

The Design of 3D Virtual Collaborative Learning System with Circuit-Measuring Function

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Abstract: This paper designed a 3D online cooperative learning system for operating virtual instruments with circuit-measuring function. By integrating with Virtual Reality, Remote Control Parameter Transmission and embedded system techniques, this system gives learners not only a cooperative learning environment via networking to jointly operate the 3D virtual instruments (for example, multi-meters and power supplies) but also the functions of instant messages and 3D puzzles to interact with one another. Therefore, learners can effectively improve learning interests and results.

Keywords: Cooperative learning system, embedded system, virtual instruments

Introduction

Many researchers on network Cooperative Learning wish to establish a more effective learning environment through the Internet in order to improve the learning ability and performance of the students (Chen, 2004; Kao, 2007). However, most of the existing network Cooperative Learning system a convenient network environment for the students to conduct online Cooperative Learning of theoretical courses. It is rarely to discuss how the Cooperative Learning environment of operation training of online-simulated instruments and the circuit current measurement can be established.

1. Embedded RS-232 Module

The "Embedded system" integrates the application of information software and hardware. This study has made use of low-cost 8-bit 89c51 chip to develop Embedded RS-232

Module to capture the data shown on the panel of the multimeter and transfer it to the computer (as shown in Figure 1).

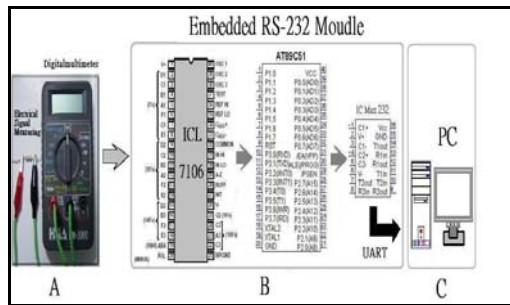


Figure 1 Embedded RS-232 Module

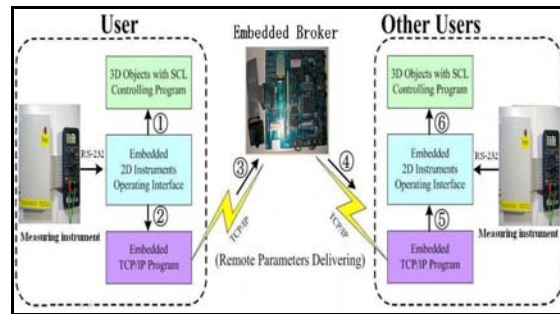


Figure 2 System operation flowchart

2. System infrastructure and implementation

The proposed cooperative practice environment with circuit measurement function sends the measured value from the multimeter Embedded RS-232 Module to the 3D virtual multimeters of the learners in the same group. Any learner can operate the own multimeter to progress cooperative practice, as shown in Figure 2. The simulated operation of the instruments and the measured data of the circuit among the members in the same group will show the same result as shown in Figure 3.



Figure 3 Measured data shown on the 3D virtual instruments of the members

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