TEACHING ELECTRONICS

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ABSTRACT

The international market of electronics and electrical engineering is one of the fastest growing segments of the international economy. In this regard, our country lags far behind in the development of the industry and the training of quality electronics engineers. Below we look at some of the shortcomings in the training of quality electronics engineers and a number of reforms that need to be implemented.

Keywords: electromagnetic, quantum mechanics, capacitor, resistor, transistor, LED, diagram, converter, laboratory, MATLAB.

INTRODUCTION

Electronics is a field of science and technology that deals with the study and development of methods for creating electronic devices and devices used to transmit, receive, process and store information. Electronics is based on physical knowledge such as electromagnetic field theory, quantum mechanics, solid structure theory, and electrical conduction phenomena. The development of electronics is closely linked to the improvement of electronic device technology. One of the most common problems in the study of electronics is that all electronic devices are made up of small components and circuits. Once we understand these little diagrams, it becomes much easier to understand the complexities. While studying at universities, many prospective engineers often repeat that electronics are not for them, and some engineers still say they have a sense of insecurity. It is not difficult to understand and study electronics if the educator approaches it in the right way and it can be very interesting.

METHODS

At present, we can not say that the knowledge and experience of electronics engineers in our country is satisfactory. It is an undeniable fact that some of our engineers do not know the characteristics of transistors, do not understand diagrams, and do not even know the basics such as choosing a resistor for an LED, calculating a capacitor for a converter. Training engineers with exemplary knowledge and increasing their competitiveness in the labor market will certainly place a high responsibility on

educators. So, first of all, we need to know what and where to start. In higher education, future electronics engineers are not able to better understand and master their disciplines. There are a number of reasons for this; the inexperience of the teacher, the lack of a laboratory equipped with textbooks and modern equipment, the lack of interest of the student, and most importantly, the sequence of all the topics taught complement each other, which means that if the student finds it difficult to understand one topic, the next becomes more complex for. 4 years is a very short time to train mature electronics engineers. So high schools are at the forefront of what we need to reform first. Mathematics and physics are important subjects for electronics engineers in high school. Due to the lack of experienced teachers in the existing disciplines and the lack of practical laboratories, students are limited to theoretical knowledge and are unable to master the topics.

DISCUSSION AND RESULTS

If we take the example of specialized schools with a greater focus on physics; to form a special department of physics and start teaching from the 2nd grade, which of course requires a high level of experience and skills from the educator. First of all, it will be more effective to show our young engineers the basics of safety rules by forming videos and animations using simple and modern information resources.

The world of electronics can be fun for students. By learning how to connect and assemble simple devices, students can discover new hobbies and possibly interests that will guide their professional goals. As a result, their thinking expands and they become aware of the concepts behind the technologies that people use every day. Here are some ways to teach students how to design electronics.

Show students wiring diagrams:

Circuits are the basis of simple and complex electronic devices. Therefore, electronic circuits are a logical place to start e-learning for students. These are diagrams showing how the various components of a circuit are connected. When following the guides, students should refer to the diagrams, so they should learn to understand the diagrams better. In a simple electronic diagram, show what each symbol means. Parallel lines representing the battery, a zigzag line for a resistor, and a triangle and a line representing LED lights are common symbols. Students need to learn to recognize diagrams based on diagrams.

To teach students the concepts of electronics:

To deepen a student’s understanding of electronics through electronic diagrams, we need to teach them some basic electronics concepts. Explain the function of parts such as resistors and consider theoretical ideas. For example, to explain what voltage and electric currents are. Also, to show how to perform calculations with Ohm’s law

to explain how to choose a resistor for LED lighting. As we introduce the concepts, an important rule of thumb to teach students how to design electronics is to show them how these ideas work in real life. So, we have to keep learning for them.

Using e-hobby packages:

Electronic hobby kits are an invaluable tool for beginners in electronics of all ages. One is enough for one student to provide some of the components needed to create great devices. Electronic hobby kits can include circuits and even wires and tools to shape computers to take electronic projects to the next level. At the end of each academic year, short-term practical exercises covering the topics covered during the holidays (kinematics, dynamics, statics, electrostatics, relativity, …, quantum physics, atomic and nuclear physics) organization, which will further strengthen the knowledge gained on the subject. At the same time, learning foreign languages is very useful, as a simple example is the lack of textbooks and the solution to some of their problems.

At the same time we need to include science in the school curriculum from the 8th grade to form their initial knowledge of the MATLAB system.

MATLAB is a programming platform for engineers and scientists to analyze and design systems and products that change the world.

MATLAB options:

-Data analysis;

-Development of algorithms;

-Development of models and applications;

MATLAB allows us to transfer our ideas from research to production through integration into enterprise applications and embedded devices, as well as integration with Simulink and Model-based design.

In higher education:

It is important that we first explain to students in depth the structure of the atom and its nature. In most cases, it is limited to providing basic information. They need to know the electronic formulas of atoms, the distribution of electrons in an atom according to their energy, the effective mass of electrons, ..., the quantum numbers of electrons, and other properties. After studying the structure, composition, nature (zone theory) of electrical materials and elements, our students will be able to better understand academic words and information, even if the knowledge of their specialties is not simplified by teachers. Use the highest quality and most reliable software for computer modeling in electronics. In addition to expanding their MATLAB-based knowledge, it is important to develop the ability to find solutions by analyzing existing problems in an appropriate MATLAB system. In explaining the components of electronics, we need to train them according to a specific equivalent circuit. In this case, students who have a good understanding of all the features of the p-n junction in

the example of a semiconductor, can easily understand and analyze the logical components of diodes, transistors, thyristors, operational amplifier, microcontrollers, microprocessors and other electronics. Now we need to focus on designing electronic circuits and develop creative thinking skills.

CONCLUSION

In the fast-growing world of electronics and microelectronics, our engineers must be advanced professionals and our country must occupy an important position in organic electronics.

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