APPLICATION OF VIRTUAL LABORATORIES ON THE COURSE "DESIGN OF MEASURING INSTRUMENTS"

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DOI: 10.5958/2249-7137.2022.00730.3

ABSTRACT

This article discusses virtual laboratory work on specialization and their advantages in use. Naturally, this can only be a virtual, computer laboratory workshop that fits on a regular flash drive and runs without first installing the program on the computer. The presence of an additional virtual laboratory in addition to the 8 laboratories provided for in the plan will allow all students to work independently. The presence of an additional virtual laboratory in addition to the 8 laboratories provided for in the plan will allow all students to work independently. To avoid this malfunction, manufacturers use light fluxes of an unusual spectrum, for example, a laser beam. Such a source is quite simple to manufacture - the radiation is focused into a thin beam, usually red.

KEYWORDS: *Design, Device, Laboratory.*

INTRODUCTION

The use of virtual laboratories in the field of teaching laboratory work in subjects provides programmatic training that allows you to conduct several different experiments without contact with the real equipment or object.

The modern practice of teaching the course "Design of Measuring Instruments" in higher educational institutions requires, in addition to well-equipped stationary educational laboratories. etc. Naturally, this can only be a virtual, computer laboratory workshop that fits on a regular flash drive and runs without first installing the program on the computer. In addition, it is desirable to use the elements of this workshop both as lecture demonstrations of physical phenomena and as an element of practical exercises (virtual laboratory work). [one]

Virtual work provides research skills, control the quality of knowledge gained, test hypotheses and confirm the reality of physical laws. [2]

The purpose and objective of the course "Design of measuring instruments" is the development of models and algorithms for complex design processes using the basics, rules, principles of design, the use of information technology in the design of measuring instruments; building

computer-aided design systems, stages of building measuring instruments, patenting new designs, optimizing the choice of structural elements, optimizing the selection of critical elements of measuring instruments, characteristics of sensors, their types, dynamic mechanical analysis of the requirements for protecting the design of devices, ergonomics and technical aesthetics requirements are mainly important for studying construction design .

According to the course, the following requirements are imposed on the knowledge, skills and abilities of students.

The student must:

- study the design process, search for technical solutions, general and special requirements for measuring instruments, design stages, project documentation, terms of reference, technical proposal, instrument sketch, technical project, working documentation, factors affecting the operation of the instrument, search for a design solution, selection the physical principle of motion, physical and technical effects, a set of criteria for the similarity method, the identification of patentable designs, the efficiency achieved as a result of the use of automation, understanding the development of modern design methods, etc.

The course "Design of measuring instruments" for students in the direction of "Metrology, standardization and product quality management" is designed for 2 semesters, the total educational process of the lesson is 276 hours.

General	276 hours	5 semester	6 semester
lecture	80 h	48h	32h
practice	48h	32h	16h
laboratory	16h	-	16h
Independent work	132h	72h	60h

Laboratory classes are held in the 5th and 6th semester for 3rd courses. There are 8 laboratories in total.

Laboratory classrooms of the department are equipped with all educational materials and devices. Each student is given a maximum of 30 minutes to conduct and explain the lab. In small groups of 12 students. Students want to conduct experiments on their own, but lack of time worsens the process of laboratory studies.

The need for virtual laboratories was felt after studying the problem. The presence of an additional virtual laboratory in addition to the 8 laboratories provided for in the plan will allow all students to work independently. The virtual laboratory allows you to control the time inside the experiment, slowing it down or speeding it up.

Methodology for preparing a virtual laboratory

Structure - laboratory work.

1. Note to the student (rules, formulas, diagrams, graphs).

2. Job description.

3. Measuring instruments. Multimetr.

4. Accessories. Insertion fee. Set of connecting wires. Lamp.Power supply

5. Experiment.

Subject: Design of Measuring Instruments
1-laboratory. Study of the characteristics of optoelectronic sensors.
Objective:
1.Characteristics of the optoelectronic sensor
2.Elements of the optoelectronic sensor
3.Working principle.
Basic information about the device.
Report.

1.Characteristics of the optoelectronic sensor

Front view Rear view Top view

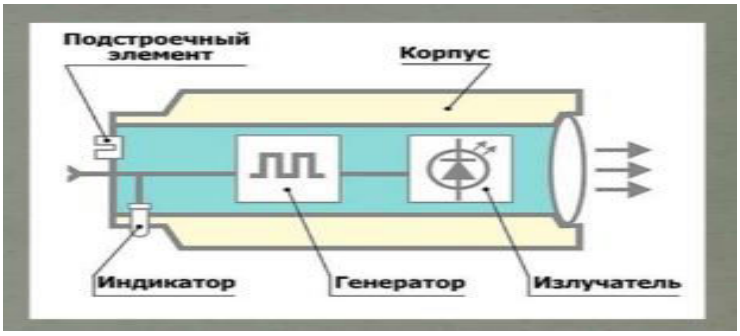


Optoelectronic sensors (OPS), often referred to as photosensors , are among the most versatile sensors. They allow you to measure many physical quantities: pressure, displacement, speed, acceleration, temperature, chemical composition, magnetic fields, etc.[3]

An optoelectronic sensor consists of two main components - an emitter and a receiver. In turn, the emitter usually includes:

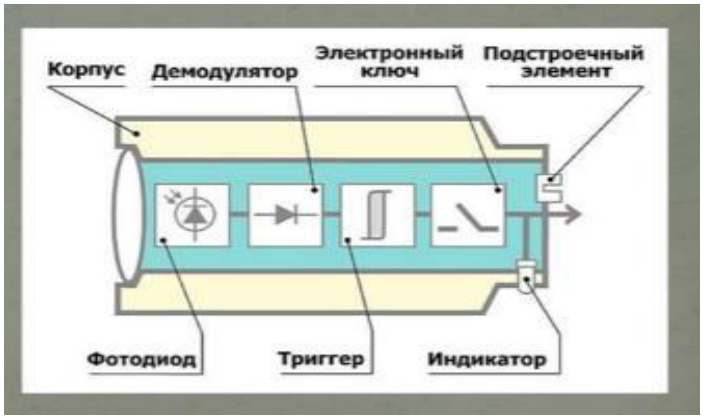
- emitter (LED, laser, or other option)
- generator
- setting element (potentiometer/button/screw)
- work indicator

Structure



The receiver is a more complex device and includes:

- photodiode
- demodulator
- Schmitt trigger
- electronic switching element
- setting element (potentiometer/button/screw)
- operation indicators [4]



Elements of an optoelectronic sensor

A multimeteris a versatile measuring instrument.	
Power supply unit - a device designed to generate the voltage required by the system from the voltage of the electrical network.	

Lamp - electric light source	
Board - installation for electrical connection	

Principle of operation

Optical sensor working principle: when the beam passes through the sensor unobstructed, it will be activated. But, when it is interrupted by some kind of barrier, the device stops working and transmits a signal to the central computer, from which the operator learns about the information he needs. To avoid this malfunction, manufacturers use light fluxes of an unusual spectrum, for example, a laser beam. Such a source is quite simple to manufacture - the radiation is focused into a thin beam, usually red.

For the subject "Design of measuring instruments" for laboratory work, the best option is VirtualLab . This is a project to develop virtual laboratory work for students in physics, chemistry, biology, ecology and other subjects. With the help of VirtualLab , students master additional materials and independently solve the problem of laboratory work, even in the absence of the necessary equipment.

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