Electrical & Computer Engineering

PROFILE

Chair: Can E. Korman
202-994-6083
www.ece.gwu.edu
Full-time faculty: 26
Undergraduate students: 201
Graduate students: 206
Annual research expenditures: $1.7 million

FACULTY

Shahrokh Ahmadi, **ASSISTANT RESEARCH PROFESSOR**
Lawrence Bennett, **RESEARCH PROFESSOR AND APS FELLOW**
Robert L. Carroll, **PROFESSOR**
Edward Della Torre, **PROFESSOR, IEEE FELLOW AND APS FELLOW**
Milos Doroslovacki, **ASSOCIATE PROFESSOR**
Tarek A. El-Ghazawi, **PROFESSOR**
Kie-Bum Eom, **PROFESSOR**
Robert J. Harrington, **PROFESSOR AND IEEE FELLOW**
Hermann J. Helgert, **PROFESSOR**
Howie Huang, **ASSISTANT PROFESSOR**
Walter K. Kahn, **PROFESSOR AND IEEE FELLOW**
Matthew Kay, **ASSISTANT PROFESSOR**
Can E. Korman, **PROFESSOR**
Nicholas Kyriakopoulos, **PROFESSOR**
Roger H. Lang, **PROFESSOR AND IEEE FELLOW**
Ting N. Lee, **PROFESSOR**
Murray H. Loew, **PROFESSOR, IEEE FELLOW AND AIMBE FELLOW**
Thomas J. Manuccia, **PROFESSOR**
David J. Nagel, **RESEARCH PROFESSOR**
Martha Pardavi-Horvath, **PROFESSOR**
Suresh Subramaniam, **PROFESSOR**
Branimir R. Vojcic, **PROFESSOR**
Wasyl Wasylkiwskyj, **PROFESSOR AND IEEE FELLOW**
Mona Zaghloul, **PROFESSOR AND IEEE FELLOW**
Jason M. Zara, **ASSISTANT PROFESSOR**
Vesna Zderic, **ASSISTANT PROFESSOR**

RESEARCH AREAS

BIOMEDICAL ENGINEERING
Kay, Loew, Manuccia, Zara, Zderic

COMMUNICATIONS AND NETWORKS
Doroslovacki, Helgert, Subramaniam, Vojcic

COMPUTER ARCHITECTURE AND NETWORKING
El-Ghazawi, Huang

ELECTROMAGNETICS
Bennett, Della Torre, Kahn, Korman, Lang, Pardavi-Horvath, Wasylkiwskyj

MICROELECTRONICS, VLSI SYSTEMS, AND MEMS
Ahmadi, Korman, Nagel, Zaghloul

MULTIMEDIA PROCESSING
Eom, Loew

SIGNAL PROCESSING, SYSTEMS, AND CONTROLS
Carroll, Doroslovacki, Eom, Harrington, Kyriakopoulos, Lee, Wasylkiwskyj

FINDING A BETTER WAY: Professor Suresh Subramaniam studies optical networking to find better ways to send data from one point to another.

Putting the Guesswork *In*

Internet traffic is exploding, and as multi-media applications like YouTube and video-on-demand expand—and more content is transferred over the Internet rather than over specialized networks such as telephone and cable—it will continue to multiply. Fiber and optical networking equipment make up the bulk of the infrastructure that carries this traffic, and, in fact, fiber is the only medium that currently is capable of satisfying this huge demand.

So anticipating what direction fiber optic networking will go in the next five to ten years is an important venture, and it is the challenge that Professor Suresh Subramaniam of the Department of Electrical and Computer Engineering has set for himself. "A two-word description of what I am is a 'network architect,'" explains Subramaniam. "I come up with new ways to design fiber optic networks, looking at their performance through mathematical tools. I design new algorithms to find better ways to send data from one point to another or to combine data from various sources to be sent over one fiber."

Although Subramaniam's research interest is in general networking, his primary focus is on modeling optical network performance. Modeling necessarily requires assumptions about the future, and this is the biggest challenge he faces. "Without assumptions you can't do modeling," Subramaniam says, "but you have to make the *right* assumptions; that's the catch. You can't depart too far from reality." The other challenge is to architect networks that are cost-effective, because cost is the main consideration. This includes estimating what kind of traffic the network will carry and what the intensity of that traffic will be.

Although fiber is a revolutionary transmission medium capable of handling an enormous traffic load, it must be present at all the various points that traffic is generated and at the end user locations. As Subramaniam notes, "It's easy to put a lot of fiber in the middle of the network where a lot of traffic is being mixed together; the challenge is getting the fiber all the way to these end points and to the customer locations in a cost-effective manner. Because the expenses in building such large fiber optic networks are huge, modeling them first is critical."

Subramaniam has already made some unique contributions to optical network improvements. A common problem with optical networks is that signals get distorted as they move through the network. Historically, regenerator nodes have been set up throughout the network to correct the distortions, but they are quite expensive. Working with Professor Maite Brandt-Pearce of the University of Virginia, Subramaniam looked for alternative ways to intelligently route signals through the network to minimize the effects of these distortions. "We were able to show that you can get rid of a lot of regenerators by using intelligent algorithms for routing signals and thereby save a lot of cost," he says. "We were one of the first groups to do this and several other groups are now following up on our work."