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Simulation Modeling Programs

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ANNOTATION

This article describes the forms and methods of organizing independent, practical and laboratory training.

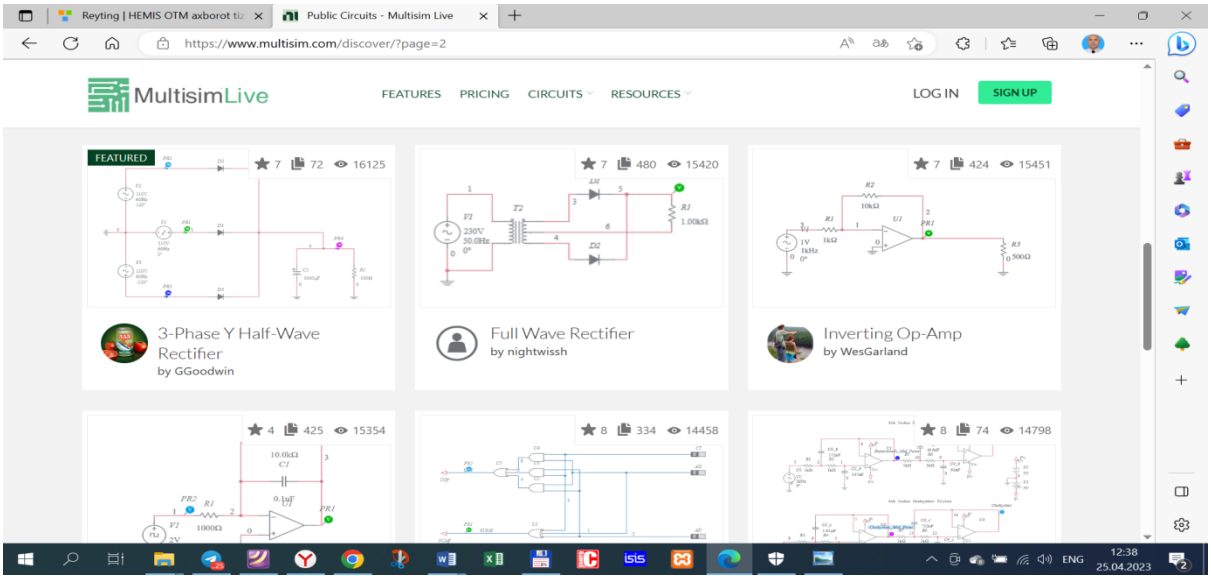
It is known that independent education is given a lot of attention in higher education curricula today. It allows and requires individual student engagement. The role of information technologies and modern software and technical tools in increasing the effectiveness of individual independent training is incomparable. Leading companies in the world are creating and improving various software and technical tools for mastering knowledge in the fields of science and technology in various aspects of human activity. In particular, simulation programs allow students to learn in depth the sciences of electrical engineering, electronics, telecommunications, radio communication, measurement techniques, engineering - mechanical engineering, and mechatronics.

Teachers of specialized subjects use the knowledge and skills that students have acquired during theoretical classes and deepen them when conducting practical training in special subjects. The intended purpose of the experience-practical training largely determines the methodology of conducting it, the methods of the teacher of a special subject to guide the work of students, the procedure for performing certain experiments or practical work, and so on. After the students have mastered the theoretical material, become familiar with the studied phenomena and processes, it will be much easier to conduct an experiment - practical training with them. At the moment, the lack of equipment for practical and laboratory training in higher education institutions makes it difficult for students to do training. This causes the quality of education to drop. The use of existing equipment and practical work with their help in teaching technical sciences can cause a number of problems. For example, protection from electric shock, fear of damaging the device, etc. The biggest problem is that there is not enough equipment for individual student training, the constant material and spiritual wear and tear of these equipment, the need to use them under the supervision of an instructor due to the

lack of technical equipment, lack of time, etc.

In this case, it is appropriate to use simulation virtual programs to provide students with deeper knowledge and individual engagement. Examples of this are Multisim, Proteus, Matlab, Cisco_Packet_Tracer and other programs [1-7]. Doing practical training in these programs is very convenient. Here, you can see all the components with your own eyes, connect and use the elements without psychological barriers (fear of incorrect connection, damage, damage to the device). The use of special simulation programs protects students from electrical hazards and increases labor productivity. Each student will have the opportunity to do it individually. It is desirable that laboratory equipment is not required for practical work through these programs.

The availability of online simulation programs allows independent, practical and laboratory training even on smartphones. For example, more than 35,000 electrical engineering and electronics students can interact on NI Corporation's multisim.com page. The figure below shows the layouts in the multisim.com window:



Conclusion: So, the activity of students increases due to the use of simulation programs. Therefore, it is advisable to rapidly introduce interactive software technical tools into the educational process. Students' activity is a process that not only acquires theoretical knowledge, but also develops the skills of "decision-making" and choosing optimal engineering solutions, which are necessary for practical activities. Therefore, maintaining the skills of conducting experiments in students, developing the ability to effectively use the means of automating the processes of experimenting allows training qualified specialists.

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