

The Sensor Technic Workplace for Internet Learning

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Abstract - New age brings new techniques, technological processes, analytical and measuring methods and unconventional and innovative processes. All education must be conforming to these new trends and new technology. They are base for new education methods, which mainly uses a new communication technologies and Internet. The electronic texts, presentations, autocorrelation tests, simulations and virtual labs are most often used for e-learning.

The remotely controlled laboratories are one of special e-learning types. It is modern type of lab education, which is used little, because the modern conception laboratory and communications and control devices are need. Some aspects of these problems and new remotely controlled workplace for Internet learning of sensor technique are described in this paper.

Keywords – Internet, remotely control, sensor, learning

I. INTRODUCTION

New age brings new techniques, technological processes, analytical and measuring methods and unconventional and innovative processes. All education must be conforming to this new trends and new technology. They are base for new education methods, which mainly uses a new communication technique. The old education systems in fringe area (sensor technique, high voltage) of electronics were mainly focused on theoretic passages in the past. A practical education was reduced for the reasons of safeness or inaccessibility. The classical lecture notes were not easily updated in short time and distributed. Therefore the classic lecture notes don't contained new knowledge from research and development.

New education methods use a new communication technologies and Internet. Main advantage is access to education, basic and extension theoretical knowledge from comfortable and safe environment of home in all time. Next advantages are the using the audio and video technologies for simulations of studied phenomena and then observe behavior of the studied system, the possibility of repetition and autocorrelation tests of obtained knowledge. One of secondary advantages is for example reduction of student expenses to traffic - reduction of traffic volume and increment of environmentalism. This type of electronics learning is ideal for students of distance

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learning, but many advantages it brings for students of full-time study too.

The electronic texts, presentations, autocorrelation tests, simulations and virtual labs are most often used for e-learning. This e-learning types are bases for bigger e-learning system. One of them is for example Moodle [1], which is a Course Management System. It is a free web application for educators, which can use it for create of effective online learning courses.

The remotely controlled laboratories are one of the e-learning types. It is modern type of lab education, which is used little, because the modern conception laboratory and communications and control devices are need. Main advantage is reality of measuring processes. One of these systems is software LabView [2]. It is very often used software for testing, measurement and control of real processes. Though it is very often used, we can find some deficiencies for learning Internet applications (installation software on user side). Other concept of remotely controlled laboratories was developed for iSES [3], where user doesn't install software and have control over process. But this disadvantage for teachers is installation of server software and special card to all control computers. Next Internet projects don't solve the remotely controlled laboratories, but they control the various devices, robots, toys, etc. These projects have a video control by WEB camera for process authenticity.

This project is focused to development of devices, which make possible a realizing of full remotely controlled lab with easy installation and using. This device is designed primarily for workplaces of sensor technique. Sensor technologies are very fast growing area – mainly semiconductor, but think and thick film technology too.

II. THE CONCEPT OF SYSTEM

The concept of this system is on the figure 1. A user sends his request from WEB browser (Internet Explorer, Firefox, Mozilla) through his PC3 and Internet to server database. A driver, which was programmed in C# language [4], on e.g. PC1 reads some requests from MySQL database [5], which is installed on free Apache HTTP Server [6]. The programming languages for this part were HTML [7] and PHP [8]. The driver sends these requests to defined device. The serial port RS-232 was used for this communication. The device, which controls some sensor (sensor of motion, distance, e.g.), work up these request and sends an answers to server database. These answers are then shown to user computer. The functionality of device is monitored by WEB camera.

II. THE CONCEPT OF DEVICES

Each device is independent device of the other device. It is not controlled by Internet only, but it may be manually controlled too. It was main requirement for distance operation, where external students control the devices, and for education, where students are in laboratory and control the devices by hand. Therefore the construction is designed from some units – microprocessor unit, display unit, keyboard unit, communication unit, source unit and unit for communication with sensors and actuators for

measurements and setting of behavior of the studied system. The microprocessor unit is built on ATmega 16 microcontroller [9]. It was used the recommended circuitry of producer. The display type MC1602 [10] was used for showing of statuses. This display has 2 lines and 16 characters in line. The device is controlled by keyboard, when it is in manually control mode. The keyboard has 12 keys. All modules are energized by source unit, whose output voltage is 5V. All units are built in plastic box. The example of sensor technic workplace with designed system for remotely control of processes is shown on the figure 2.

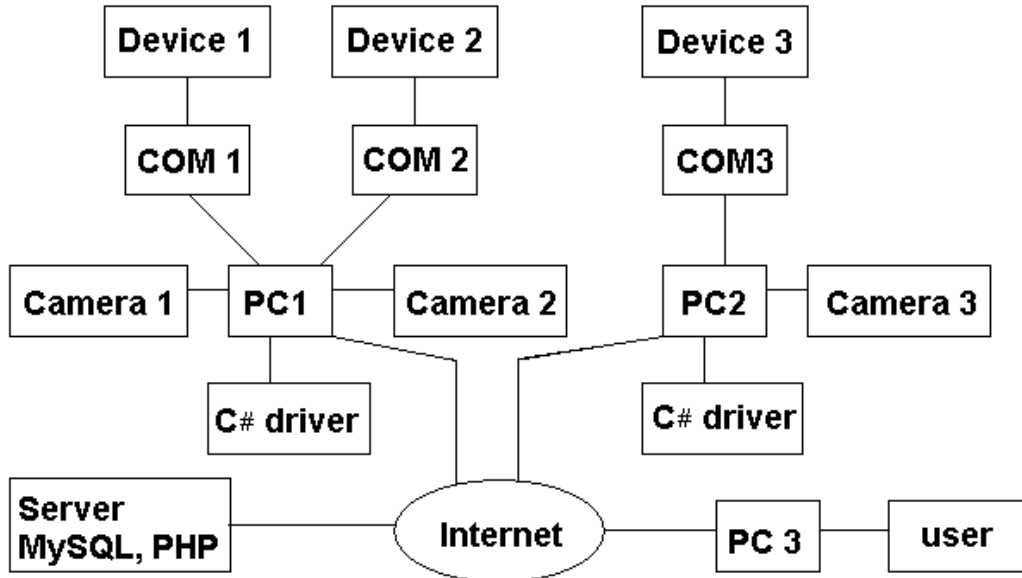


FIGURE 1: THE BLOCK SCHEME OF SYSTEM



FIGURE 2: THE SENSOR TECHNIC WORKPLACE WITH DESIGNED SYSTEM FOR REMOTELY CONTROL OF DISTANCE

III. THE USER INTERFACE

The designed software for this project was comprised from 4 parts – software for microcontroller, C# driver, database and user interface. An introductory screen is

shown on the figure 3. The user interface serves to divide users on students, teachers, administrators and other users. Each group has various options. Splash screen of measurement of position is shown on the figure 4.

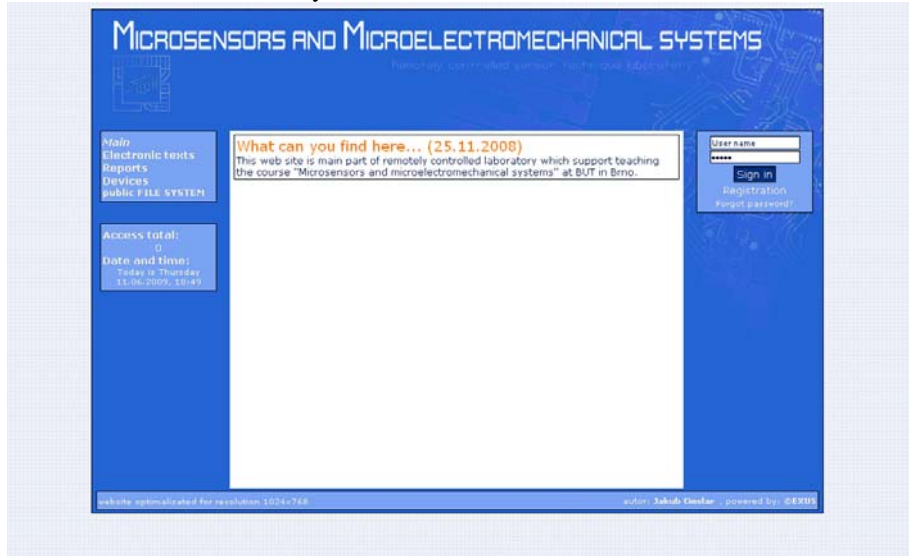


FIGURE 3: THE INTRODUCTORY SCREEN OF SYSTEM



FIGURE 4: THE SPLASH SCREEN OF POSITION MEASUREMENT

IV. CONCLUSION

New education methods use a new communication technologies and Internet. The electronic texts, presentations, autocorrelation tests, simulations and virtual labs are most often used for e-learning. One of special types for Internet learning is remotely controlled laboratories and workplaces. The new device and software for realization of remotely controlled workplace for Internet learning of sensor technique was main aim of this project. Main advantage of designed device and software is reality of measuring processes, easy installation of device, minimal installation and setup of software to control computer, manually or remotely control and user controls the measuring processes directly from menu in his WEB browser (Internet Explorer, Firefox, Mozilla). Next development of this device will be focused to a change of the communication port (from RS-232 port to USB port) and enhancement of output signal lines (in this time 20 lines) and measuring modules.

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