

# ORS

## Opportunity Research Scholars' Program

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*A community of dedicated students who work together to broaden the academic experience.*

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### Veteran ORS Scholars Exemplify Program Goals

I am often asked to explain the differences between ORS and just doing research. My standard answer includes references to community building, enrichment workshops, strong mentor relationships, and the ongoing research experience that is required to develop advanced skills. A critical element to navigating the research process is having the resolve to ride out the highs and lows. This is not an easy order for undergraduate students who have multiple demands and challenges. However, there are those occasions when perseverance through frustrating periods pays off. A primary goal of ORS is for students to make the most of the opportunities afforded to them by ongoing research. That goal can be realized by participating in research competitions, submitting proposals for conference presentations and pursuing ways for undergraduates to showcase their research. This semester, I am proud to announce the successes of two ORS groups who have achieved this goal.

The ORS Propagation Group is one of six national finalists for an an-

tenna power visualization system competition sponsored by the IEEE AP-S. With strong leadership by mentor Matt Trotter and inspiration from faculty advisor Professor Durgin, the group is very optimistic as they go to the next level in the competition. The group is composed of Courtney Drewski, Santiago Hassig, Jayson Jenkins and Rodrigo Quinteros. Now seniors, Courtney and Rodrigo started the program as freshmen and Santiago joined as a junior. In his first semester as a Scholar, Rodrigo shadowed another group. Santiago played catch-up his first semester and Courtney spent much of her first year establishing the foundation needed to conduct research. New Scholar Jayson, not intimidated by these seniors, is now an integral member of a group of veteran Scholars on a mission to win a national competition!

Sean Sanders and Sahitya Jampana from the Network Security and Architecture Lab submitted a paper to the IEEE Southeast Conference. Sean will be traveling to Charlotte, North Carolina on March 18 to

present the paper "Visual Network Traffic Classification Using Multi-Dimensional Piecewise Polynomial Models." As the lead author on the paper, Sean has been awarded PURA travel funds to attend the conference and is working with his faculty advisor, Professor Owen, to coordinate the trip. Now in his third year, Sean has sustained his commitment to his research topic culminating in this presentation. When Sahitya expressed interest in the topic, she took the challenge to work with Sean to develop the background needed for the research. Sean and Sahitya, with the guidance and flexibility of PhD mentor Kevin Fairbanks, exemplify the philosophy of ORS.

Following the path of several veteran Scholars, Seema Bhandari and David Saenz-Landazabal, are recipients of the highly competitive and prestigious President's Undergraduate Research Award (PURA). Proposals for summer PURA awards are due March 1.

*Jill Auerbach  
ORS Program Director*

### Presentations Exercise Skills at the Research Roundtable

As part of a series of skill building activities, ORS Scholars participated in the annual Research Roundtable event on November 2 and 5, 2009. Thirteen undergraduate teams presented their research plans for the coming year. Scholars were challenged to clearly describe their research projects and the motivation for the research, trends in the field, and how the work fits into those trends. Scholars strived to present their research with detail

using an engaging communication style that reflected their personality while staying within a time limit. Each presentation was followed by a Q & A session allowing the audience of scholars, PhD mentors, faculty, and staff to provide helpful feedback to the students. Scholars will present their project results at the ORS Research Poster and Presentation Competition on April 19, 2010.

*Julie Ridings  
ORS Program Coordinator*

#### IMPORTANT DATES

|        |  |
|--------|--|
| FEB 25 | New Student Social                     |
| MAR 1  | Summer PURA Proposal Deadline          |
| MAR 4  | Poster Workshop with Dr. D. Williams   |
| MAR 11 | Poster Workshop with C. Bourgeois      |
| APR 1  | Presentation Workshop with J. Auerbach |
| APR 7  | Poster Submission Deadline             |



Pujita Vijayvargiya describes challenges her team faces as they conduct research on microwave technology during the Research Roundtable.

## New Scholars, Mentors, Groups, and Sponsors

With spring semester in full swing, ORS is continuing to grow with new mentors, scholars and sponsors. With generous contributions from companies such as The Semiconductor Research Corporation (SRC) and Northrop Grumman, we have added eight students and two mentors to existing or new projects. See the following for a description of the new groups and their Projects.

### Welcome Northrup Grumman!

Northrup Grumman, a leading global security company, has joined the list of ORS corporate sponsors mid-year to partially sponsor the Passive Sensor Group. To learn more about Northrup Grumman's innovative systems, products, and solutions visit their website: [www.northropgrumman.com](http://www.northropgrumman.com).



### Passive Sensor Group

The group is made up of new Ph.D. mentor Azhar Hasan along with new scholars Alex Cardwell, Brenden Duncombe-Smith, Justin Jiang and Adithya Ravichandran, Dr. Andy Peterson is the faculty advisor. They are designing a material property(s) sensing system using monopole antennas, microstrip lines, and properties reconstructing algorithms. This requires that they develop a basic understanding of microwave circuit design, electromagnetics and function approximation algorithms.

### Microwave Data Analyzation Group

This group has been established for over a year and is advised by Dr. Tom Michaels. Lead by Ph.D. mentor Ler Gullayanon, scholars Constance Brown, Nidhi Joshi, and Pujita Vijayargiya welcome Andrew Siviers. He is a new addition to the team as of this spring. Their project is to build two kinds of microwave sensing prototypes for carpet quality checking. This involves circuit building, taking measurements, and programming with Matlab® and LabView®.

### New Research Group

Currently in the works is an additional group under the guidance of Dr. Madhavan Swaminathan, with new scholars Trevor Green, Cameron Lewis, and Pranav Ramesh. The Ph.D. mentor and project description are forthcoming.

Stephen Mobley  
Graduate Teaching Assistant

## Third Year Scholar Spotlight: Seema Bhandari

### Which ORS group are you in and what are you currently working on?

I am in the Mixed Signal Design Group with Professor Swaminathan and Mentor Abhilash Goyal. We are working on building a self healing methodology that would correct frequency deviations due to temperature buildup in a 3D IC.

### Why did you decide to participate in ORS and what do you like most about the program?

I decided to join ORS because I wanted exposure to the ongoing research within the ECE department which was not possible through my courses. I like the flexibility I have had while working on a project and the advice I receive from everyone I am working or have worked with.

### When are you graduating and what are your plans after graduation?

I graduate in August of 2010. I plan to work in the industry for a few years before I go to graduate school. I accepted an offer from Microsoft®, where I'm going to be working in the Entertainment and Devices Area (Xbox®,

Zune® and all the other cool stuff) as a Hardware Development Engineer. I'm excited about moving to the West Coast!

### What are some of your interests outside of school?

I enjoy travelling, learning languages, swimming, and watching movies.

### Where are you from?

Hyderabad, a city in the south of India.

### If you could go anywhere, where would you go?

I really want to visit Egypt. I enjoy history and the culture of the Middle East.

### What is your favorite food, color, movie, TV show, sports team, and/or band?

Food has to be Thai and Indian. Colors would be blue and white. TV show is Seinfeld and movie is Body of Lies.

### What do you like most about ECE?

I like the way it has molded my mind to think very analytically and logically.



Seema guides her team member, Brett Ireland, at the Research Skills Workshop.



## Research Group Spotlight: Network Security and Architecture Lab

Mentor Kevin Fairbanks, working in the Network Security and Architecture Lab, is a strong guide allowing students the freedom to develop their ideas. Scholars Sean Sanders and Sahitya Jampana, in their third and second years in ORS respectively, capitalize on the team environment by taking advantage of their different perspectives.

### What is the overall goal of your group's project?

Kevin Fairbanks The goal is to develop new ways to classify network traffic. This is important because as technology advances, more and more things are starting to appear online. We have every day computers, game systems, and in some circumstances major appliances sending traffic over the internet. If we are able to differentiate one type of traffic from another this can serve as a basis for research in intrusion detection and quality of service. For example, it may be more important to let email traffic go through than some one watching YouTube™ or Hulu™.

### How do you and your scholars divide the work in your group?

Kevin As the mentor, I try not to directly influence the direction of the research but offer suggestions. Since Sean has been working on the project a longer and has more of a networking background, he serves as the lead for the project. We regularly meet in my office to discuss how the research is progressing and possible avenues. Sahitya contributes by bringing in new perspectives in terms of the usage of statistics in the research.

### What is your role in meeting your project objective?

Sean Sanders Develop algorithms to model and classify network traffic.  
Sahitya Jampana My role in meeting my group's project objective is to work in coordination with Sean to come up with new ideas, write code, conduct trial runs, etc. and eventually write the paper.

### What skills are you developing through ORS?

Sean Programming, written and verbal communication. The ability to apply coursework knowledge to research problems.  
Sahitya Being in ORS has helped me develop my technical writing skills tremen-

dously. My programming skills have also improved due to more frequent use.

### What is the most challenging part of being on a team?

Sean Being innovative and making sure our research is unique.  
Sahitya The most challenging part was catching up. I joined an already existing group, so making sure I was on the same page was challenging at first.

### What do you like most about working on a team?

Sean You are not alone and do not bear all the responsibility of the research.

Sahitya Everyone has different ideas so if we run into a problem there are many solutions that are reached that no single person might have thought of.



Kevin Fairbanks, Sahitya Jampana, and Sean Sanders



## Faculty Spotlight: Dr. Manos Tentzeris

Dr. Manos Tentzeris, Radio-Frequency Identification (RFID) Research Group faculty advisor, shares his thoughts on his research and role as a Georgia Tech professor.

### What is your lab or group name?

Agile Technologies for High-performance Electromagnetic Novel Applications (ATHENA)

### Describe the main research being done at your lab.

We explore RF and wireless technologies utilizing environmentally friendly materials like paper or flexible materials like liquid crystal polymer. The applications include projects for space (NASA), smart skin for structural health monitoring, RFID's for logistics, and wearable sensors for biomonitors. In addition we work with automotive RF electronics for intelligent cars with enhanced safety capabilities. We also work on power scavenging utilizing solar or RF energy.

### Where did you receive your degrees?

I received my Bachelor's degree from the National Technical University of Athens, and my Masters' and PhD degrees from the University of Michigan at Ann Arbor.

### How long have you been at Georgia Tech and what initially drew you here?

Since 1998. I was drawn to Georgia Tech because it is a leading university in electrical engineering, and thus has lots of opportunities for higher caliber students, research, and teaching experience.

### How long have you been involved with the ORS program?

A year and a half, but I was involved with UROP (Undergraduate Research Opportunity Program) since I first came to GT.

### What do you like most about being a professor?

Having the opportunity to spend time with intelligent young people and helping them develop into good people and scientists. I also get to do research that has a significant impact in society on a local and international level.

### What is one piece of advice you would like to give to undergraduate students?

Stay focused, keep involved in the numerous research opportunities at GT, and try to get as much of a well rounded education as possible. Also get involved in ORS!

### Are there any interesting facts you would like us to know about you?

I really enjoy travelling and getting exposed to international cultures. I am good at ping pong and interested in digital photography.



Manos Tentzeris during his visit to India.

### This program would not be possible without our Sponsors...

| SPONSOR   | RESEARCH GROUP                            | FACULTY MENTOR           | PHD MENTOR      | SCHOLARS  |
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| National Science Foundation    | Machine Diagnostics Group                 | Dr. Tom Habetler         | Stefan Grubic   | Shruti Batra, Sharan Parikh   |
| <br>School of Electrical and Computer Engineering  | Passive Sensor Group                      | Dr. Andy Peterson        | Azhar Hasan     | Alex Cardwell,<br>Brenden Duncombe-Smith,<br>Justin Jiang<br>Adithya Ravichandran |
|    | Microwave Group                           | Dr. Tom Michaels         | Ler Gullayanon  | Constance Brown,<br>Nidhi Joshi, Andrew Sivers,<br>Pujita Vijayvargiya            |
|    | Power Transmission and Distribution Group | Dr. Deepak Divan         | Debrup Das      | Nanley Chery,<br>David Saenz-Landazabal,<br>Raymond Engle                         |
|   | Wind Power Generation Group               | Dr. Ron Harley           | Jiaqi Liang     | Lokeshwar Akkipeddi,<br>Chandim Chatterjee, Yujie Fu                              |
| School of Electrical and Computer Engineering   | Wireless Mesh Networks                    | Dr. John Copeland        | Myounghwan Lee  | Asma Qureshi  |
| <br>Science Applications International Corporation   | Human-Automation Systems Lab              | Dr. Ayanna Howard        | Lonnie Parker   | Marcus Chavis,<br>Brittany English  |
|   | Network Security and Architecture Lab     | Dr. Henry Owen           | Kevin Fairbanks | Sahitya Jampana, Sean Sanders   |
|   | Systems and Controls Group                | Dr. Patricio Vela        | Miguel Serrano  | Jeff Lumish, Joey Yore  |
| <br>Semiconductor Research Corporation<br><br>Education Alliance<br> | Mixed Signal Design                       | Dr. Madhavan Swaminathan | Abhilash Goyal  | Seema Bhandari, Penyen Chi,<br>Brett Ireland                                      |
|   | RFID Group                                | Dr. Manos Tentzeris      | Amin Rida       | Sam Elia, Sabastian Palacios,<br>Vernell Woods                                    |
|   | Tongue Driver Group                       | Dr. Maysam Ghovanloo     | Xueliang Huo    | Jeremy Jones,<br>Sandhya Rajaraman,<br>Felipe Salazar,<br>Jeremy Thompson         |
|   | Wireless Power Techniques                 | Dr. Greg Durgin          | Matt Trotter    | Courtney Drewski,<br>Santiago Hassig, Jayson Jenkins,<br>Rodrigo Quinteros        |
|   | TBA                                       | Dr. Madhavan Swaminathan | TBA             | Trevor Green, Cameron Lewis,<br>Pranav Remesh                                     |



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