*, Vol. 30, No. 5, pp. 51–64, Sep. 2013.
- S. Rane and P. Boufounos, Privacy-Preserving Nearest Neighbors, *IEEE Signal Processing Magazine*, Vol. 30, No. 2, pp. 18–28, Mar. 2013.
- Y. Wang, S. Rane, S.C. Draper, and P. Ishwar, A Theoretical Analysis of Authentication, Privacy & Reusability Across Secure Biometric Systems, *IEEE Trans. Information Forensics and Security*, Vol. 7, No. 6, pp. 1825–1840, Dec. 2012.
- M. Li, S. Rane, and P. Boufounos, Quantized Embeddings of Scale Invariant Image Features for Mobile Augmented Reality, *IEEE Multimedia Signal Processing Workshop (MMSP 2012)*, Banff, AB, Sep. 2012 **[Top 10% Paper Award]**
- S. Rane and W. Sun, Privacy-Preserving String Comparisons based on Levenshtein Distance, *IEEE Workshop on Information Forensics and Security (WIFS 2010)*, Seattle, WA, Dec. 2010. **[28% Acceptance]**
- M. Pathak, S. Rane, and B. Raj, Multiparty Differential Privacy via Aggregation of Locally Trained Classifiers, *Neural Information Processing Conference (NIPS 2010)*, Vancouver, BC. Canada, Dec. 2010. **[24% Acceptance]**
- S. Rane, W. Sun, and A. Vetro, Privacy-Preserving Computation of L1 Distance for Multimedia Applications, *IEEE International Conference on Multimedia and Expo (ICME 2010)*, Singapore, Jul. 2010. **[15% Acceptance]**
- B. Girod, A. Aaron, S. Rane, and D. Rebollo-Monedero, Distributed Video Coding, *Proceedings of the IEEE, Special Issue on Advances in Video Coding and Delivery*, Vol. 93, No. 1, pp. 71-83, Jan. 2005. [$>$ **1000 citations**]
- S. Rane, M. Bertalmio, G. Sapiro, Structure & Texture Filling-in of missing image blocks for Wireless Transmission and for Compression Applications, *IEEE Trans. Image Processing*, Vol. 12, No. 3, pp. 296-303, Mar. 2003. [$>$ **150 citations**]