New System on Chip Design laboratory equipment presentation

TEMPUS JEP_41107_2006

Dimitar Trajanov

06/10/2009, Skopje Macedonia

Tempus SoCD Project

- The continuous progress of semiconductor technology has made it possible to implement complex systems on a single chip, which has led to new challenges in design methodologies.
- Driven by these technological forces, the Faculty of Electrical Engineering and Information Technologies (FEIT) – Skopje with support of TEMPUS JEP_41107_2006 Project has developed an interdisciplinary Master of Science Programme on System-on-Chip design, which couples hardware and embedded software design principles.
- The programme aims to provide students with competence and skills for designing, analyzing and verifying embedded systems.

TEMPUS JEP_41107_2006
Participants

- **Technical University of Madrid**, Prof. *Octavio Nieto Taladriz Garcia*, Laboratory of Integrated Systems (LSI), Department of ElectronicEngineering (DIE), School of Telecommunication Engineering (ETSIT)
- **University of Southampton**, Prof. *Mark Zwolinski*, Electronic Systems Design Group (ESD), School of Electronics and Computer Science (ECS)
- **University SS Cyril and Methodius, Skopje**, ass. Prof. Dimitar Trajanov, Faculty of electrical engineering and information technologies, *Department:* Informatics and computer science
- **University of Niš**, Prof. *Vančo Litovski*, LEDA, Elektronski Fakultet

Tempus SoCD Project Outcomes

- Curriculum creation
- **Labs restructuring**
- Teacher's training
- Library inter-partner sharing
- Pilot students exchange

- Sustainability
- Dissemination
- Quality control and monitoring
- Management of the project

Study program plan

- Developed as a one year master degree program with 60 ECTS credits
- Provide students with practical knowledge through laboratory work and practical student projects
- Developed with the awareness of the need for a cross-disciplinary educational approach, coupling microelectronics with computer science technologies.

FEIT-Skopje
Study program plan (courses)

No.	Title	Semester		Credits		Classes
1	**System on chip design techniques**	**IX**		**5**		**2+0+2+1**
2	**Integrated circuits design**	**IX**		**5**		**2+0+2+1**
3	**Embedded computer systems software development**	**IX**		**5**		**2+0+2+1**
4	**Compulsory non-technical course**	IX		5		**2+0+2+1**
5	Specialization elective course	IX		5		**2+0+2+1**
6	Specialization elective course	IX		5		**2+0+2+1**
7	Specialization elective course		**X**		**5**	**2+0+2+1**
8	Specialization elective course		X		5	**2+0+2+1**
9	**Masters thesis**		X		20	
	TOTAL			**30**	**30**	

FEIT-Skopje
Elective courses list

No.	Title	Semester		Credits		Classes
1	Wireless and ad hoc computer networks	IX		5		2+0+2+1
2	Contemporary methods for network analysis	IX		5		2+0+2+1
3	Digital system design using HDL	IX		5		2+0+2+1
4	System reliability	IX		5		2+0+2+1
5	Collaborative computer systems	IX		5		2+0+2+1
6	Digital electronic system design		X		5	2+0+2+1
7	Custom purpose networks		X		5	2+0+2+1
8	Cryptography		X		5	2+0+2+1
9	Process computers		X		5	2+0+2+1
10	Nanotechnology		X		5	2+0+2+1

Laboratory

- Total budget for equipment 19 870 Euros
- Goal
  - Build SoCD laboratory for computer engineering students
  - Laboratory for classes and for research

Equipment

- Server x1
- Workstations x 7
- Mobile workstations x 2
- Laptops for presentation x 2
- LCD Projector
- Printer
- Network Equipment (24x1Gpbs LAN Switch, Wireless access points, cables)

Development boards

- FPGA development boards
  - OpenSPARC Evaluation Platform x 1
  - Xilinx Spartan-3E FPGA (**1.2M gates**) x 1
  - Xilinx Spartan 3E FPGA (**250K gates**) x 2
  - Xilinx Spartan 3E FPGA (**500K gates**) x 1
  - Xilinx Virtex-II Pro (53,136 Logic Cells) Network Development System x 1
- The 8051 Trainer board x 1
- Micro .Net Development platform x 1
- ZigBee Development Kit x 1

Digital oscilloscopes

- **PicoScope 3224** 2-channels PC oscilloscope **(**Bandwidth 50MHz Sampling rate (repetitive) 2.5GS/s) x 1
- **PicoScope 2203** 2-channels PC oscilloscope (Bandwidth 5MHz, Sampling rate (repetitive) 1GS/s) x 1
- **PicoScope 2104** Handheld PC oscilloscope (Bandwidth 10MHz, Sampling rate (repetitive) 1GS/s) x

Sensors and peripheral modules

- Sensors
  - Temperature/Thermostat Peripheral Module x 1
  - Infrared Reflective Object Sensor 4-pack x 1
  - Infrared Light Detector Module x 1
  - Pushbutton Peripheral Module x 1
  - Video Decoder Board x 1
- Peripheral modules
  - Open Collector Peripheral Module x 1
  - Four slide-switch Peripheral Module x 1
  - Analog to Digital Peripheral Module x 2
  - Digital to Analog Peripheral Module x 1
  - GWS Servo Kit x 2
  - Robotic Starter Kit x 1

Other analog and digital parts

- **Displays**
  - Digital Input Peripheral Module x 1
  - LED Peripheral Module x 2
  - Two-digit high bright seven-segment display x 2
  - 16x2 character display x 5
- **Wire kits and connectors**
  - Digital Breadboard x 3
  - Digital Wire Wrap x 3
  - 32x65 hole wire wrap area x 2
  - Test Point Header x 2
  - Analog Parts Kit x 2
  - Digital Parts Kit x 2
  - Wire Kit x 3
  - 6 Pin Cable Connector x 4

Conclusion

- The new master studies curriculum in System on chip design was created in Macedonia
- Completely new laboratory is created
  - Laboratory equipment can be used for teaching and small research projects