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INTRODUCTION OF MODERN MEDICAL MONITORING SYSTEMS INTO THE TRAINING OF BIOMEDICAL ENGINEERING SPECIALISTS

Current trends in the digitisation of medicine require higher education institutions to provide students with access to modern means of measuring human vital signs and skills in working with integrated telemedicine systems. High-quality practical training of specialists, especially in the G22 Biomedical Engineering programme, should include working with devices that measure blood pressure, heart rate, blood oxygen saturation, body temperature, respiratory rate, ECG and other parameters.

In order to improve the quality of practical training and strengthen research capacity, the medical devices and systems laboratory was modernised as part of the Horizon Europe 'WIDE AcrossEU' project. A key element of the modernisation was the addition of a modern medical vital signs monitor and the purchase of spirometry devices and telemedicine devices. This equipment opens up opportunities for the educational process and experimental research in the field of physiology and biomedical measurements.

The purchased laboratory base is a multifunctional tool that can be used to train students majoring in Biomedical Engineering in several key areas:

1. Practical and laboratory work

A medical monitor of vital signs, equipped with sensors for measuring blood pressure, heart rate, saturation and body temperature, allows students to acquire the necessary practical skills required by the updated educational programmes.

Students learn about the structure and principles of monitoring systems, as well as the basics of specific methods for measuring physiological parameters: pulse oximetry (determination of blood saturation SpO_2, heart rate), methods for measuring pressure and principles for measuring temperature, ECG, and respiratory parameters. Training in the practical aspects of creating and configuring a medical network in a medical facility with the connection of diagnostic equipment and data transfer to a central storage facility. Training in setting up patient records. Students record, process and analyse human physiological parameters obtained from the monitor. Basics of medical data processing.

2. Research and experimental studies

The equipment opens up wide opportunities for conducting applied physiological and bioengineering research: this includes studying the body's adaptive responses to various factors, primarily increased physical and mental stress. Research into the influence of external factors, such as peripheral blood supply and movement, on the accuracy and occurrence of artefacts when measuring saturation (SpO_2) and heart rate (PPG measurement).

3. Development of telemedicine and IoT systems

As part of their work with the equipment, students can participate in the development of modern technological solutions that are particularly relevant to the field of telemedicine. Specifically, this involves developing the concept of IoT (Internet of Things) architecture for the secure transmission of biometric data from a monitoring device to a doctor or to medical data storage servers.

4. Verification of the performance and reliability of various diagnostic and therapeutic methods. Verification of the accuracy of physiological parameter measurements of proprietary devices.

Thus, the specified equipment has become an important element of the educational and scientific infrastructure, providing opportunities for laboratory work, experiments and research in the field of physiology, biomedical engineering and

List of sources used:

1. Korenivska O., Benedytskyi V., Denysiuk D. Biomedical engineering in sports medicine. XXXIII International scientific and practical conference «State of Scientific Research: Methods and Prospects for Development Across Different Fields», August 7-9, 2024. Graz, Austria. International Scientific Unity, 2024. p. 93 - 97.

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