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Paper

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Remote Laboratories Versus Virtual and Real Laboratories

Innovations in Virtual and Remote Laboratories are increasingly taking place in engineering education. During the last decade the nearly exponential expansion of the Internet has had an enormous impact on all areas of human activities. One of the most affected areas is, without any doubt, the tertiary education sector and especially engineering education. The changing and rapidly developing e-environment at universities depends both on the software and hardware, but also on how they are used for teaching and learning purposes. The theoretical side of engineering education has changed a lot with the introduction of the Internet. Numerous materials available on the Internet for teaching engineering courses include lecture notes, interactive tutorials, simulation packages, etc. The new technology has also brought a significant improvement in communication within the academic community.
Although one of the most important factors in forming the engineering graduate qualities, the last field influenced by the new technology, is the practical component of the engineering education. Many software packages have been developed for the simulation of real experiments and although very useful for the preparatory work, none of these virtual experiments can replace the real laboratory work.
Remote laboratories (RL) offer a solution to the problem. They have all the advantages of the new technology in the form of Internet and yet may offer the realistic laboratory environment for experimentation. At the University of South Australia we are currently developing a new system named NetLab that will support students doing real laboratory experiments over the Internet from distant locations. We researched currently existing remote laboratories, although there is only a small number of them, and in this paper we would like to make a comparison between real laboratory, virtual laboratories and remote laboratories in terms of their advantages and disadvantages from the perspective of a modern university environment.
The main deficiency of the current remote laboratories is that they do not look real. Although students perform experiments on real equipment and obtain realistic data, they do not have the feeling of working in a real laboratory. In our system, NetLab, we intend not only to provide the facility for performing measurements and controlling real equipment remotely, but also to provide students with all the advantages and excitements offered by experimental work in a realistic laboratory environment, including collaboration and communication with other students in the "lab".