

UNIVERSITY OF LOUISIANA AT LAFAYETTE

STEP Committee

Technology Fee Application

**Enhancement of the Digital System Technology
Laboratory**

Cherif Aissi (PI)

**Department of Industrial Technology
College of Engineering**

Title:	Enhancement of the Digital System Technology Laboratory	Date:	1-14-2022
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2. ABSTRACT (250 words or less):

This proposal requests funding to enhance an existing Digital and Microprocessor Control System Technology laboratory located in Rougeau Hall, room #266. This laboratory is being used for undergraduate instructions in the Department of Industrial Technology in the college of Engineering. This *improvement* consists of replacing outdated equipment (i.e., over 10- year-old PCs that can no longer run current software version of Multisim 2021 without crashing. In addition, these old PCs run under Windows 7 which is no longer supported by Microsoft and cannot be upgraded to Windows 10 due to their outdated hardware. With new modern PCs, updated FPGA BASYS 3 digital boards can be installed to introduce students to the latest technology that is current in the industry. This will allow the department to focus more on digital systems with emphasis on field programmable gate arrays (FPGA.) The Department of Industrial Technology views the funding of this proposal as critical to keep up with today's tools used in the industry. The laboratory will serve three main purposes:

- (i) To enhance our courses in the area of Digital System Technology to acquaint students with software and hardware tools that are current practice in many industrial environments. In fact, ITEC 322 is a required course and serves all students enrolled in ITEC program.
- (ii) To provide a state-of-the-art facility where students can upgrade their skills and focus on learning the technical material rather than wondering why the existing outdated PCs are so slow and crash all the time.
- (iii) To allow industrial technology students to develop complex and sophisticated projects with less frustration. The acquisition of the requested equipment will allow the Department of Industrial Technology to compete for federal funding in the areas of undergraduate education and future laboratory expansions.

3. Description:

3.a. Purpose of grant and impact to student body as a whole

The purpose of this proposal is to enhance an existing digital and microprocessor control system technology laboratory which was upgraded in 2011 by the PI using a STEP grant "Enhancement of the Microprocessor control system Technology laboratory," June 2011-June 2012, \$14,306. This Laboratory served our students very well for about 10 years by providing them with the state-of-the-art equipment to develop expertise in the field of Digital and Microprocessor Control System Technology. However, today the current equipment, specially the PCs, can no longer run without crashing, the latest version of National Instrument Mutism software, that our college of Engineering purchase the upgrade license on a yearly basis. In addition, the department is shifting its focus more in the area of digital systems with emphasis on FPGA. The funding of this project will not only keep this laboratory running but will also allow the PI to enhance the ITEC department curriculum.

For instance, in the area of teaching, the department of ITEC adheres to the principle of teaching courses with hands-on equipment. When it comes to practical challenges, our students learn better and more quickly in an experimental environment with immediate feedback, rather than using theoretical approach. To enhance the ITEC curriculum, the department plans to upgrade one existing course in Digital System Technology, ITEC322 by integrating real world applications. With the funding of the requested equipment, students will be exposed and trained on the current technology such as field programmable gate arrays (FPGA) that most industry companies use today.

Furthermore, in the area of professional development, the proposed laboratory enhancement will benefit local economic development greatly and will affect students significantly. Graduates from this program will have more experience in the area of digital system technology and can contribute better to local companies and institutions. An available skilled work force of graduates in this area will be a factor in increasing the likelihood of additional high-tech companies moving to Louisiana. For instance, local professionals who are interested in the practical application development rather than the traditional theoretical use of digital system technology may enroll in this course to upgrade their skills and gain practical experience. Funding of this grant will enhance the potential for cooperation between local industry and faculty members in the department of ITEC at the University of Louisiana at Lafayette.

The requested equipment complements the existing equipment available in the department of ITEC laboratories and provides an opportunity to have the needed resources to teach high tech courses and conduct research in the field of digital system technology. Currently the ITEC department utilizes three electronics laboratories to support the teaching of fundamentals analog system technology, digital systems technology as well as integrated systems technology. The requested equipment will enhance the digital system technology laboratory and will certainly have a significant impact on the student body in several ways:

- (1) Students can focus on learning the technical material in this updated state-of-the-art facility, rather than wondering why the existing outdated eight-year old PCs are so slow and crash all the time.
- (2) Students will have an ideal environment to design complex digital systems and applications that use FPGAs to achieve improved and complete product development. They will also learn the tools in digital system technology that are currently in use by the industry.
- (3) With the enhancement and expansion of the digital system technology laboratory, students will learn the entire process from the first design concept to the result of testing the product using the most current tools.

The requested equipment will greatly enhance and expand the capabilities of the Industrial Technology Department. The impact of funding this STEP proposal will be substantial in aspects of curriculum development, instruction, research, industry, and community involvement.

3.b. Projected lifetime of enhancement

It is expected that this equipment enhancement will have a lasting impact for at least the next five years. The requested PCs and diligent FPGA basys 3 boards will allow us to run updated software and hardware that is currently being used in the industry. The latest version of the updated 2021 software, which includes both Mutisim and Labview, has already been upgraded by the college of engineering. In addition all supplies will be purchased by the ITEC department as needed. With the funding of the requested PCs, students will have a better learning environment.

3.c. Person(s) responsible for

(i) Implementation

Dr. Cherif Aissi is responsible to implement the enhancement of digital system technology laboratory. He is responsible to place purchasing orders as well as ensuring a timely delivery of the equipment. The PI is currently taking all preparations to meet this objective. His assigned graduate teaching assistant (GTA) will assist him.

(ii) Installation

Dr. Aissi and Mr. Harvey Ozbirn, the computer system administrator will install and test the PCs. Dr. Aissi and Mr. Harvey Ozbirn are responsible to setup the digital system technology laboratory. The GTA will assist in testing both the hardware and software equipment.

(iii) Maintenance

The Department of ITEC is responsible to maintain all its PCs. Mr. Harvey Ozbirn is a member of its faculty and has provided the maintenance of all the PCs , including the hardware and general software.

(iv) Operation

Dr. Aissi, will be running the digital and microprocessor control system technology laboratory and coordinate with all professors to conduct ITEC 322 laboratory classes. Dr. Aissi as well Dr. Shelton Houston (department head) will monitor this laboratory operation.

(v) Training

Dr. Aissi has run this laboratory for the last 25 years. He has provided training for all graduate teaching assistants and faculty members who are interested in this field. Thus, no training is requested.

3.d. Purpose and justification for each of the items listed in the Budget Proposal

- 11 Standard PCs are needed to replace old outdated computer that can no longer run new software versions without crashing. The requested PCs include Windows 10 and Microsoft Office.
- The standard laptop is needed for the PI to develop applications and to demonstrate them to students as a learning tool. It will also help the PI to conduct his lectures in a more efficient manner where simulations and lectures are presented at the same time.

Timeline/ Implementation schedule

During Year 1

Month 1:

Order all equipment and other items needed for installation and operation. Install equipment and test it.

Month 2:

Start using the equipment to teach ITEC 322 lab sessions.

Month 3-12:

Experiments and application development.

During Year 2:

Maintenance and update installation.

During Year 3:

Maintenance and update installation.

During Year 4:

Maintenance and update installation.

During Year 5:

Maintenance and update installation

The funding is request for only the first year. No funds are requested for the remaining years.

4. Budget Proposal

1. Equipment	\$14,245.00
11 Desktop Enhanced PCs (each \$1295.00)	
Dell Optiplex 7000 with Monitor	
2. 1 Laptop Dell Latitude Enhanced series	\$1,320.00
3. Hardware: 12 Diligent Basys3 board	\$ 1,788
(each @ \$149.00)	
4. Supplies	
Electronics kit parts for experiments	\$600.00
(each @ \$50.00)	
5. Maintenance	\$0.00
6. Personnel	\$0.00
7. Other	\$0.00

TOTAL: \$17,953.00

5. Include any additional information relevant to your application.

It should be clear that the funding of this STEP proposal is to purchase the requested equipment. Other funds are matched by the college of Engineering and ITEC department. For instance, the college of Engineering has already purchased a license for the 2021 version of Multisim and Labview software and the ITEC department will provide the needed yearly supplies and maintenance.

Qualifications:

Dr. Aissi (PI) has a doctoral of science degree in Electrical Engineering. He is a professor in the college of Engineering and has over 30 years of experience in developing and managing laboratories in the field of analog and digital systems.

6. Discuss all previous funded STEP projects (if any).

Dr. Aissi has received funding for the following step projects to enhance laboratories in the Industrial Technology Department.

- Principal Investigator, “Enhancement of the Integrated Systems Technology Laboratory,” STEP grant, May 2017-May 2018, \$33,649. The main objective of this proposal is to enhance the integrated system Laboratory for teaching and research.
- Principal Investigator, “Enhancement of the Analog Systems Technology Laboratory,” STEP grant, May 2013, \$12,957. The main objective of this proposal is to enhance the analog system technology Laboratory for teaching and research
- Principal Investigator, “Enhancement of the Microprocessor control system Technology laboratory,” STEP grant June 2011, \$14,306. The main objective of this proposal is to enhance the microprocessor control system Laboratory for teaching and research