AC 2008-578: UNIVERSITIES COLLABORATE WITH INDUSTRY TO FILL NEED FOR HANDS-ON WORKSHOPS

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Abstract

There are many indices that point to a market need for hands-on workshops to educate a changing global workplace. A collaborative effort offering industry-driven workshops addresses this issue. In its October 13, 2003 issue, *Electronic Design* magazine surveyed its readers to assess attitudes about needs for continuing education.[1] The results drew the following conclusions:

- 71% of surveyed engineers had employers paying for learning
- 50% of surveyed engineers participated in formal classes and conferences
- The most desired topics were DSP; C/C++ programming; communications and RF design; and analog[1]

Couple these statistics with students who wish to incorporate hands-on learning in their curriculum, and you have an audience for 1-2 day workshops that address a market need for instruction, due to rapid technology changes.

Introduction

Students entering college today will graduate to a different world. In an article in the winter 2006 edition of *Marquette*, the magazine of Marquette University, author Barbara Abel writes about this changing landscape. She cited a 2004 book, *The Jobs Revolution: Changing How America Works*, which projected that between 1991 and 2015, the number of U.S. jobs requiring skilled workers would increase from 50% to 76%.[2] "None of the top ten jobs that will exist in 2010 existed today," the book says quoting U.S. Education Secretary Richard Riley. Those jobs will require technology that's still being developed. The most important thing a student can do today is learn to learn."[3] Ms. Abel continues "the book also notes that the emerging work force must be flexible, ready to spend a lifetime learning new skills because new kinds of work will continually be created and old ones will vanish."[4]

The effects of technological change on economies and the struggle to keep pace have been discussed by many others. In a paper on the economic importance of patents, The European Patent Office stated "Today's economy is becoming increasingly knowledge-based and intellectual property in the form of patents plays a vital role in this growth. Between 1992 and 2002, the number of patents filed in Europe, Japan and the United States grew by more than 40 percent."[5] In a paper entitled "Innovation and Growth," the Business and Industry Advisory Committee to the Organization for Economic Co-operation and Development (OECD) wrote, "This velocity of innovation is enabled by technology, feeding on itself, permitting the management of the private enterprise model to alter its composition with remarkable speed. At the same time, that invention is opening new product and marketing possibilities for the customers of those goods and services, sometimes shifting demand so quickly that even the most sophisticated modelers cannot predict tomorrow."[6] In other words, educators are currently preparing students for jobs that don't yet exist.

This continuing upward spiral of innovation imposes difficult challenges on companies, the educational infrastructure, government and the individual to adapt and stay current. If the graduating engineer will be working with technologies, products, applications and markets 10 years or less into his/her career that did not exist at the time of graduation, where will he/she gain that knowledge? How can companies address the time and cost pressures of having to constantly re-train their engineering staffs to remain competitive? How can the educational infrastructure remain relevant and effective when the useful life of a technology education continues to shrink? What can government do to promote the health and vitality of this economic engine to ensure prosperity?

To meet these demands, it is critical for universities to partner with industry to keep abreast of technological advances and build relationships with engineering professionals in the industry. This paper will address the collaborative effort between Microchip Technology Inc. and the Arizona State University, Polytechnic campus (ASU Poly) to bring low-cost, short-duration, hands-on technical workshops on an on-going-basis to industry and the academic community, to meet some of these challenges.

Microchip Technology's Regional Training Centers (RTCs)

Late in 2005, semiconductor company Microchip Technology recognized the opportunity to expand the adoption of its microcontroller and analog products into end-user products by creating a network of regionally-based classrooms that would teach engineers how to efficiently use the company's products and development tools. Classes were developed to be short in duration (typically half or full days) and inexpensive, taking into account the time and financial pressures that companies often feel when sending an employee for training. These Regional Training Centers (RTCs) were set up across North America, Europe and Asia to reduce the travel requirements often associated with training.

After several months of planning and developing course material, the first North American center opened in August, 2006. There are now eight centers located across North America, and the course offerings have expanded from product-based knowledge to application-based classes, to meet customer demand. Classes are run in each RTC throughout the year. In 2007, over 3,000 engineers attended the various courses offered.

Early in 2007, ASU Poly approached Microchip with the idea of setting up a "remote" training center on the ASU Poly campus—remote, in the sense that the facility would not be connected directly to any Microchip facility and the center would not be run by Microchip personnel. Looking to expand the program but constrained by the resources and expenses required to open each additional RTC, Microchip was very interested in pursuing this relationship. Soon after, the two organizations began the process of defining how the partnership would operate.

Planning for Success

For the partnership to be a success, both organizations had to understand each other's objectives and constraints. For Microchip, these consisted of:

- Expertise of the instructor in Microchip products
- Consistency of message
- Access to attendee information
- Self sufficiency of ASU Poly

ASU Poly's objectives and concerns included:

- Image of partnering with an industry leader
- Attract new students
- Access to course material for inclusion into degree programs
- Training available to instructors
- Tool and product availability for classes

Recognizing that the instructor assigned by ASU Poly would also be teaching within the school's degree programs, the decision was made to select a small number of classes that would be applicable to both employed engineers and students at the university. The next step was to train the trainer. This was accomplished by having the assigned instructor attend a series of the Microchip workshops that would be taught at ASU Poly. In this way, the instructor not only learned the material first hand, but also understood any logistical issues associated with conducting the class. The instructor also saw the typical questions and comments that a working professional might ask.

Microchip committed to providing the necessary development hardware and software to ASU Poly, and ASU Poly provided the classroom space and computer equipment.

Benefits to Arizona State University (ASU) at the Polytechnic Campus

The Electronic Systems Department (ESD) in the College of Technology and Innovation at the Polytechnic campus offers both Bachelor of Science (BS) and Master of Science (MS) degrees, with various academic concentrations. The program's mission is to produce business-ready graduate*s*. Its secondary mission is to provide a lifelong learning environment for industry employees to cope with the challenges outlined earlier in this paper. The ESD faculty strives to upgrade their coursework on a yearly basis with consultation of the Industry Advisory Board, in order to keep pace with technological advancement in the classroom. Recently, the faculty restructured its academic degree curriculum for undergraduate students and, as a result of this—and with the help of Microchip Technology Inc., is pleased to introduce a new area of academic concentration called "Embedded Controllers*."* The coursework identified for this curriculum by both participants (ASU and Microchip Technology Inc.) is shown in Figure 1.

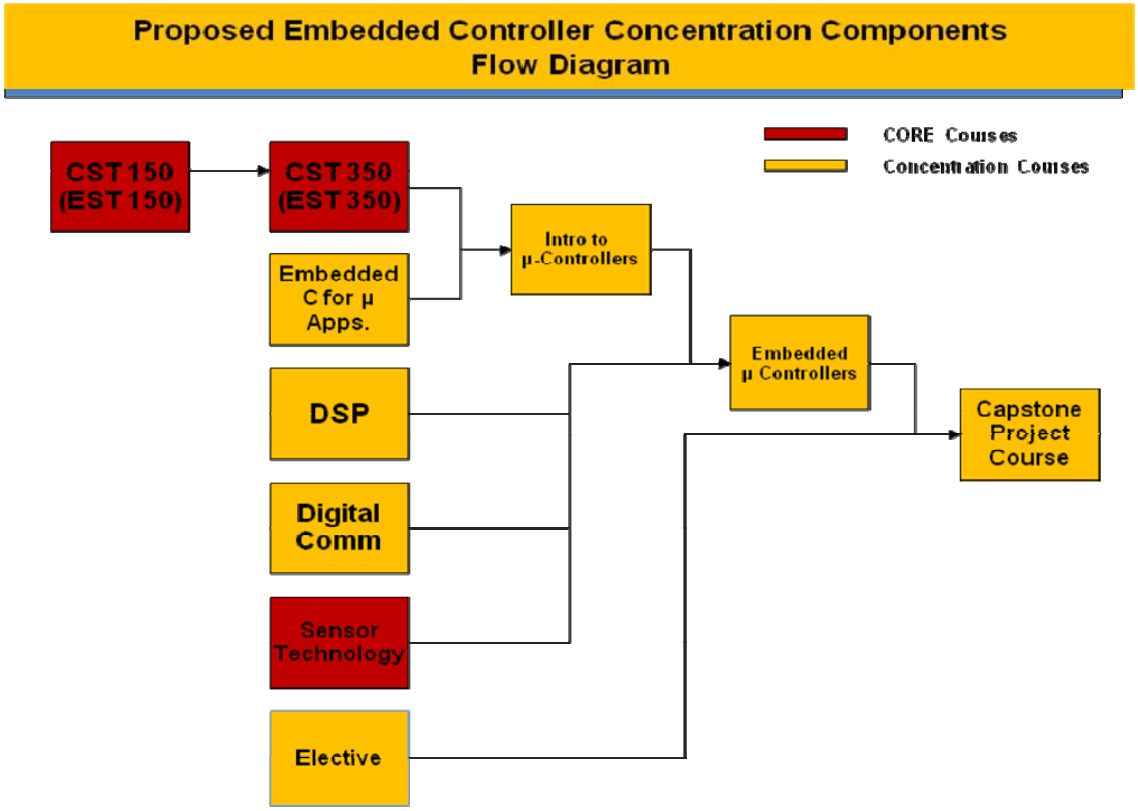

Figure 1:
Curriculum and Coursework for ASU Poly Degree, Concentration in Embedded Controllers

Additionally, ESD students will have an opportunity to participate in RTC workshops, to learn the latest products developed by Microchip Technology. The faculty in the ESD department at ASU has already participated in the MASTERs conference/workshop, conducted by Microchip for their customers annually. This event will serve as a professional development activity for the faculty to learn updated technological products and bring this knowledge and experience to the classroom. The engineering staff at Microchip is also assisting the ESD faculty by sharing workshop materials as supplements to classroom lectures, and by serving as guest speakers for the microcontroller classes. Furthermore, this partnership provides internship and, hopefully, career opportunities for the students in the program.

This industry partnership is expected to benefit the program to recruit talented young adults to ASU's program, and to prepare them for industry-ready careers. Placement opportunities for these students after graduation are expected to be much better, due to their course experiences with Microchip products. The industry partnership can also lead to academic research opportunities for the faculty in the ESD department. In a similar way, Microchip Technology will also have an opportunity to hire the graduates, who are already well versed with its products. Microchip will also have access to university faculty, facilities and talent for research collaboration.

RTC Workshops

The ESD at ASU's Polytechnic campus is excited at the prospect of offering RTC workshops under the guidance of Microchip Technology. The targeted audiences for these workshops are expected, primarily, to be Microchip customers, ASU students, and faculty from ASU and other institutions. These workshops will also serve as lifelong learning venues for working adults, the workforce that needs to be up-skilled to compete for jobs, and high school teachers. The less intimidating workshop setting at a higher-education site is a plus to attract various groups to attend these workshops. ASU and Microchip Technology expect to work out an effective market plan to launch and sustain these workshops over a period of time. The number of workshops offered and their frequency is designed to be adjusted based upon demand. The pricing structure is expected to meet affordability criteria.

Summary

Technological development is becoming a foundation for economic prosperity. The exponential change in this development, however, is highlighting the need for constant learning and forcing educators, industry, government and the individual to find new and effective ways of making continuing education a reality. Microchip Technology and ASU Poly's collaboration on delivering short, cost-effective hands-on workshops is one example of how industry and academia can work together to meet this need.

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Note: All trademarks mentioned herein are property of their respective companies.

References

[1] Frenzel, Louis J., "To Step Up Your Career, You've Got to Keep Learning," Electronic Design, October 13, 2003, < http://electronicdesign.com/Articles/print.cfm?ARticleID=5858>

2 Abel, Barbara, "The New Frontier – The World", Marquette, Winter 2006, <http://www.marquette.edu/magazine/winter06/frontier.html>

[3] ibid

[4] ibid

[5] European Patent Office, "The economic importance of patents", <http://www.epo.org/innovation-and-economy/economic-impact.html>

[6] Business and Industry Advisory Committee to the OECD, "Innovation and Growth, A Discussion Paper for the OECD Council at Ministerial Level", June, 2000, <http://www.biac.org/statements/high_level/Ministerial2000FINAL+Table.pdf>