The Benefit of VFRP Faculty/Student Mentorship

The Information Institute's Visiting Faculty Research Program (VFRP) has a summer opportunity for faculty who can opt to bring a student with the support of the topic advisor. Students can benefit from this experience when a faculty mentor encourages students to participate in focused research, collaborate on journal papers and provide a platform for them to present the research.

Dr. Soundararajan Ezekiel of Indiana University of Pennsylvania has done just that. He has encouraged his students and provided a means for them to attend various conferences and events to present their collaborative efforts and expose them to the larger body of scientific research opportunities. Additional opportunities are available to them while they are participating in the summer VFRP through onsite presentations and poster sessions all while encouraging networking with other faculty and universities. Below are some of the accomplishments under Dr. Ezekiel's tutelage.

Journal Papers

- *Multi-Focus, Multi-Resolution Image Fusion: A Comparative Study of Transforms and Fusion Methods* (journal paper preprint)
  Michael J McLaughlin, Michael Giansiracusa, Paul Singerman, Soundararajan Ezekiel, Michael H Ferris, Erik Blasch, and Mark Alford

Conferences

- *Geospatial Informatics, Motion Imagery, and Network Analytics VII*
  April 12, 2017 - Anaheim, California

- *Double-Density and Dual-Tree Based Methods for Image Super Resolution*
  Mike Giansiracusa, Paul Singerman, and Soundararajan Ezekiel

- *Matrix Sketching For Big Data Reduction*
  Mike Giansiracusa, Paul Singerman, and Soundararajan Ezekiel

- *General Linear Hypothesis Test: A Method For Algorithm Selection*
  Mike Giansiracusa, Paul Singerman, and Soundararajan Ezekiel

AIPR 2017. Sponsored by IEEE, October 10-12, Washington DC.

- *Fusion of Deep Convolutional Neural Network*
  Robert Suchy, Soundararajan Ezekiel, and Maria Cornacchia

http://www.wpafb.af.mil/Welcome/Fact-Sheets/Display/Article/836756/afrlri-information-institute/

Our Mission

Strengthen and Expand Information Technology Research within the Information Directorate.

Develop collaborative relationships among and between the academic members and the Information Directorate.

Increase research emphasis in areas of information technologies critical to the Information Directorate's mission.

This Issue

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FALL/WINTER 2017   Issue #4

- *Ballistic Missile Boost Phase Acceleration Reconstruction*
  Colter Long, Soundararajan Ezekiel, Larry Pearlstein, and Joseph Raquepas

- *Geospatial Informatics, Fusion and Video Analytics VI*
  SPIE Defense + Security
  April 17-21, 2016
  Baltimore, Maryland

- *A Comparative Study Of Multi-Focus Image Fusion Validation Metrics*
  Michael Giansiracusa, Adam Lutz, Neal Messer, Soundararajan Ezekiel, Mark Alford, Erik Blasch, Adnan Bubalo, and Michael Manno

- *Multi-Focus and Multi-Modal Fusion: A Study of Multi-Resolution Transforms*
  Michael Giansiracusa, Adam Lutz, Soundararajan Ezekiel, Mark Alford, Erik Blasch, Adnan Bubalo, and Millicent Thomas

- *Bandelet-Based Image Fusion: A Comparative Study For Multi-Focus Images*
  Michael Giansiracusa, Adam Lutz, Neal Messer, Soundararajan Ezekiel, Erik Blasch, and Mark Alford

- *Optimal Multi-Focus Contourlet-Based Image Fusion Algorithm Selection*
  Adam Lutz, Michael Giansiracusa, Neal Messer, Soundararajan Ezekiel, Erik Blasch, and Mark Alford

Future Conference Opportunities

- *Geospatial Informatics, Motion Imagery, and Network Analytics VII*
  April 15-19, 2018, Orlando, Florida

- *Fusion Based Heterogeneous Convolutional Neural Networks Architecture* (submitted)
  Maria Cornacchia, Robert Suchy, and Soundararajan Ezekiel

- *Malware Classification Using Deep Learning* (submitted)
  David Kornish, Justin Geary, Laurent Njilla, and Soundararajan Ezekiel

- *Malware Classification Using Deep Learning* (submitted)
  David Kornish, Justin Geary, Laurent Njilla, and Soundararajan Ezekiel

Other Opportunities

1. Presented three posters at the **Armed Forces Communications and Electronics Association (AFCEA) conference** for the submitted **SPIE papers** on June 14, 2016
   a. Bandelet-Based Image Fusion: A Comparative Study for Multi-Focus Images
   b. Multi-Focus Contourlet-Based Image Fusion Algorithm Selection
   c. Multi-Focus and Multi-Modal Fusion: A Study of Multi-Resolution Transforms

2. Three abstracts accepted by **NAECON - National Aerospace & Electronics Conference & Ohio Innovation Summit (NAECON-OIS)**, Dayton, OH, USA, July 26 - 29, 2016
   a. Double-Density and Dual-Tree Based Methods for Image Super Resolution
   b. Matrix Sketching For Big Data Reduction
   c. Context-Driven Automated Data Relocation for Use in Data Transpositioning

3. Three posters presented at the **NAECON conference**
   a. Methods for Image Super Resolution
   b. Context-Driven Automated Data Relocation for Use in Data Transpositioning
   c. Matrix Sketching for Big Data Reduction

4. Four abstracts accepted to **Applied Imagery Pattern Recognition (AIPR)- Imaging and Artificial Intelligence: Intersection and Synergy**, Washington DC, October 18-20, 2016
   a. Multi-Scale Transformation Based Image Super-Resolution
   b. User, Content, and Item - (CUI) Based Filtering for Big Data
   c. Content-Based Information Retrieval Using Data Transpositioning
   d. Seismic Signal Analysis Using Multi-Scale/Multi-Resolution Transformations

5. Presented two posters at the **Information Institute Summer Research Associate Poster Session** and **Technical Interchange**, Urtz Conference, July 12, 2016
   a. Matrix Sketching Using Skylark
   b. SmallK - Nonnegative Matrix Factorization

Consider introducing a student to the 2018 summer research experience at AFRL/RI

For more information and to access the application, go to
- http://www.wpafb.af.mil/Welcome/Fact-Sheets/Display/Article/836756/afrlri-information-institute/

To submit other mentor faculty/student stories, please send to
- rrs.iiweb@us.af.mil

AFRL/RI Visiting Faculty Successes

Dr. Yang Cai

Dr. Cai is one of our visiting summer faculty. He is founder of Visual Intelligence Studio, and Senior Systems Scientist at CyLab, at Carnegie Mellon University. He has recently written two books in both ebook format and print edition.

Ambient Diagnostics. CRC Press. 2014

This book addresses innovative methods for discovering patterns from affordable devices such as mobile phones, watches, cameras and game interfaces to interpret multimedia data for personal health monitoring and diagnosis.

This is the first comprehensive textbook on multidisciplinary innovations in affordable healthcare—from sensory fusion, pattern detection, to classification.

Instinctive Computing. Springer. 2016

This book connects artificial intelligence to primitive intelligence. It explores the idea that a genuinely intelligent computer will be able to interact naturally with humans. To form this bridge, computers need the ability to recognize, understand and even have instincts similar to humans.

Dr. Jeffrey Duffany

Dr. Duffany is a full professor at the Universidad del Turabo, Gurabo, Puerto Rico, and an adjunct professor at Politechnic University, Hato Rey, Puerto Rico.

In December Jeffrey wrote a chapter titled "Computer Security" (pages 3-20) of a new book introducing readers to the tools needed to protect IT resources and communicate with security specialists when there is a security problem.

Computer and Network Security Essentials. Springer. 2018

This first edition book introduces the concepts, techniques, methods, approaches, and trends needed by security specialists to improve their security skills and capabilities. The book is available on Amazon.com

Dr. Soundararajan Ezekiel and Sam Grieggs

The Big Data Project, Funded through an Education Partnership Agreement with Indiana University of Pennsylvania and under the mentorship of Dr. Soundararajan Ezekiel, reports that student Sam Grieggs received admittance to Notre Dame University's PhD program for Fall 2017. Additionally, Dr. Ezekiel has coauthored several papers with his students and most recently presented these works to numerous conferences.

See article "The Benefit of VFRP Faculty/Student Mentorship" for more details regarding coauthored papers and conferences.

Dr. Chin-Tser Huang

Received his US Citizenship in April.

Dr. Sanjay Madria

Dr. Madria is the Director of the Web and Wireless Computing Lab, and Professor in the Department of Computer Science at the Missouri University of Science and Technology. Also a member of the Association for Computing Machinery (ACM) Distinguished Scientists.

Cloud Transactions Adhere to Strict Policy Consistency for Improved Performance (10 ACM page, full paper)

Together with Air Force Research Laboratory (AFRL) Information Directorate colleagues Mark Linderman, AFRL/RI and James Milllian, AFRL/RISA this paper based on 2017 summer work, and an extension grant will be presented at the 33rd ACM Symposium On Applied Computing (SAC) in Pau, France.

Dr. Ruixin Niu

Congratulations to Dr. Ruixin Niu of Virginia Commonwealth University who was promoted to Associate Professor effective July 1, 2017. Dr. Niu has participated with the VFRP for a number of years.

Dr. Tianyu Yang

Dr. Yang received an award from Embry-Riddle Aeronautical University (ERAU) in April 2017, in recognition of his research accomplishments in collaboration with AFRL/Information Directorate.

Professor Abas Sivjee Outstanding Research Award

This annual award selects only one winner among nominees from all academic disciplines at ERAU's Daytona Beach campus. Dr. Yang was a VFRP faculty fellow in 2012 and 2017, and an NRC Senior Associate in 2013. He has worked with Mr. Douglas Smith, AFRL/RIGB and Dr. John Matyjas, AFRL/RIT on interference suppression techniques for Multiple Input Multiple Output (MIMO) communication systems. In addition, he has been working with AFRL/RISC on distributed control of multi-agent systems under the support of Machine Intelligence for Mission Focused Autonomy (MIMFA) program. Dr. Yang facilitated ERAU's joining II as a member institution in 2012, and has been serving as the University Partnership Program Manager at ERAU since then.

Other News

Nathaniel W. Rowe, AFRL/RI
Candidate - Education with Industry (EWI)

Please join us in congratulating Nathaniel W. Rowe, faculty advisor, on his AY18 selection for Basic, Intermediate, and Senior Civilian Developmental Education (CDE), Civilian Strategic Leadership Program (CSLP) and the Engineer and Scientist Exchange Program (ESEP). CDE is essential to the professional development of career civilians. This selections is a significant achievement in today's competitive, high-quality Air Force. Again, congratulations and best wishes for your continued success!

2017 New/Renewed II Memberships

New members

- Clarkson University ....Potsdam, NY
- Texas Southern University ....Houston, TX
- University of California, Riverside ....Riverside, CA
- University of South Alabama......................................Mobile, AL

Renewed members

- University of North Texas...Denton, TX
- University of Rochester ....Rochester, NY

Summer Participant Awards

This year the Information Institute recognized those present this summer who have participated in our Visiting Faculty Research Program for 5 and 10 years.

5 Year recognition

* Dr. Soundararajan Ezekiel
* Dr. Venkatsubramanian Venkateswaran
* Mr. Edwin Hach
* Dr. Xiaojiang Du
* Dr. Jing Peng
* Dr. Sanjay Madria
* Dr. Warner Miller
* Dr. Lixin Shen
* Dr. James Stine
* Dr. Weifeng Su

10 Year Recognition

** Dr. Chin-Tser Huang
** Dr. Vladimir Nikulin
 * Dr. Kaliappandar Ravindran

5 consecutive years are noted with * asterisks.
10 consecutive years are noted with ** asterisks.

2017 Summer Visiting Faculty Program Statistics

- ■ Summer Research Associates
  - 54 Faculty
  - 15 Students
  - 44 Minority faculty and students
  - 10 Female faculty and students
- ■ 41 Representative Universities
- ■ 20 Extension Grants Awarded

- 19 Permanent Resident faculty and students