2ND COSMOS RESEARCH COMMUNITY WORKSHOP
UPDATED AGENDA

OCTOBER 14, 2020
11:00AM-6:15PM US EDT

SESSION 1 – OPENING SESSION (11:00AM – 12:00PM)

11:00 – 11:15AM	Welcoming Remarks	*D. Raychaudhuri, Rutgers University*
11:15 – 11:35AM	COSMOS Overview	*Gil Zussman, Columbia University*
11:35AM – 11:50AM	Remarks from NSF	*Alex Sprintson, NSF*
11:50AM – 12:00PM	NGIatlantic.eu – Opportunities for US – EU Experimentation on Next Generation Internet	*Jim Clarke, NGI Atlantic*

SESSION 2 – B5G WIRELESS TECHNOLOGY AND MMWAVE (12:00PM – 3:00PM)

12:00PM – 12:40PM	**Keynote Address:** **Guessing Random Additive Noise Decoding (GRAND)**	***Muriel Medard*** ***Massachusetts Institute of Technology***
12:40 – 1:00PM	Lunch Break	
1:00 – 1:20PM	Opportunities and Challenges with 5G mmw	*Mikael Höök, Ericsson*
1:20 – 1:40PM	Millimeter-wave Directional Communications: Challenges, Opportunities and Emerging Capabilities in the COSMOS Testbed	*Alberto Valdes–Garcia* *IBM T.J. Watson Research Center*
1:40 – 2:00PM	Reliable 90% Coverage and Rate Prediction of mmWave Links using New Measurement-based Propagation Models	*Reinaldo Valenzuela* *Nokia Bell Labs*
2:00 – 2:20PM	City–Scale Wireless Testbed: Research Challenges and Expectations from the Research Community	*Dola Saha* *University at Albany, SUNY*
2:20 – 2:40PM	Fog Reinforcement in Dynamic Wireless Networks	*Beatriz Lorenzo* *University of Massachusetts*
2:40 – 3:00PM	Physical Network Infrastructure Monitoring on COSMOS	*Jesse Simsarian, Nokia Bell Labs*
	20 min break	

SESSION 3 – FUTURE MOBILE NETWORKS AND EDGE CLOUD (3:20PM – 6:15PM)

3:20 – 3:50PM	**Keynote Address:** **Towards Special-purpose Edge Computing**	***Prashant Shenoy*** ***University of Massachusetts***
3:50 – 4:10PM	Optical Transport Challenges in Supporting Low Latency, Dense Cells and New MEC Architectures	*Marco Ruffini* *Trinity College–Dublin*
4:10 – 4:30PM	Clean G: Using NFV to Re-Architect the Packet Core and Control Plane for Cellular Networks	*K.K. Ramakrishnan* *University of California –Riverside*
4:30 – 4:50PM	Virtual COSMOS with Mininet-Optical	*Bob Lantz, Stanford University*
4:50 – 5:10PM	Optical Technologies at CPQD: Facing the Challenges to Support Future Networks in Brazil	*Rafa Figueiredo* *CPQD – Optical Technologies*
5:10 – 5:30PM	Mobile Edge Resource Management for Future Smart Disaster Response: Challenges and Directions	*Saptarshi Debroy* *Hunter College – CUNY*
5:30 – 5:50PM	Object Detection in Smart City Intersections: Real-time Considerations	*Zoran Kostic* *Columbia University*
5:50 – 6:15PM	OPEN FORUM for Questions and Comments	

The COSMOS Project is funded by a grant from the PAWR Project Office (PPO) and the National Science Foundation (NSF).

KEYNOTE SPEAKERS

Muriel Médard,
MIT

Title: Guessing Random Additive Noise Decoding (GRAND)

Abstract: Claude Shannon's 1948 "A Mathematical Theory of Communication" provided the basis for the digital communication revolution. As part of that ground-breaking work, he identified the greatest rate (capacity) at which data can be communicated over a noisy channel. He also provided an algorithm for achieving it, based on random codes and a code-centric maximum Maximum Likelihood (ML) decoding, where channel outputs are compared to all possible codewords to select the most likely candidate based on the observed output. Despite its mathematical elegance, his algorithm is impractical from a complexity perspective and much work in the intervening 70 years has focused on co-designing codes and decoders that enable reliable communication at high rates.

We introduce a new algorithm for a noise-centric, rather than code-centric, ML decoding. The algorithm is based on the principle that the receiver rank orders noise sequences from most likely to least likely, and guesses noises accordingly. Subtracting noise from the received signal in that order, the first instance that results in an element of the code-book is the ML decoding. For common additive noise channels, we establish that the algorithm is capacity-achieving for uniformly selected code-books, providing an intuitive alternate approach to the channel coding theorem. We illustrate the practical usefulness of our approach and the fact that it renders the decoding of random codes feasible. The complexity of the decoding is, for the sorts of channels generally used in commercial applications, quite low, unlike code-centric ML.

This work is joint with Ken Duffy (Maynooth University).

Bio: Muriel Médard is the Cecil H. Green Professor in the Electrical Engineering and Computer Science (EECS) Department at MIT and leads the Network Coding and Reliable Communications Group at the Research Laboratory for Electronics at MIT. She has served as editor for many publications of the Institute of Electrical and Electronics Engineers (IEEE), of which she was elected Fellow, and she has served as Editor in Chief of the IEEE Journal on Selected Areas in Communications. She was President of the IEEE Information Theory Society in 2012, and served on its board of governors for eleven years. She has served as technical program committee co-chair of many of the major conferences in information theory, communications and networking. She received the 2019 Best Paper award for IEEE Transactions on Network Science and Engineering, 2009 IEEE Communication Society and Information Theory Society Joint Paper Award, the 2009 William R. Bennett Prize in the Field of Communications Networking, the 2002 IEEE Leon K. Kirchmayer Prize Paper Award, the 2018 ACM SIGCOMM Test of Time Paper Award and several conference paper awards. She was co-winner of the MIT 2004 Harold E. Egerton Faculty Achievement Award, received the 2013 EECS Graduate Student Association Mentor Award and served as undergraduate Faculty in Residence for seven years. In 2007 she was named a Gilbreth Lecturer by the U.S. National Academy of Engineering. She received the 2016 IEEE Vehicular Technology James Evans Avant Garde Award, the 2017 Aaron Wyner Distinguished Service Award from the IEEE Information Theory Society and the 2017 IEEE Communications Society Edwin Howard Armstrong Achievement Award. She is a member of the National Academy of Inventors. She was elected Member of the National Academy of Engineering for her contributions to the theory and practice of network coding in 2020. She received in 2020 a doctorate honors cause from the Technical University of Munich.

Prashant Shenoy
University of
Massachusetts

Title: Towards Special-purpose Edge Computing

Abstract: In this talk, I will argue that the era of general-purpose computing is rapidly evolving into one of special-purpose computing due to technological advances that allow for inexpensive hardware devices and accelerators to optimize specific classes of application workloads. Edge computing has not been immune to these trends, and it is now feasible to specialize edge deployments for workloads such as machine learning analytics, speech, and augmented reality using low-cost specialized hardware. I will discuss the implications of these technology trends of the future mobile and IOT-based edge applications and present new challenges that will need to be addressed to fully exploit these trends.

Bio: Prashant Shenoy is currently a Distinguished Professor and Associate Dean in the College of Information and Computer Sciences at the University of Massachusetts Amherst. He received the B.Tech degree in Computer Science and Engineering from the Indian Institute of Technology, Bombay and the M.S and Ph.D degrees in Computer Science from the University of Texas, Austin. His research interests lie in distributed systems and networking, with a recent emphasis on cloud and green computing. He has been the recipient of several best paper awards at leading conferences, including a Sigmetrics Test of Time Award. He serves on editorial boards of the several journals and has served as the program chair of over a dozen ACM and IEEE conferences. He is a fellow of the ACM, the IEEE and the AAAS.

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