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IMPLEMENTATION OF DISTANCE LEARNING AT UNIVERSITIES USING THE EXPERIENCE OF THE HONEYWELL PROCESS CONTROL LABORATORY AT TASHKENT STATE TECHNICAL UNIVERSITY

Nodirbek Rustambekovich Yusupbekov

Tashkent State Technical University, Address: 2 Universitetskaya st., 100095, Tashkent city, Republic of Uzbekistan E-mail: dodabek@mail.ru, dodabek@mail.ru

Adilov Tulkunovich Farukh

LLC "XIMAVTOMATIKA", Tashkent city, Republic of Uzbekistan E-mail: Farukh.Adilov@himavtomatika.uz, farukh.adilov@himavtomatika.uz

Isakova Ismailovna Sitora

NGEI "Process Knowledge System", Tashkent city, Republic of Uzbekistan E-mail: Sitora.isakova@himavtomatika.uz, Sitora.isakova@himavtomatika.uz

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Since 2005

IMPLEMENTATION OF DISTANCE LEARNING AT UNIVERSITIES USING THE EXPERIENCE OF THE HONEYWELL PROCESS CONTROL LABORATORY AT TASHKENT STATE TECHNICAL UNIVERSITY

Yusupbekov Nodirbek Rustambekovich¹, Adilov Farukh Tulkunovich²,
Isakova Sitora Ismailovna³

^{1,2}Tashkent State Technical University, Address: 2 Universitetskaya st., 100095, Tashkent city, Republic of Uzbekistan

E-mail: app-tgtu@mail.ru;

²LLC "XIMAVTOMATIKA", Tashkent city, Republic of Uzbekistan

E-mail: Farukh.Adilov@himavtomatika.uz;

³NGEI "Process Knowledge System", Tashkent city, Republic of Uzbekistan

E-mail: Sitora.isakova@himavtomatika.uz.

Abstract: The experience of modernization of the Honeywell Process Control Laboratory at Tashkent State Technical University has been considered (which is equipped with upgraded equipment (simulators for simulating various technological processes, distance learning tools). As a result, the quality of the demonstration of process control mechanisms increased the availability of theoretical and practical knowledge in the field of automated control systems. They also considered the teaching methods necessary for a modern student – remote access in real time, when students pass a knowledge test, consult with teachers, etc.

Keywords: Laboratory, APCS, telecommunications, distance education, iCloud, Zoom, Skype, simulators, Honeywell PKS, UniSim.

Аннотация: Тошкент давлат техника университетидаги Honeywell технологик жараёнларни бошқариш лабораториясини модернизациялаш – замонавий жиҳозлар (тқрли технологик жараёнларни имитациялаш тренажёрлари, масофавий ўқитиш воситалари) билан таъминлаш тажрибаси кўриб чиқилган, натижада технологик жараёнлар (ТЖ) ни бошқаришни намоиши этиш сифати, ТЖ АБТлар соҳасидаги назарий ва амалий билимларни олишга бўлган қулайликлар ошган. Шунингдек замонавий талабаларга зарур бўлган ўқитиш усуллари – талабалар билими тегишлилигига реал вақт режимида масофадан рухсат бериш, ўқитувчи билан маслаҳатлашиш кўриб чиқилган.

Таянч сўзлар: лаборатория, ТЖ АБТ, телекоммуникация, масофавий ўқитиш, iCloud, Zoom, Skype, тренажёрлар, Honeywell PKS, UniSim.

Аннотация: Рассмотрен опыт модернизации Лаборатории управления технологическими процессами Honeywell в Ташкентском государственном техническом университете – оснащение модернизированным оборудованием (тренажеры для имитации различных технологических процессов, средства дистанционного обучения), в результате чего качество демонстрации управления технологическими процессами (ТП) механизмов увеличилась доступность теоретических и практических знаний в области АСУ ТП. Также были рассмотрены необходимые современному студенту методы обучения – удаленный доступ в режиме реального времени, когда студенты проходят проверку знаний, консультируются с преподавателями и т.д.

Ключевые слова: Лаборатория, АСУ ТП, телекоммуникации, дистанционное обучение, iCloud, Zoom, Skype, тренажеры, Honeywell PKS, UniSim.

Introduction

The requirements for students and, as a result, for the education system are changing rapidly. In the past, education was about teaching people something. Today, the essence of education is to help the individual develop a reliable inner core and goal-setting skills in order to find their own path in an increasingly uncertain, fickle and increasingly complex world.

Due to the fact that science does not stand still, the separation of theoretical knowledge from practice, unfortunately, is so significant that at the end we get specialists with diplomas that they simply do not correspond to, with unformed goals and a lack of understanding of how to gain experience if the employer wants see a specialist with at least 3-5 years of experience on the doorstep of the personnel department. First of all, it is necessary to close this gap [1-4].

The rapid development of material and digital technologies and new management tools in the 21st century provides humanity with unprecedented opportunities to create the desired future on a planetary scale. It is impossible to prepare a student once and for all for everything that awaits him, throughout his life he will have to unlearn and retrain in order to react to the changing world around him, then, based on the achievements of progress, the most correct approach to instilling in students the proper skills will be to let them take advantage of these achievements - build control strategies themselves, respond to disturbances in the technological process, find a solution in troubleshooting, etc. without risk to the real object, that is, to give them test equipment, a simulator.

Main part

After considering all of the above problems and their probable solutions, taking into account the fact that at present almost the entire system of higher education is focused on revising educational programs, taking into account the need to introduce digital technologies into the educational process, the "Honeywell process control laboratory" laboratory was created at TSTU. ", Designed to develop students' knowledge in the field of process control systems. Thanks to this approach, about 200 students finish each semester using Honeywell hardware and software, developing and improving digital skills, competence through real-time simulation of production processes.

There are 9 simulators in the laboratory [5]:

- 8 system blocks - Core-I5 combined with 8 gigabytes of RAM (with Windows 7 for students);
- 1 system unit - Core-I5 in combination with 16 gigabytes of RAM (with Windows Server 2008 for the teacher);
- 15 FullHD monitors with GTX960 video cards to ensure the required number of video outputs and smooth information display;
- Video projector (BENQ digital Projector);
- Interactive whiteboard (INTERWRITE DualBoard™ 1279 / 1279RF1)
- Honeywell C200 controller (for process simulation during training).
- Experion PKS software package (clients for students, server for instructors).
- UniSim® Design software package (including Engineering Studies component).



Fig. 1. Laboratory "Honeywell Process Control laboratory" at TSTU.

Experion® PKS is a powerful software platform with innovative applications for superior HMI and a highly scalable, integrated multi-server control system.

The latest version dramatically simplifies the configuration and interoperability of thousands of production sites and improves operational efficiency through the use of hardware-based templates. Access to process data in real time, storage and archiving of hundreds of thousands of parameters, a perfect alarm and event recording system, organization of reports, an extensive system of task and recipe settings, powerful and modern C300 controllers, flexible control strategies, and much more - allow operators effectively, and most importantly, safely manage objects of any complexity.

The UniSim® Design Suite is a set of simulation software tools used to perform dynamic modeling and engineering studies.

UniSim Design is an important foundation for Honeywell's ability to provide a variety of detailed dynamic models and engineering studies, including:

- Emergency depressurization and flaring.
- Compressor and anti-surge control.
- Overpressure Protection System (HIPPS).
- Built-in piping and manufacturing platforms.
- Design of technological process and controllability.

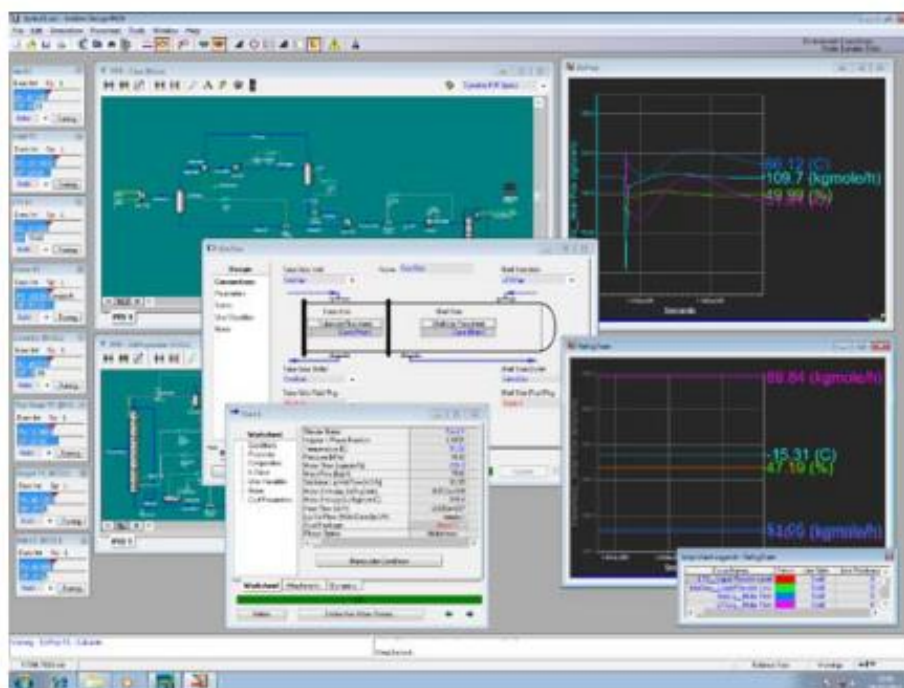


Fig. 2. UniSim® Design Suite interface.

Also, the specialists of Khimavtomatika provided for the possibility of conducting remote training sessions via the Internet (on-line training) using the Zoom program [6-11]. Zoom software supports two-way video and audio transmission (both teacher-to-student and student-to-teacher), screen sharing for teaching material, and chat and file sharing functions.

During online learning with the help of the "ZOOM" program, it is possible to broadcast and show examples to students of how projects or laboratory work are created, that is, to conduct classes with a teacher in real time.

In the event that the student did not have time or was behind the lessons, there is always the opportunity to review the material covered after the lesson, since all lessons are recorded and saved on the computer.

If a student, for some reason, could not attend the classes, he can, either from a smartphone or from a tablet or laptop, connect via the Internet to the lecture online, while being in any part of the world

and listen to a course of lectures ... And upon returning to the university, you can download the recordings of practical lessons and work on yourself on your own. This is the most important thing in education, when a student learns and works on himself, for himself, for his needs and for his future, and not because he MUST be present in class for the sake of a grade.

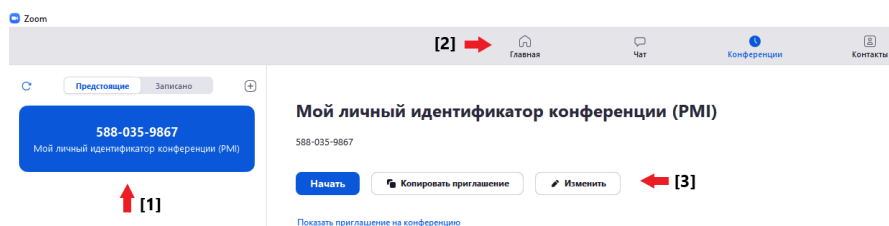


Fig. 3. Program «Zoom».

1. Conference ID - sent to a group of students to connect to a conference (lecture) via mail, telegram, phone message, etc.
2. Control Panel - in the Home tab you can:



Новая конференция

create a conference for students or feedback from students;



Войти

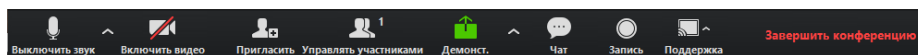
- enter an already existing conference (for example, a seminar or general meeting of the teaching council);



Запланировать

- schedule a lecture on schedule.

3. Start a conference and invite students (participants) to a lecture, setting a personal conference ID.



During the lecture (conference):

1. the sound from the class or the video from the teacher can be turned off;
2. you can invite or remove a participant;
3. show other windows on the computer and screens;
4. chat with students and immediately answer students' questions;
5. write down the lecture itself so that the student can revise the topic that was not clear the first time;
6. complete the lecture (conference).

And also, as mentioned above about environmental literacy, you need to be able to value and protect nature and find more and more new and modern ideas for the preservation of nature, and you need to start small. For example, spending paper in universities in public and private institutions, etc.

just colossal, and therefore the cutting down of trees for its production is simply insane. Why should a student print essays, independent work, handouts to a teacher, if in our time it is possible to do all this in electronic form? There are many ways to transfer data without printing it all out on paper. For example, Google drive, Yandex disc, iCloud, Drop box, One drive, etc. To do this, it is necessary to save lectures, secure materials and links for self-education and send information with access to this document to all students. And they, in turn, can open the attached material on their electronic devices, read, study, attach their abstracts and publications, as well as link to open general access to their works. This allows all students to familiarize themselves with the necessary information, thereby leaving comments and remarks on the work. Applying this technique in the educational process makes it possible to take care and protect our nature!

Conclusion

In conclusion of all of the above, it can be noted that in the Honeywell Process Control Laboratory, the teaching method is accessible and simple. Students can develop skills by working on their mistakes, choosing their own direction, sharing data and always being in contact with the teacher. This approach to education increases the level of knowledge of both the student and the teacher, since in this case not only the teacher shares his knowledge and skills, but also the student. By creating new conditions for the development of the educational system and ecosystem, there should be no pursuit of grades. Practical knowledge in the field of process control systems and the availability of simulators with the possibility of simulation, as well as online training with Chemavtomatika, allows us to produce ready-made qualified personnel who understand that self-education is power, that training is necessary for the student himself, and not for teachers or employers.

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