

## In Step with Negar Reiskarimian

### *A Rising Star in Integrated Circuits*

Ever since she was a little girl, Negar Reiskarimian dreamed of becoming an engineer. Her father, a civil engineer in Iran, influenced her to pursue her dreams. Negar was born in Shiraz, Iran. She graduated high school in 2007 and moved to Tehran to attend Sharif University of Technology. Negar completed her bachelor's and master's degrees in 2011 and 2013, respectively.

Negar's master's work was under the advisement of Prof. Ali Fotowat-Ahmady. Her master's thesis focused on designing an adaptive electro-optical receiver with maximum sensitivity for free-space optics (FSO) links. In FSO systems, various atmospheric conditions, such as fog and rain, can have adverse effects on establishing and maintaining the reliability of the link. Having reconfigurability and adaptive control in the electro-optical front end to compensate for the uncertainties of the atmospheric effects is essential.

In 2013, Negar's journey continued, and she moved to the United States to pursue her Ph.D. at Columbia University in New York. She joined Prof. Harish Krishnaswamy's group in August 2013, and her expected gradu-

The article is part of a series highlighting an SSCS member in each issue of the magazine. If you would like to nominate a member to be featured or would like to be featured yourself, please e-mail News Editor Abira Sengupta (abira.sengupta@ieee.org).

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The Marconi Society reception for Young Scholars in October 2017 (from left): Wenhan Dai, Shu Sun, Negar Reiskarimian, Vinton Cerf (chair of the Marconi Society), Ananda Theertha Suresh, and Robert Tkach (vice chair of the Marconi Society). Marconi Society Paul Baran Young Scholars are a diverse group of outstanding young scientists and engineers who have demonstrated exceptional capability and potential.



Negar and her brother, Amirreza, at the airport before she left for the United States in 2013.

ation date is May 2019. "Working with Prof. Krishnaswamy has been the highlight of my Ph.D.," said Negar of her advisor. "His enthusiasm and dedication have taught me a lot during these past few years."

Negar's Ph.D. dissertation focuses on breaking Lorentz reciprocity on a complementary metal-oxide-semi-



Negar at Columbia University's Norooz Celebration (Iranian New Year).

conductor chip. Lorentz reciprocity is a fundamental characteristic of the vast majority of electronic and photonic structures. In a reciprocal medium, signals traveling in opposite directions



Negar chats with a colleague at the 2015 IEEE Radio Frequency Integrated Circuits Symposium.



Negar presents her first conference paper at the 2015 IEEE Radio Frequency Integrated Circuits Symposium.



Negar presenting an invited talk at the University of Florida Electrical and Computer Engineering Department earlier this year.



The Marconi Society award ceremony (from left): Wenhan Dai, Negar Reiskarimian, Shu Sun, Ananda Theertha Suresh, and Robert Tkach (vice chair of the Marconi Society).

have the same transfer characteristics. Breaking reciprocity will allow novel wave-propagation regimes. It can allow waves to only travel in one direction. Historically, reciprocity can be broken by using a magnetic material. “In my thesis, I have shown a new approach to break reciprocity by performing spatio-temporal modulation of conductivity of the medium. The resulting nonreciprocal devices have significantly smaller footprints, while they can have good performance as their magnetic counterparts,” Negar said.

Negar is interested in the intersection of IC design and applied physics, specifically, in novel physical and electromagnetic phenomena and how they can inspire new ICs and systems designs for various applications. “The type of cross-disciplinary research that was initiated during my Ph.D. work led me to believe in

the value of working at the cross section of neighboring research fields,” She said.

Negar’s research interests include ICs and systems, applied electromagnetics, and nanophotonics, with a focus on analog, radio-frequency, millimeter-wave, and optical ICs, and metamaterials and systems for a variety of applications, from emerging wireless communications paradigms to the Internet of Things, imaging, sensing, and opto-/bioelectronics.

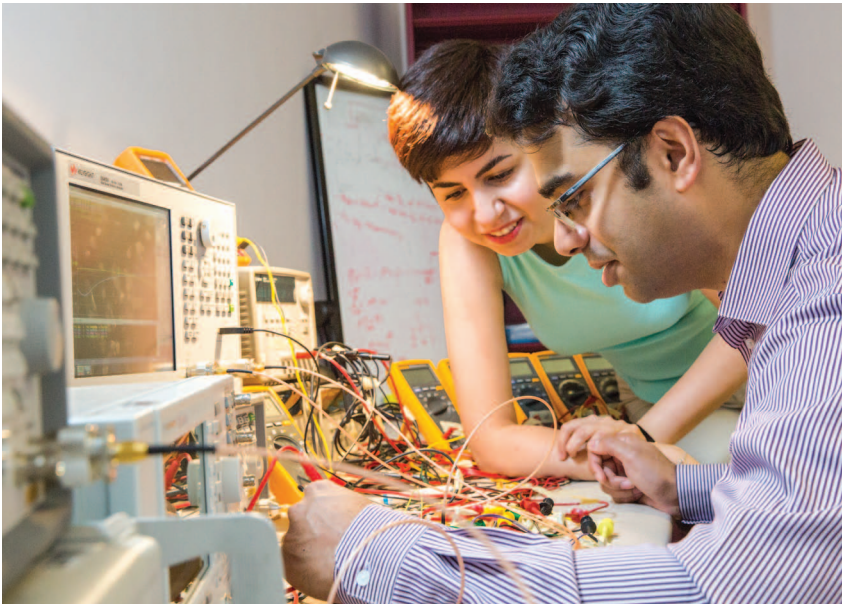
One of Negar’s most rewarding experiences during her Ph.D. was visiting the California Institute of Technology (CalTech), Pasadena, as a Young Investigator Lecturer in Engineering and Applied Sciences in 2017. The program was started to support female and underrepresented minority Ph.D. and postdoctorate students. She was fortunate to be among the ten

### FUN FACTS ABOUT NEGAR

- Negar’s undergraduate concentration was in telecommunication systems. After she took a course on analog ICs in her junior year, she fell in love with circuit design and switched to microelectronics for her master’s, followed by a Ph.D.
- Negar likes to hike, cook, and take long walks in New York City.
- Negar enjoys going to see Broadway shows.
- Negar loves to swim and does so whenever she needs to relax.

people who were invited to CalTech in the first year of the program, to present her research and network with faculty and students.

“One of my biggest aspirations is to be able to engage more female students



**Negar and her advisor, Prof. Harish Krishnaswamy, working on a project in the lab in September 2017.**



**Negar and her advisor, Prof. Harish Krishnaswamy at Columbia University in September 2017.**

and professionals to pursue engineering-related careers,” Negar said. “I attended the Rising Stars Workshop held at Stanford University in 2017 as a participant, and it was really beneficial.” This year, She will be joining the Massachusetts Institute of Technology (MIT) Rising Stars Workshop as a speaker on a panel related to job searches. “I hope I’m able to give back to the community and help others find their path to pursue academic careers,” Negar said.

Negar credits the IEEE Solid-State Circuits Society (SSCS) for being an essential part of her professional growth and development. She has learned a

lot about state-of-the-art research that SSCS members are working on through Distinguished Lectures that are organized by the SSCS New York Chapter and held at Columbia University. Negar is closely involved with her local SSCS Chapter and recently organized a mini colloquium on new modes of light and acoustic-wave propagation. The event featured renowned speakers who discussed various aspects of nonreciprocal wave propagation, with a focus on ICs, photonic, microelectromechanical systems, and acoustic devices.

Negar has received a number of honors and awards, including being

selected as a DARPA Riser in 2018 to participate in D60, the agency’s 60th anniversary symposium. She was a recipient of the National Science Foundation Professional Development Award to attend the Electrical and Computer Engineering Department Heads Association Annual Conference iREDEFINE ECE Workshop in 2018. She was featured on *Forbes* “30 Under 30” list in the science category in 2018.

“Winning a predoctoral achievement award from the SSCS has been a defining moment in my career,” Negar said. “The SSCS predoctoral achievement award has helped me boost my academic career and exposed my research and ideas to the broader community.” The award also provided Negar with the opportunity to attend the annual International Solid-State Circuits Conference (ISSCC). “At ISSCC, I was able to network with my peers and researchers from across academia and industry,” She said. “This has been essential to my personal development and has helped me make connections both personally and professionally.”

**Negar’s Ph.D. dissertation focuses on breaking Lorentz reciprocity on a complementary metal-oxide-semiconductor chip.**

In her free time, Negar loves to take in the sights and sounds of the Big Apple. She enjoys living in New York City, taking long walks and exploring different neighborhoods, hopping into little cafés and restaurants, and participating in local cultural events. Negar loves to read (especially nonfiction, biographies, and history books) and listen to music over a good cup of coffee or tea. In July of 2019, Negar will join MIT as an assistant professor of electrical engineering and computer science.

—Abira Sengupta