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Hello From The Director

Prof. Theodore (Ted) S. Rappaport

Recent press releases by leading wireless companies, such as Samsung Electronics, NEC, and NTT, have caught the attention of the popular press. Radio system prototypes and experiments are now demonstrating that millimeter wave wireless communications is not only viable, but, in fact, will be necessary to keep up with the expected demand for capacity by mobile consumers. Indeed, the amount of spectrum available for wireless communications at frequencies above 10 GHz eclipses today’s global cellular spectrum allocation by many, many orders of magnitude. This is a great new frontier, and I haven’t seen this much opportunity or excitement since the early 1990’s when a tiny company called Qualcomm proffered the idea of CDMA to a fledgling and skeptical mobile industry that was starved for spectrum at the time.

I am convinced that millimeter wave wireless communications is the future, as our work and others have shown that technology will support the move up in frequency and bandwidth. However, what is not clear to me is how we will produce enough properly educated engineers who will build out this completely new world of wireless - with new architectures, new networks, and new systems and signal designs, and new equipment form factors and use cases. An army of engineers will be needed, steeped in this new world of millimeter wave wireless communications, where wavelengths are so small that circuit and antenna issues become integral to communications, and where test and measurement equipment does not yet even exist. At NYU WIRELESS, we are working closely with our industrial affiliate sponsor companies to solve problems, develop technologies, and to ensure there is an arsenal of students who can help build this future. We would welcome your company’s involvement as we build this future together in one of the greatest laboratories in the world- New York City.

The IEEE and technical conferences are beginning to do their part in disseminating knowledge and building this technical community. This year at the IEEE International Conference on Communications in Budapest, there was a special panel on "Millimeter Wave for 5G." There, leading experts from Intel, Ericsson, Samsung, NEC, and Nokia Siemens offered their views and early results. The Communications Theory Workshop in Thailand also featured a look at mmwave wireless. While these are very early days, one thing to look for in the coming years is a move up in frequency and bandwidth at a rate that far exceeds anything that has happened before in the history of wireless. Moore’s law is finally about to do its magic by shrinking the radio wavelength of wireless systems.
L-3 Communications has joined the NYU WIRELESS research center as an industrial affiliate sponsor and board member. L-3 is a leading aerospace and defense company with technical expertise and best-in-class products in many areas, including secure and networked communications, microwave, RF and telemetry.

According to Dr. Randal Sylvester, Chief Technologist for L-3’s Communication Systems-West unit, investing in NYU WIRELESS was an easy choice to make. “When partnering with academia, we seek programs with exceptionally strong research capabilities in emerging fields who can produce students capable of solving difficult problems” said Dr. Sylvester. “The groundbreaking research in circuit design, video signaling, and millimeter wave communications at NYU WIRELESS will be an asset to L-3, and facilitate business growth.”

“L-3 is a world class communications and engineering company, and we are pleased to be working closely with them. We are delighted to have their active involvement in our center as we partner with them on new projects,” said Prof. Theodore (Ted) Rappaport, NYU WIRELESS director and founder.

NYU WIRELESS is a new research center at New York University (NYU) and NYU-Poly that includes more than 20 faculty and 100 graduate students in engineering, computer science, and medicine. The center involves faculty and students across these disciplines, and is playing a leading role in research and education for emerging millimeter wave mobile communications, high rate mobile video, and new medical applications of wireless technology. L-3 Communications has made a commitment of $300,000 for a three-year affiliate membership, and joins the NYU WIRELESS Industrial Affiliates advisory board that also includes Samsung Corporation, National Instruments, and InterDigital.

Headquartered in New York City, L-3 employs approximately 51,000 people worldwide and is a prime contractor in C3ISR (Command, Control, Communications, Intelligence, Surveillance and Reconnaissance) systems, platform and logistics solutions, and national security solutions. L-3 is also a leading provider of a broad range of electronic systems used on military and commercial platforms. The company reported 2012 sales of $13.1 billion.
NYU WIRELESS offers an unprecedented and unique set of skills in a world-class research environment to create next generation mass-deployable devices across a wide range of applications and markets. This new center combines NYU-Poly’s engineering program with NYU’s world-class Medical school and the Courant Institute, with a depth of expertise that offers unparalleled capabilities for the creation of new technologies. NYU WIRELESS involves more than 20 faculty members and 100 graduate students from NYU-Poly’s Electrical and Computer Engineering department, NYU’s Courant Institute of Mathematical Sciences, and the Langone School of Medicine (NYUSOM).

NYU WIRELESS Faculty

Henry Bertoni
Radio Channels
NYU-Poly

Marc Bloom
Anesthesiology
NYUSOM

Ryan Brown
RF Coils/Imaging
NYUSOM

Justin Cappos
Systems Security
NYU-Poly

Christopher Collins
MRI
NYUSOM

Elza Erkip
Communications
NYU-Poly

David Goodman
Communications
NYU-Poly

Ramesh Karri
VLSI systems
NYU-Poly

Mike Knox
RF/Microwaves
NYU-Poly

Ricardo Lattanzi
MRI
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Ricardo Otazo
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Algorithms/Data
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Dan Sodickson
RF/ MRI Design
NYUSOM

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Computing
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Jonathan Viventi
Med. Electronic
NYU-Poly

Peter Voltz
DSP/Comms.
NYU-Poly

Yao Wang
Image/Video
NYU-Poly
NYU WIRELESS Moves Into World-Class Research Space

In the spring of 2013, NYU WIRELESS faculty and students completed their move into 13,500 square feet of world-class research space, with labs for wireless research, computing, and medical applications. The space was designed to create a collaborative environment where state-of-the-art wireless research can be conducted in an ultra-modern, comfortable setting that fosters collaboration among faculty and student researchers, while providing room for corporate visitors. Located on the 9th floor of the NYU-Poly 2 MetroTech building, Brooklyn campus visitors are greeted by a spectacular view of the New York metroplex, with the Chrysler building and Manhattan bridge featured prominently. The same view is prominent in the executive conference room. The facility is equipped with special visitor work carrels as well as seating for collaborators and corporate sponsors.

The NYU WIRELESS research space also contains three new classrooms that feature the latest technologies in acoustics, lighting, and multi-media surround sound. In addition to the executive conference room, the graduate students have a second conference room with a technical library, and several large common areas conducive to brainstorming and social interaction, including a large lounge and a kitchen pantry equipped with all the comforts of home. The new facility also contains four fully equipped laboratories for researching the next generation of wireless technologies. Equipped with over 75 student workstations, the space provides a dedicated workplace for NYU WIRELESS student researchers and faculty from throughout NYU. Students can easily collaborate on research projects using lounge areas and the student conference room, all which are equipped with whiteboard walls and modern projectors.

The NYU WIRELESS laboratories contain a wide range of instruments including FPGA development platforms, RF channel sounders, signal generators, vector network analyzers, spectrum analyzers, protocol analyzers, circuit and simulation workstations, and semiconductor probe stations. The lab is fully equipped to perform communications, networking, and signal processing research for fifth generation (5G) wireless topics, as well as new medical wireless devices. NYU WIRELESS faculty and students conduct extensive research on systems, architectures, and applications covering the physical layer, media access control layer, and networking layers for broadband wireless and wired communications. Other center research areas include circuit design and medical instrumentation development for MRI imaging, anesthesiology, and cardiology research.

The research space was designed by Professor Theodore (Ted) Rappaport, the founding director of NYU WIRELESS and a faculty member of the Electrical and Computer Engineering Department at NYU-Poly, the Courant Institute of Mathematical Sciences, and the Department of Radiology at NYU Langone Medical Center. He previously founded academic wireless centers at Virginia Tech and The University of Texas at Austin, and also founded two wireless technology companies.
NYU WIRELESS Receives $1.2 Million NetS Grant from National Science Foundation

As further validation of the investment in wireless research at NYU, the National Science Foundation (NSF) recently announced NYU WIRELESS professors Sundeept Rangan, Elza Erkip and Ted Rappaport have received a four year, $1.2 Million research grant through its NetS Medium-sized grant program. Known for its intensely competitive nature, NetS research awards are highly coveted and quite competitive. They involve a stringent peer-review process by industry and academic experts. This major NSF award augments recent investments by major communications companies, such as Samsung, National Instruments, InterDigital and L-3 Communications, which are industrial affiliate sponsors of NYU WIRELESS, as well as Intel and Nokia Siemens, who are supporting millimeter wave research at NYU WIRELESS.

The project, entitled “Massive Mobile Broadband Communications with Millimeter Wave Picocellular Networks,” will fund approximately six full time graduate and undergraduate students and will develop new theories and analysis results for the mobile industry, as it begins to contemplate new architectures and approaches for carrying orders of magnitude more data capacity to the subscriber handset.

Intel Awards $1.05 Million to NYU WIRELESS, Princeton, and Univ. of Southern California for 5G Cellular Development

Intel Corporation has awarded NYU WIRELESS with research funding for fifth generation (5G) cellular development. NYU-Poly Professor Theodore (Ted) Rappaport and Professor Mung Chiang from Princeton University received $250,000 distributed over three years. Additionally, Professor Andy Molisch and Professor Giuseppe Caire from the University of Southern California received $550,000 distributed over three years. Collaboration between NYU-Poly’s NYU WIRELESS, Princeton University, and the University of Southern California totals $1.05 million and was awarded as part of Intel’s highly competitive “Beyond 4G” award competition. Only a handful of top academic research centers throughout the world receive funding from Intel’s competitive programs, and NYU WIRELESS is pleased to be working with Intel and colleagues at USC and Princeton.
Current wireless communication channels are experiencing heavy congestion due to the widespread use of smartphones and tablets world-wide, thus giving rise to an unprecedented demand for wider and faster cellular networks and less costly backhaul between base stations. Millimeter wave communication channels offer a viable solution to current bandwidth congestion. The millimeter wave frequency spectrum can support high bandwidths, thus providing multi-gigabit data rates, much greater than today.

NYU WIRELESS graduate students Shu Sun and George Maccartney, working with professor Theodore (Ted) Rappaport, will lead a project for Nokia Siemens Networks (NSN) that will study millimeter wave cellular communications measurements in the E-band in Brooklyn and Manhattan. This data will be used as the basis of a statistical spatial channel model to characterize the millimeter wave band in one of the world’s toughest propagation environments.

Cisco Systems Awards Prof. Yao Wang $75,000 To Fund Video Web Streaming Research Project

NYU WIRELESS Professor Yao Wang has received $75,000 from Cisco Systems, Inc., to support a research project on “Video Adaptation for HTTP Live Streaming Using Perceptual Quality and Rate Models Considering the Impact of Temporal Variation of Frame Rate and Quantization.” In video streaming, the video coding rate has to be changed dynamically in response to changes in the sustainable bandwidth at the receiver. To optimize the perceptual quality, one must consider the impact of varying the video rate (often realized by varying quantization stepsize, frame rate, and frame size) on the perceived video quality. In this project, Prof. Wang and her students will perform subjective quality experiments to systematically evaluate the impact of such variations, and develop models that analytically relate the quality with the variation patterns of different encoding parameters. They will further design practical video adaptation algorithms under the recently standardized dynamic adaptive streaming over HTTP (DASH) framework, which can improve users’ quality of experience by exploiting the developed quality model.
Predicting future trends is an essential skill for companies. To help them discover new trends that may be disruptive to existing Internet bandwidth, Time Warner Cable, in conjunction with the NYC Media Lab, has provided a $40k grant to NYU WIRELESS Professor Justin Cappos. Prof. Cappos is working with his post doc, Dr. Yanyan Zhuang, to study potential new technologies that may drive different home user bandwidth trends. While there are several topics they are investigating, the work of NYU WIRELESS on 5G is particularly disruptive and different to end user bandwidth. According to Prof. Cappos, “The 5G initiative at NYU WIRELESS has the potential to completely shift and change bandwidth patterns as it relates to end users. With 1000 times more bandwidth, it not only enables more applications, but also allows some backhaul links that would be currently wired to be wireless.”

Internet bandwidth has been driven by two factors: network buildout and disruptive technologies. 5G happens to be both. Network buildout includes the carrying capacity, speed, and other quality factors. Using the less crowded millimeterwave spectrum, 5G will enable up to 1000 times higher capacity than the current 4G. Disruptive technologies dramatically shifts the bandwidth use pattern by changing how users access a network. In this sense, 5G changes the way for people to use a smartphone or computer: via the development of smaller, smarter cells, devices cooperate for, rather than compete for, spectrum bandwidth. Amongst the four topics investigated, it is anticipated that 5G will first lead to a ground-swell of network use that is fundamentally different than any previous expectations would have predicted.

5G will be the driving force. It enables more devices to be connected to the Internet through the use of abundant spectrum at a different frequency. It also encourages wireless relaying and cooperative communication. This paves the way for the second technology for future bandwidth trend: Internet of Things (IoT). The other two technologies are peer-to-peer (P2P) cloud / overlays, and software defined networks (SDN) for consumer networks. All four technologies will shift the use pattern of network bandwidth and result in a different bandwidth demand curve in the future.

Prof. Cappos is the leader of the Seattle project at NYU WIRELESS, a testbed deployed on tens of thousands of computing devices and used by thousands of developers around the world. Seattle is also being commercialized to build a P2P cloud storage environment. “With 5G initiative and Seattle testbed, the new disruptive and transformative technologies at NYU WIRELESS will bring together people, devices, computation and data. They will turn resources and information into unprecedented service capacities. This is in fact the goal of lots of companies and government, including Cisco’s vision on Internet of Everything (IoE), Fog Computing, and Mozilla IGNITE,” says Dr. Yanyan Zhuang. With the four technologies, 5G, IoT, P2P cloud and SDN, it’s not difficult to imagine a future Internet where network infrastructure becomes less complex, everyday devices have ubiquitous connectivity, and power meters, washing machines, thermostats, and toasters are all connected to the Internet. “Computation, storage and data transfer will no longer be up in the cloud. They will happen right inside our homes and buildings.”
In the fast-paced world of wireless technology, researchers need a powerful and flexible platform to rapidly design and prototype communications systems and protocols at all layers of the protocol stack. Traditional test solutions, such as commercially available channel and base station emulators, are often prohibitively expensive and lack the programmability and flexibility needed when engineering completely new technologies. Offering a more configurable alternative to “big box” equipment, individual embedded microcontroller, FPGA, and DSP boards typically found in academic labs leave much to be desired, and are often impractical for experimenting with networks larger than just a few nodes.

This is why NYU WIRELESS graduate student Russell Ford, under the supervision of Prof. Sundeep Rangan, is building a testbed that combines the benefits of FPGA Software-Defined Radio (SDR) with real-time, software-based network emulation. The researchers believe the new flexible real-time emulation environment will dramatically decrease turn-around time for designs and algorithm testing for future millimeter-wave cellular networks that exploit cooperative communication and high gain steerable antennas. The emulation system works hand in hand with a real time channel model that may be implemented using real-world millimeter wave (mm-wave) propagation data from New York City collected by the research team of Prof. Ted Rappaport. The ability to implement and evaluate a wide range of new approaches will accelerate and differentiate the activities at NYU WIRELESS in the fields of cellular and wireless networking.

The testbed makes use of the popular, open-source NS-3 framework to simulate medium-size LTE/EPC networks in real-time on a multi-core Linux machine. One of the advantages of NS-3 emulation is the ability for real applications to tap into the simulation using virtual network interfaces. Sponsored by National Instruments and Interdigital Communications, corporate members of the NYU WIRELESS Industrial Affiliates program, with funding from the National Science Foundation (NSF), the new simulation capabilities are helping drive product development for future products at the participating companies.

Ford, a Ph.D. student in Electrical and Computer Engineering, co-ops at National Instruments in Austin, Texas when he is not working on his Ph.D. at NYU. He believes that the testbed will be an invaluable tool for research, not only for improving current systems like LTE but also for investigating novel, next-gen systems such as mm-wave cellular. By combining the speed and accuracy of FPGAs with the ease of programming software simulation into a single platform, researchers can undertake these kinds of challenging systems engineering projects that would be considerably more difficult using traditional solutions.
Social Network-based Music Video Recommendation System

There is an extraordinary amount of video content available online now through popular websites like YouTube, Netflix, and Hulu. With the rise in the number of online streaming video websites, it has become increasingly challenging for users to quickly identify video content that falls in line with their interests. That challenge has given rise to the recommendation system. Traditional recommendation systems, which employ collaborative filtering, predict the interests of users by mining their video watching and rating history data. The popular online social networks, like Facebook and Twitter, provide additional information to improve the accuracy of video recommendation.

The common rationale behind social recommendation systems is that a user’s taste is similar to and/or influenced by her trusted friends in social networks. NYU WIRELESS faculty member Prof. Yong Liu is developing a Facebook app for music video recommendation between friends. The core of the app is a social recommendation system that automatically generates music video playlists for users by mining their own video watching and rating history, as well as the video watching and rating activities of their friends on a social network. User feedback, including likes and dislikes, comments, and shares, are collected and processed in real-time to dynamically update their playlists. If the app is widely adopted by users, it will serve as a valuable platform to conduct online experiments to test and improve the recommendation accuracy and user experience of various social recommendation systems proposed by other research teams.

Medical Research News

Developing A Small Wireless Electrophysiology System

NYU WIRELESS Prof. Jonathan Viventi and researchers Shih-Cheng Cheng, Yen-Chia Chuan and Jui-Chih Wang have designed a small diameter (25 mm) and low-profile (7 mm) wireless electrophysiology system that can be implanted on different kinds of small animals. The system is designed around commercially available Bluetooth Low Energy components for low cost and ease of use. The size, noise, sampling rate, bandwidth, number of channels, battery life, input voltage range, distortion and cost were some of the challenges faced by the team. The system will be used in a number of freely behaving animal experiments at NYU. The system, including complete circuit diagrams and software, will be made available through NYU WIRELESS.
Doctors often wonder if their patients are following orders. After all, without the patient’s cooperation, the best medical treatments in the world will not work if the patient does not follow the proper prescribed dosing regimen. Dr. Antoinette Schoenthaler, an NYU WIRELESS medical researcher, clinical epidemiologist, hypertension specialist, and behavioral scientist, is leading a project, sponsored by the American Heart Association, to evaluate the effect of a practice-based adherence intervention (AI) vs. usual care (UC) for medication adherence in 148 high-risk Latino patients with uncontrolled hypertension (HTN).

To facilitate translation into routine practice, the AI will be integrated into the clinic electronic medical record system, and be delivered by bilingual health coaches. To provide a more targeted intervention, a one-month screening phase with a wireless electronic monitoring device (EMD) will be used to determine the adherence status of the patients. Only patients who are non-adherent to their antihypertensive medications (taking < 80%) at the one-month visit will be randomly assigned to either the AI or UC group. The project hypothesizes that a higher proportion of patients in the AI group will be adherent to their medications and exhibit a greater reduction in systolic and diastolic BP at six-months. All patients will meet with health coaches for medication reconciliation, appointment setting, and follow-up. Those in the UC group will receive standard HTN care as determined by their physician. Patients in the AI group will also complete a tailored adherence checklist with the health coach and receive individualized counseling to develop self-monitoring strategies to improve medication adherence. Adherence reports created from the wireless EMD data will be uploaded into the clinic EMR for the counseling sessions. Sessions for the AI group will be held biweekly for the first three months followed by monthly sessions for the remaining three months (nine sessions total). The primary outcome is the proportion of adherent patients one month after the final intervention session, assessed with data collected via a wireless EMD.
The application of compressed sensing for rapid magnetic resonance imaging (MRI) has started a revolution in the medical field, and promises to significantly improve current imaging techniques while enabling new, faster imaging capabilities that detect abnormalities in the body much earlier than ever before possible. NYU WIRELESS is playing an important role in this pioneering medical advancement.

Prof. Ricardo Otazo and his research team at the NYU Department of Radiology have developed several compressed sensing MRI techniques with promising applications to cardiac, body, breast, neuro and musculoskeletal imaging. However, compressed sensing reconstruction increases the computational burden and thus reconstruction time, which is currently one of the major limitations for clinical acceptance.

In order to use compressed sensing in clinical applications, NYU WIRELESS faculty in the schools of Medicine and Computer Science including Zhouheng Yang, Dennis Shasha, Florian Knoll and Ricardo Otazo have developed novel implementations of many compressed sensing reconstruction algorithms using parallel computing techniques on commercially-available Graphical Processing Units (GPUs). These have provided a boost in performance and enabled real-time reconstructions. For example, the reconstruction time of a 2D cardiac cine data set, which is used clinically for evaluation of cardiac function, was reduced from five minutes (with an optimized Matlab implementation) to only 0.8 seconds (with a parallel CUDA implementation on a GPU). Using the same implementation, the reconstruction of a multislice cardiac perfusion data set with whole-heart coverage (4D imaging), which is used for diagnosis of ischemic heart diseases, was feasible in only 14 seconds.

Such significant improvements pave the way for clinical acceptance of compressed sensing, and enable the possibility of real-time evaluation of the images, as they are being acquired. This boost in processing, combined with the improved imaging capability of moving parts, such as the beating heart, and lungs, offers revolutionary speed-up times and much improved capabilities for diagnosing patients. The application of compressed sensing in clinical studies is expected to vastly improve the ability to detect, diagnose and treat lesions as compared to current magnetic MRI techniques used in hospitals and clinics today.
NYU WIRELESS Electrical Engineering Professor Michael Knox and researcher Gavin Vitale are developing a method to reliably monitor heart rate by detecting arterial wall movement through the use of Radio Frequency (RF) electromagnetic waves. A sensor may be placed inside the mouth, so as to maximize freedom of movement for the user, and allows for ease of setup when the RF sensor is fitted in an oral appliance. So-called “non-contact” methods of pulse detection allow for vital sign detection in a number of different environments; from within the safe confines of a medical office to a more challenging atmosphere like a recently affected disaster area.

The majority of research thus far has involved detecting movement of the heart wall to convey pulse information. This is typically accomplished using a Doppler radar receiver where the phase of the returning wave is compared with the incident wave phase to provide range information about the intended target.

Sophomore Undergraduate Researchers Receive NYU Award

NYU WIRELESS sophomore undergraduate researchers Jocelyn Schulz (Electrical Engineering & Computer Science) and George Wong (Physics & Math) received the award for Best-in-Panel in “Mathematics and Modeling in Understanding of the Physical World” at the 39th annual NYU Undergraduate Research Conference on April 12, 2013. Schulz and Wong presented their work from Prof. Ted Rappaport’s group on a 3D statistical ray tracer for mm-wave frequencies, along with results from a 28 GHz urban propagation measurement campaign sponsored by Samsung. An abstract of their work will be published in the 17th volume of NYU’s journal of undergraduate research, Inquiry. Schulz and Wong were funded by NYU’s Dean’s Undergraduate Research Fund, as well as by the National Science Foundation, and the NYU WIRELESS Industrial Affiliates program.
IEEE Honors NYU WIRELESS Professor for Research to Speed Mobile Data Transfer

NYU WIRELESS’s Associate Director Prof. Elza Erkip has received the 2013 IEEE Communications Society Award for Advances in Communication for her paper “User Cooperation Diversity-Part I: System Description,” which was published in the journal IEEE Transactions on Communications in 2003. The award is given to an outstanding paper that appeared in any IEEE Communications Society publication in the previous 15 calendar years, a timeframe that ensures that the winning piece has had a vital and long-lasting impact.

This marked the second time the paper had been honored by the Institute of Electrical and Electronics Engineers (IEEE): In 2004, shortly after its publication, “User Cooperation Diversity-Part I and Part II” had won the IEEE Communications Society’s Stephen O. Rice Paper Prize, which is awarded annually to a stellar paper from the preceding three years that the organization predicts will have significant importance—in Erkip’s case, an exceptionally accurate prediction.

The paper, which was co-written by Andrew Sendonaris and Behnaam Aazhang, addresses a problem familiar to any user of a mobile phone: dropped calls and poor reception due to variations in signal strength. Erkip and her colleagues formulated a plan in which the signal on an individual’s mobile device could be boosted by tapping into the collective power of surrounding smartphones, laptops, and other wireless devices. “Results show that, even though the inter-user channel is noisy,” they wrote, “cooperation leads not only to an increase in capacity for both users but also to a more robust system, where users’ achievable rates are less susceptible to channel variations.”

“Dr. Erkip has contributed significantly to the basic knowledge that enables better and faster communication in the 21st century, and NYU-Poly is honored to count her among our faculty in one of our core academic areas,” said NYU-Poly President Katepalli R. Sreenivasan. “We congratulate her on this important recognition by her peers.”

Erkip is a Fellow of the IEEE, the world’s largest professional association for the advancement of technology. The organization includes more than 425,000 members in some 160 countries; has more than 1,400 standards and projects under development; and publishes almost 150 transactions, journals, and magazines.

Her other IEEE honors include: the IEEE ICC Communication Theory Symposium Best Paper Award in 2007, a Distinguished Lectureship in the IEEE Information Theory Society, the General Chairmanship of the 2013 IEEE International Symposium of Information Theory, and membership on the Board of Governors of the IEEE Information Theory Society. Additionally, Erkip was an Associate Editor of IEEE Transactions on Information Theory from 2009 to 2011, an Associate Editor of IEEE Transactions on Communications from 2006 to 2008, a Publications Editor of IEEE Transactions on Information Theory from 2006 to 2008 and a Guest Editor of IEEE Signal Processing Magazine in 2007.

A finalist for the New York Academy of Sciences Blavatnik Awards for Young Scientists in 2010, she has also been the recipient of the National Science Foundation CAREER Award and the IBM Faculty Partnership Award.

Erkip, who has chaired numerous conferences and workshops, was elected in 2013 to the Science Academy Society of Turkey. She currently serves as the Associate Director of NYU WIRELESS, the world’s first academic research center combining wireless, computing, and medical applications.
NYU WIRELESS Leadership

Associate Directors Elza Erkip, Dennis Shasha, and Daniel Sodickson are helping Director and Founder Ted Rappaport manage NYU WIRELESS across the Brooklyn and Manhattan campuses of NYU. Prof. Erkip is an Electrical and Computer Engineering professor at NYU-Poly, and is a world-renowned information theorist who serves on the Board of Governors of the IEEE Information Theory Society. Prof. Shasha of Courant’s Computer Science Department is widely known for his expertise in data-intensive algorithms, streaming data, and is a highly acclaimed inventor of mathematical puzzles and sometimes columnist for magazines such as Scientific American. Dr. Daniel Sodickson is the Vice Chair for Research in the Department of Radiology at NYU School of Medicine, and is Director of the Bernard and Irene Schwartz Center for Biomedical Imaging. Sodickson pioneered the use of radiofrequency detector arrays for parallel data acquisition in magnetic resonance imaging (MRI), which has revolutionized the daily practice of MRI for clinical diagnosis and research.

Research at NYU WIRELESS

NYU WIRELESS Electrical and Computer Engineering faculty have expertise in information theory, video and speech coding and processing, DSP and simulation, networking, circuit design, and RF propagation and antennas. The Medical faculty specializes in MRI, EP Cardiology, Anesthesiology, Neurosurgery, Behavioral Medicine, and have a wide range of clinical specialties. Computer Science faculty have expertise in databases, algorithms, network topologies, and social/web-based traffic monitoring and prediction. NYU WIRELESS has state-of-the-art RF/Analog circuit design, simulation, and hardware testing capabilities for semiconductor devices up to 220 GHz, specialized RF propagation and antenna test systems, subjective audio and video testing equipment, and access to the entire NYU IT network for research studies. Students and faculty are familiar with proper procedures for IC design, layout, and testing, and have conducted successful tape-outs using state-of-the-art semiconductor processes. Faculty in NYU WIRELESS are research leaders with expertise in wireless communications, distributed computing and networking, radiology, medical imaging, surgery, diagnostics, and the life sciences.

Publications

Wireless Communication


Magnetic Resonance Imaging
Free-breathing contrast-enhanced multiphase MRI of the liver using a combination of compressed sensing, parallel imaging, and gold-en-angle radial sampling, Chandra-rana, Hersh; Feng, Li; Block, Tobias K; Rosenkrantz, Andrew B; Lim, Ruth P; Babb, James S; Sodickson, Daniel K; Otazo, Ricardo, 2013 Jan;48(1):10-16, Investigative radiology — id: 202342, year: 2013, vol: 48, page: 10, stat: Journal Article.


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Genomics, Parallel Computing and Databases
Gene regulatory networks in plants:
NYU WIRELESS Publications (Genomics, Parallel computing and Databases Continued)(Dec 2012 - June. 2013)

learning causality from time and perturbation Gabriel Krouk, Jesse Lingeman, Amy Marshall Colon, Gloria Coruzzi and Dennis Shasha Genome Biology 2013, 14:123 (27 June 2013)

“Parametric Bayesian Priors and Better Choice of Negative Examples Improve Protein Function Prediction”, Noah Youngs, Duncan P Lorenzo-Brown, Kevin Drew, Dennis Shasha, Richard Bonneau Bioinformatics 2013;

Fernando Chirigati, Dennis Shasha, and Juliana Freire, “ReproZip: Packing Experiments for Sharing and Publication” ACM SIGMOD 2013;

Wei Cao and Dennis Shasha, “AppSleuth: a Tool for Database Tuning at the Application Level”, EDBT 2013

Electromagnetics


Security


Public Health


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