

STUDENT USE OF PERSONAL DIGITAL ASSISTANTS IN A COMPUTER ENGINEERING COURSE

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Abstract --- Penn State Abington has integrated the student use of personal digital assistant (PDA) technology to foster active and collaborative learning experiences in the classroom and laboratory. Palm™ PDA technology was introduced into a sophomore-level digital systems course in the fall of 2000. The students have investigated handheld software tools for enhancing learning and instruction in both the lecture and laboratory components of the course. Handheld databases, simple CAD tools, C programming, image capture, web-based tools, and robotics applications have been explored.

Index Terms — active learning, digital design, handheld computer, Personal Digital Assistant, PDA.

OVERVIEW

In the fall of 2000, 24 students in a sophomore-level digital systems course at Penn State Abington were each provided a Palm IIIx[1] personal digital assistant (PDA). The goal was to explore active and collaborative learning enhancements in the classroom and laboratory. The Palm PDA is an inexpensive, handheld computer which supports a wide array of software tools including database, spreadsheet, document viewing and editing, graphics, programming, and web-browser applications. The devices possess a serial port allowing connection to external devices, such as data acquisition systems and other computers. Additionally, there is support for close-range, IR communication and transfer of programs and data between PDA units. PDAs can be synchronized with a PC system during which data files, programs, web pages, and other resources can be exchanged. The PDA system software and overall operation are highly intuitive, making it an ideal tool for educational use. Penn State Abington has also integrated handheld computers in an Information Sciences and Technology program and a French III course [2].

The students utilized their PDAs in all class and laboratory meetings for the digital systems course. Course topics include Boolean algebra, combinational and sequential logic, state machines, and programmable logic devices. Class notes and quizzes were distributed to the students via the infrared beaming feature. Classroom activities included the creation and execution of small C programs that were designed to highlight course topics. Class materials and tutorials that existed on the web were also downloaded to the Palm devices for access in the classroom, and in other locations, such as the lab, library, or

at home. Reference materials that supported digital circuit construction were created for access in the laboratory sessions. Experiments with interfacing the Palm PDA to microcontroller technology were explored, and an operational autonomous mobile robot was designed and constructed using the Palm as the "brain" of the robot. Software could be entered and modified directly on the Palm device allowing modifications to be performed in locations where desktop or laptop PCs were not available.

Student teams constructed and evaluated a variety of course tools based on existing PDA software products, and in a few cases, custom solutions were attempted. Student PDA projects included a digital circuit schematic database (see figure 1), IC reference database, software for truth table and K-map generation, and simple digital circuit schematic entry (CAD). These tools were used to support individual and team design exercises in the classroom and lab.

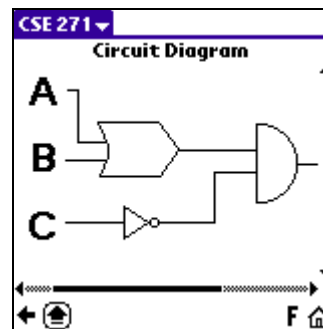


FIGURE 1

Circuit Diagram on a Palm PDA using InfoView [3]

CONCLUSIONS

The use of PDA technology as an instructional tool in the digital systems course was highly rated by the students and the instructor. The investigation and testing of software tools demonstrated the usefulness of the PDA to enhance active and collaborative learning in the classroom and lab. Based on the preliminary success of this project, the PDA integration is planned for a future offering of this course to build on the experiences discussed above.

REFERENCES

- [1] Palm, Inc., Santa Clara, CA. URL: www.palm.com
- [2] Avanzato, R.L., "Handheld Computers in the Classroom and Laboratory," to appear in the Proceedings of the 2001 Annual ASEE Conference, Albuquerque, NM, June 2001.
- [3] The HandTop Company; URL: www.handtop.com

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