



cise.uprm.edu

### From the Chair

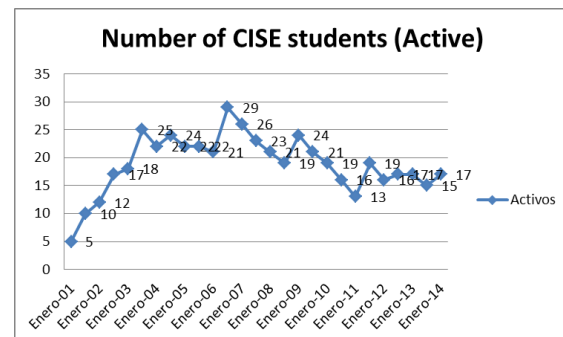


We all recognize the fundamental impact that the development of information technology and computing has on the social and economic development. The CISE doctoral program is committed to prepare leaders of computing innovation for highly qualified careers in academia, government, and industry. We graduated the first doctoral student in 2004. Since then we have graduated 23 students of which 26% are female. Looking at the numbers the graduates have published around 50 journal papers and over 120 peer-reviewed conference papers. Most of our graduates have been recruited by high education institutions in Puerto Rico (UPR-Mayagüez, UPR-Rio Piedras, UPR-Bayamón, UPR-Arecibo, UPR-Cayey, UPR-Ponce, and Universidad del Turabo) and some of them have been very successful obtaining research funding. We must agree that this is a healthy measure of the academic program impact. However, we must be more careful as it comes to real social and economic impact. Publications and graduating index is just a piece of the cake. We need to look for mechanisms to provide opportunities for our students to create their own businesses and develop highly transferable knowledge to local businesses. Realistically we have not reached the point where our graduates have a radical effect on the development of our economy.

On the other hand, consistently the program has maintained an average of 20 active students per semester (see Figure below). However the retention rate is about 50% and the graduation rate is roughly 35%. We need to increase these indices. Although these percentages may look better than the numbers in other doctoral programs in our institution and outside, we need to optimize our resources and do it better. We need to develop mechanisms to attract the best talent to the program and we need to provide the student the environment to excel their capabilities.

I understand it would not be the most popular “From the Chair” message since I am supposed to highlight only the positive achievements, but my intention is to target on what we need to foresee to improve. Here my two cents! Meantime, your constructive criticism and wiliness to collaborate with our program through educational and research projects is very welcome.

*Wilson Rivera, PhD  
CISE coordinator*



## Dissertation Defenses

### Ollantay Medina's Dissertation Defense

On December 4, 2013, **Ollantay Medina** defended his doctoral dissertation titled "A Neocortex-Based model for Pattern Recognition" under the supervision of **Dr. Vidya Manian** from the Electrical and Computer Engineering at UPRM.

In his dissertation Ollantay proposes a generic pattern recognition model based on the known operation of the neocortex and is oriented to deal with sequences of patterns or data streams. The theoretical model establishes a more general framework for treatment of space time data through a dimensionality reduction process. For a given instance of space time data, the process characterizes a space time region that might be called an invariant representation. The model exhibits desirable properties for a pattern recognition system, such as spatial and temporal auto associativity, spatial and temporal noise tolerance, recognition under sequence contextualization, and input prediction.

## Alumni News



**Rafael A. Arce** (CISE PhD 2007) is an Associate Professor at the Department of Computer Science of the University of Puerto Rico, Rio Piedras Campus. Dr. Arce research

interests include mapping of algorithms to dedicated hardware architectures, high-level synthesis in electronic design automation, analysis and design of algorithms for bioinformatics, and hardware and software co-design for custom computing machines.



Doctoral Program in Computing and Information Science and Engineering  
University of Puerto Rico at Mayaguez  
<http://cise.uprm.edu>

Dr. Arce is currently serving as co-principal investigator for the projects "CC-NIE Networking Infrastructure: Perimeter Network to Expedite the Transmission of Science Project (NSF)" and "Development of engaging and readily transferable laboratory experiences for the introductory programming course (NSF)". He also has been Principal Investigator in the projects "Asserting Parallel Computational Thinking into Undergraduate 4-year Computer Science Curriculum (CPATH-NSF 2009-2012)" and "Acquisition of Equipment for the Establishment of a Reconfigurable Computing Center at the University of Puerto Rico (NSF-MRI 2009-2012).

## Recent CISE Lectures

- Oct 31, 2013: Using de-duplication to improve efficiency of data storage; **Dr. Emmanuel Arzuaga** (UPRM)
- Nov 18, 2013: Tools for mining Massive Data Sets ; **Dr. Edgar Acuna** (UPRM)

## Students' News

During the fall 2013 **Hiva samadian** in coordination with his adviser **Dr. Amir Chinaei** offered a series of research talks on "Privacy and Security"

On September 25, 2013 and October 2, 2013 **Humberto Diaz** presented the workshop titled "Introduction to Artificial Intelligence and Search Problems"

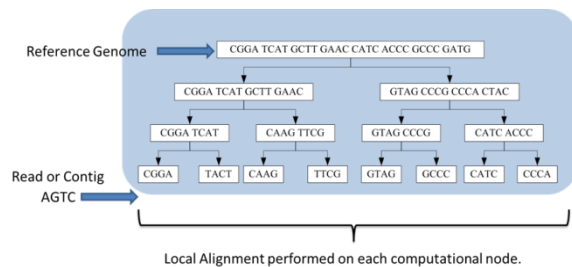


## Work in Progress

Biologists use DNA, RNA or Protein sequences alignment between two different sequences to obtain vital information on new sequences by comparing new ones with already known characterized sequences. Advances in sequencing generation technologies are causing the throughput of new sequences to be higher than what the current computational capabilities could handle.

Wilfredo Lugo's research work focuses on identifying a time efficient optimal local alignment method implemented using a decomposition strategy. The decomposition is envisioned to distribute segments of the reference genome to computational nodes together with copies of the short reads or "contigs" obtained from sequencing systems. With these two sequences (the genome segment and the "contig") each computing node performs local alignments and then sends the results back to their parent computing nodes for further joining and/or pruning.

If successful this work will reduce the time required in the alignment of millions of short-reads (up to 500 bps) against a reference genome.



## Grants and Awards

**Dr. Vidya Manian** has received funding from the Department of Defense (DoD) totaling \$474,960 for the project titled "Statistical signal processing and tattoo electronics for ubiquitous brain machine interfaces."

**Dr. Jaime Ramirez Vick** has received funding from the Department of Defense (DoD) in the amount of \$250,700 for the project "Acquisition of an Instron Electropuls E3000 Instrument for Mechanical Testing."

**Marie Lluberes** and **Dr. Jaime Seguel** received the ADVCOMP 2013 Best Paper Award for the paper titled "Semantics and Accuracy of Gene Expression Threshold Computations: A Case Study."

## Recent Publications

### Journals

- O. Medina, V. Manian and J. D. Chinea, "Biodiversity assessment using hierarchical agglomerative clustering and spectral unmixing over hyperspectral images," *Sensors Journal*, 13(10), 13949-13959, 2013.

### Peer Reviewed Conferences

- Javier Rivera, F. Valverde, M. Saldana and V. Manian, "Security inspection through anomaly detection using hyperspectral imaging technology," *Proc. SPIE Intl. Conf. defense, security and sensing*, Vol. 8743-12, Baltimore, Maryland, 2013.
- Wilson Rivera (2013). "How to introduce parallelism into programming languages courses" In *EduPar-13*.

