

The Higher Education Program – Focus: Florida International University

Florida International University (FIU) was Miami's first public four-year university, and has a powerful record of innovation and research that continues to improve the quality of life in its communities. One of Florida's eleven state universities, FIU opened for classes in 1972 with 5,667 students. Today it has more than 36,000 students, 800 full-time faculty and 110,000 alumni, making it the largest university in South Florida.

The College of Engineering and Computing and Information Sciences is South Florida's premier engineering education resource. FIU offers students the opportunity to evolve in a culturally diverse environment and participate in South Florida's international business activities while in school. FIU draws a large proportion of its students from neighboring Hispanic and Latin American countries, and graduates the largest number of Hispanic students with Bachelor's and Master's degrees of any university in the United States. Furthermore, the number of women engineering graduates is 9% above the national average.

The Electrical and Computer Engineering Department encompasses a broad range of research and educational interests, concentrating on the design and development of electronic circuits and packaging, VLSI and nano-technology, solid state devices, electro-magnetics, digital signal processing, power systems, telecommunications and networking. The department has 400 undergraduate

students and 120 graduate students, and there are currently 20 full time faculty (all with PhD degrees), and 6 adjunct faculty members.

The **VLSI and Intelligent Systems Design Laboratory** was created in 2003 to promote research to develop Intelligent System-on-Chip (SOC) designs for industrial and commercial applications. A newer but equally important mission is the development of a sequence of courses at the senior and graduate level to provide the depth and breadth necessary in the



Dr. Subbarao V. Wunnuva, Professor of Electrical & Computer Engineering, Florida International University

implementation of SOC's, including CPLD's, FPGAs, ASIC and VLSI transistor level layouts involving Radio Frequency (RF), wireless and low power embedded and secure systems.

The Laboratory was the brainchild of Professor Subbarao V. Wunnuva. Dr. Wunnuva has been actively involved in the field of Digital Systems,

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**– DR. SUBBARAO V. WUNNUVA,
PROFESSOR OF ELECTRICAL & COMPUTER ENGINEERING,
FLORIDA INTERNATIONAL UNIVERSITY**

Micro-processors, and Computer Communication Networks for the past 20 years. He has worked as a consulting engineer for numerous companies and is the author of three books on Micro-processors and Systems.

The Laboratory was established with a grant of \$50,000 from the College of Engineering that provided the funds for the workstations, file servers and PCs, as well as an initial donation from Mentor Graphics of over \$1.47M in software through its Higher Education Program.

"I spoke to a number of my colleagues and associates at various IEEE conferences, and it became clear that Mentor Graphics was able to provide entire flows for FPGA, IC, ASIC and PCB that meet our academic needs," said Wunnuva. "And, in talking with other universities about Mentor's Higher Education Program they appeared very satisfied with Mentor's program and support."

To date, twelve masters degree projects have been completed involving twenty three students using the Mentor software, many of whom are now using the tools in pursuit of their PhDs. Wunnuva is now expanding the use of the tools to cover undergraduate classes, and introducing projects in analog and RF design using Mentor's IC design, simulation and layout tools.

"All the Mentor Graphics software is installed and maintained by the students.

By giving them this responsibility, it exposes them to some of the real world issues they will face in industry. Also, it is the students who know more about the software, its features and when new releases come out, and we have found



Student members of FIU's VLSI laboratory. From left to right: Marcus Temitope, Chandra Kadijala, Vivek Jayaram, Jaime Montenegro (seated), Jufang Yao, Richard Zavaleta, Rafael Romero

that working this way it is much easier to keep our installation up to date with the latest releases."

Jaime Montenegro is a PhD student studying the determination of body composition through a bioelectrical VLSI system. Montenegro completed his Master's degree through his project studying microprocessor design and communications. As part of his degree, Montenegro implemented a 12-bit word error correction and detection system in VHDL, using Mentor's ModelSim simulation and Leonardo Spectrum synthesis tools.

"Mentor's software has proved very powerful. When we first looked at tools we were a little overwhelmed, but once we became familiar with their capabilities,

they really helped us," commented Montenegro. "There are many variables and settings that we have made use of to make the simulation and synthesis processes run seamlessly, without having to manually step in every time."

Montenegro also acts as the general manager of the VLSI Laboratory, as well as being responsible for Mentor's FPGA tools. In this role he organizes regular meetings with his team to share their experience and knowledge and determine how to pass this information on to other students within the department, either via presentations or the writing of targeted tutorials. "The documentation is very thorough, but we also create our own tutorials that focus on the very basics of the tools, so that a

student with no previous knowledge whatsoever can get up and running almost immediately. For example, we recently transitioned from Leonardo to Mentor's Precision tool for FPGA synthesis, and to make sure any student can pick up Precision quickly I created a simple tutorial to walk the students through its basic use."

The FIU team has made extensive use of Mentor's Customer Support, particularly Supportnet, whenever issues have arisen.

"What is interesting is that in most cases we find the solutions to our problems using the Search capability in Supportnet," said Montenegro. "Only in a small number of cases have we needed to open a Service Request or call the hotline,

and when we do, we usually get a response within ten to fifteen minutes.”

Vivek Jayaram explained a recent experience, resulting from his management of Linux workstations and the installation of the IC design tools. “My policy is to first ensure that we have read the appropriate section of the manual to make sure I have not made any basic mistakes; it can be embarrassing to call support and

find out that you failed to follow an instruction on page one of the release notes. After this and searching Supportnet it was clear to me that I needed to speak with an engineer. The support engineer was very helpful, emailing me scripts to run to check out our environment, one of which highlighted a problem with some setting in our Linux environment. As a result we were up and

running with the tools well ahead of the training.”

Looking to the future, Wunnuva sees many opportunities for the VLSI Laboratory. “A number of our students are pursuing their PhDs in our emerging disciplines such as biomedical engineering and nano-technology. Furthermore, there are good opportunities for us to exploit our knowledge and help develop the expertise in VLSI design both in the Miami area and in the Latin American region. FIU is a member of the Latin American Caribbean Consortium for Engineering Institutions (LACCEI), and we are keen to use our knowledge to help train other members’ faculty and students.”

“We are delighted with the software and support from Mentor Graphics. It has enabled us to expand our engineering program, it has enabled our students to experience leading edge design tools, and it is enabling FIU to take a lead in developing VLSI expertise in the Miami and Latin American region.”

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– JAIME MONTENEGRO

PHD STUDENT AT FLORIDA INTERNATIONAL UNIVERSITY

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Corporate Headquarters
Mentor Graphics Corporation
8005 SW Boeckman Road
Wilsonville, OR 97070-7777
Phone: 503.685.7000
Fax: 503.685.1204

Sales and Product Information
Phone: 800.547.3000

Silicon Valley
Mentor Graphics Corporation
1001 Ridder Park Drive
San Jose, California 95131 USA
Phone: 408.436.1500
Fax: 408.436.1501

North American Support Center
Phone: 800.547.4303

Europe
Mentor Graphics
Deutschland GmbH
Arnulfstrasse 201
80634 Munich
Germany
Phone: +49.89.57096.0
Fax: +49.89.57096.400

Pacific Rim
Mentor Graphics (Taiwan)
Room 1001, 10F
International Trade Building
No. 333, Section 1, Keelung Road
Taipei, Taiwan, ROC
Phone: 886.2.87252000
Fax: 886.2.27576027

Japan
Mentor Graphics Japan Co., Ltd.
Gotenyama Hills
7-35, Kita-Shinagawa 4-chome
Shinagawa-Ku, Tokyo 140
Japan
Phone: 81.3.5488.3033
Fax: 81.3.5488.3004

