

Internet-Mediated Process Control Laboratory

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Abstract: The Internet provides a new environment for developing a variety of applications for educational and research purposes. Internet mediated experimentation is an important domain from many points of view. From an educational perspective, it is the enabling technology for Internet based engineering education and active learning. From industrial perspective, it is a competitive service for remote measurement, supervision, diagnosis and control. From an information and communication technology (ICT) perspective, it is a challenging application that pushes research in Web services and communication systems. Experimentation has a special role in domains where high theoretical challenges and the need for abstraction must be combined with engineering applicability and the real-world needs. The University must give the students a solid basic engineering education, and not only to train them for specific tasks. On the other hand, practical experience provided to students by the lab work along the whole course is necessary. Students solve practical problems and gain experience and practice needed for their future career. Experimental work is necessity for engineering education. This paper presents the implementation of a web-based laboratory experiment on a coupled tank apparatus. The web-based laboratory has been developed to serve students and staff at the University of Kragujevac. The laboratory is an educational tool for teaching students the basic principles and methodology in performing a series of experiments on a coupled tank apparatus at any time and from any location through the Internet. With the capability to implement strategies for manual, proportional integral derivative (PID), general state-space, and fuzzy logic control, the laboratory also provides a platform for research staff to test new control algorithms. Measurement, filtering and estimation theory as well as IT skills are important part of educational potential of the designed laboratory exercise, too. Video signal has been used to provide video feedback, with a camera mounted on a platform. The laboratory can be accessed at <http://weblab.kg.ac.yu> (mirror <http://www.cqm.co.yu/weblab>). Internet mediated laboratory environment allows students to access the laboratory at any time and from anywhere. While one student exercises on the connected control apparatus, others can observe this process over the Internet/Intranet. This way of learning offers also an interesting economic potential in industrial applications, especially for: fault telediagnosis, telemonitoring and telemaintenance of equipment, telecontrol of processes, robots and other devices. In direct interaction with the devices at the remote location, a large student community can access these experiments. High-cost instruments are shared by many users, emphasizing the more dynamical educational environments. Using this way of distance learning, the total costs for education are reduced. Also, the teacher can assign laboratory exercise as homework.