ABOUT THE CENTER

The Center for Computing Research and Development (CECORD) was established in 1994 to support the research activities of the NSF grant entitled: Development of a Computer Engineering Research Environment at UPR-Mayaguez. During the last four years new grants have been brought to the Center. Currently, CECORD provides administrative support for nine research grants totaling over $5,000,000 and matching funds totaling over $2,000,000. Among the grants are an NSF CISE II-MI grant, an NSF Presidential Early Career Award for Scientists and Engineers (PECASE) grant, an NSF CAREER grant and a Partnership Award for the Integration of Research into Mathematics, Science, Engineering and Technology Undergraduate Education (PAIR) from NASA. These grants are funded by the following agencies: National Science Foundation, NASA, Department of Defense, DEPSCoR, Intel, PREPA, Epilepsy Foundation of America and ID Research Lab.

MISSION

The mission of CECORD is to promote and support research and development in all areas of computing and computer applications, in accordance with the mission and objectives of the Recinto Universitario de Mayagüez and the University of Puerto Rico.

OBJECTIVES

The main objectives of the Center are to:

• foster high quality undergraduate and graduate computing research,
• promote research collaborations,
• serve as a vehicle for dissemination of all aspects of computing research,
• promote interdisciplinary applied research involving computing,
• promote and sponsor faculty development activities,
• serve as a model in the use of computing technology,
• promote the enhancement and development of new academic programs in computing, as appropriate,
• promote the development of computer applications that will benefit our society.

RESEARCH ACTIVITY

Research Projects

During this year the grants are supporting the following research projects:

• Biometric Systems Development (Luis Jiménez, José L. Cruz, Ramón Vásquez)
• Parallel Image Processing Application Development (José L. Cruz)
• Data Analysis of Hyperspectral Remote Sensing Imagery (Luis Jiménez, Miguel Vélez, Shawn Hunt)
• Texture Analysis System on Parallel Structure (Ramón E. Vásquez)
• Usability studies of Web pages (José A. Borges, Manuel Pérez and Néstor J. Rodríguez)
• Interfaces for Computer-Based Patient Records (José A. Borges and Néstor J. Rodríguez)
• Interprocedural Analysis for Parallelization of Code (Isidoro Couvertier)
• Automatic Pattern Recognition in Multispectral Images, and Lossless Image Compression Algorithms (Shawn Hunt)
• Computational Harmonic Analysis (Jaime Seguel)
• Algorithms for Image Compression (Hamed Parsiani)
• Applications-Driven Optical Interconnect Technology Modeling (José L. Cruz)
• Prediction of Seizures Using Wavelet Neural Networks (Javier Echauz)
• Human-Discourse Principles in Human-Computer Interaction: Models and Tools for Development (Manuel A. Pérez)
Publications

During the past four years CECORD’s researchers have been able to publish over 120 research papers in major conferences and journal publications. A significant number of these publications (over 70) have been co-authored by graduate and undergraduate students.

Research Assistants

During the last four years the grants administered by CECORD have supported over 30 graduate students and over 70 undergraduate students. These students have produced 75 research papers, 25 master theses, and over 100 research presentations.

Ph.D. PROGRAM IN ICSE

One aim of CECORD is to promote and sponsor the development of a Ph.D. in Information and Computing Sciences and Engineering (ICSE). This program is an interdisciplinary effort between the Electrical and Computer Engineering Department and the Mathematics Department of the UPR-Mayagüez Campus. The program will has two areas of concentration: Scientific Computing, and Computer Sciences and Engineering. Within the Concentration of Computer Science and Engineering there are two subspecialties: software systems, and signal processing and information systems.

The main objectives of the program are:

- Serve at the highest level as a center of education and research in information and computing sciences and engineering,
- Prepare professionals at the highest level capable of contributing to the social and economic development,
- Provide professionals capable of integrating in interdisciplinary teams of scientific and technological research.

COMPUTING RESEARCH CONFERENCE

One of the major activities sponsored by CECORD is the Computing Research Conference. The objective of this conference is to promote research among graduate and undergraduate students in different areas of computing. The conference provides a forum for students to present their research work. Students from a variety of disciplines and college institutions have participated in the three conferences that have been celebrated (CRC95, CRC96 and CRC97). The papers presented at these conferences have been published on Conference Proceedings.

COMPUTING RESOURCES

Most of the computing resources that support the research conducted by CECORD’s researchers are concentrated in three research laboratories: the Human Computer Interaction Lab., the Laboratory for Remote Sensing and Image Processing (LARSIP) and the Optoelectronic Systems Research Laboratory.

LARSIP

The Laboratory for Remote Sensing and Image Processing is a multidisciplinary laboratory dedicated to the research and implementation of Remote Sensing, Geographical Information Systems (GIS), Signal and Image Processing, Emergency Response Systems, and Global Positioning Systems (GPS) technologies. Seven research groups carry on the research activity in the Lab. These groups are:

- Computational Signal Processing
- Remote Sensing Applications
- Advanced Automated Image Analysis
- Climate Modeling
- Image Compression
- Model-Based Signal Processing
- Nonlinear and Adaptive Signal Processing

The main computing resources at LARSIP consist of one Sun SPARC Enterprise 3000 server, one Sun SPARC 20 server, one Gateway P-200 server, one Dell Dual Pentium 300, two Silicon Graphics O2, two Sparc Ultra2, ten Sparc Ultra1, two Sparc 20, eight Dell XPS R400, three Dell XPS H/D266 workstations, and software for image and signal processing.

The Human Computer Interaction Lab

The HCI Lab. supports research related to the development of human-computer interfaces and usability engineering. The main research topics
Currently supported are human-computer dialogue, usability of Web pages, and medical informatics interfaces. The main computing resources at the HCI Lab consist of five Pentium PC workstations, two Power Macintosh, software for developing user interfaces, software for developing databases, and software for developing multimedia productions.

**Optoelectronic Systems Research Laboratory**

This laboratory is dedicated to systems level modeling activities of various next-generation optoelectronic computing architectures. The modeling activities are based on an Applications-Driven perspective, where the role of optical interconnections in supporting the various algorithmic and communication structures that arise in parallel image processing applications are studied. The main computational resources available in the lab are two GP6-233 PC, two GP6-300 PC, one E-3110 300 PC and one E-500 PC.

**Administrative Personnel**

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<tr>
<th>Name</th>
<th>Title</th>
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<tr>
<td>Ramón Vásquez</td>
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<td>Damaris Echevarría</td>
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<td>Damaris Pérez</td>
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<td>Ariadne López</td>
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<td>Anibal Morales</td>
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<td>Pieter Van Der Meer</td>
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<td>Vidya Maniam</td>
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**Researchers**

- Dr. José A. Borges
- Dr. Shawn Hunt
- Dr. Thomas Noack
- Dr. Hamed Parsiani
- Dr. Domingo Rodríguez
- Dr. Jaime Seguel
- Dr. Javier Echauz
- Dr. Manuel A. Pérez
- Dr. Miguel Vélez
- Dr. José L. Cruz
- Dr. Luis Jiménez
- Dr. Isidoro Couvertier
- Dr. Javier Arroyo

**Assistant Researchers**

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- Dr. Julia C. Ortiz
- Dr. Celia R. Colón
- Dr. Merbil González

**Advisory Board**

- Oscar García: Wright State University
- Charles Harlow: Louisiana State University
- John J. Puttress: Lucent Technologies Inc.
- Thomas M. Raleigh: Bell Communications Research
- Ravi Sethi: Lucent Technologies, Inc.
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