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ENHANCING EDUCATIONAL EFFICIENCY THROUGH VIRTUAL SIMULATORS

An analysis of the current state of measuring technology and trends in its further development reveals that, alongside the advancement and enhancement of traditional measuring instruments, a relatively novel direction is emerging, namely the development of so-called virtual measuring instruments.

This is facilitated by three factors [1–4]:

- firstly, significant progress in the development of electronic computing equipment, as a result of which personal computers have become a common and even necessary tool for engineers, scientists, and teachers;
- secondly, the fleet of measuring equipment is often replenished and renewed not as fast as required by modern realities;
- and thirdly, the disruption of various integration links significantly complicates

the process of development and, most importantly, production of modern measuring instruments.

In this context of these considerations, it becomes evident that the search for alternative avenues to enhance the existing fleet of measuring instruments is imperative.

One such avenue is the development and creation of virtual measuring instruments.

In view of the progressive development of computing technology and the computerisation of all sectors of the economy, it seems reasonable to suggest that the powerful technological potential of computerisation could be harnessed to improve the measurement process in measuring systems.

The search for a solution has led to the creation of virtual instruments, which offer significant advantages over traditional instruments.

These advantages provide a rationale for the development of virtual computer simulators based on the virtualisation of the measurement process.

Such simulators could enhance the visibility and efficiency of the educational process, while also facilitating the expansion of the functionality of distance learning systems.

The relevance of this area is that [3; 4]:

- firstly, the composition of regular means of measuring equipment, which is available and necessary to ensure the quality of the learning process, as a rule, is limited, often requires repair, restoration or replacement, so the value of virtual computer simulators in such cases can hardly be overestimated;
- secondly, virtual computer simulators can provide practical skills in working with the most modern means of computer technology, which, due to limited technical or economic opportunities, are not yet used in teaching;
- thirdly, virtual computer simulators can be used by students during self-preparation for classes, because they are quite easy to operate, do not require special knowledge in the field of programming, are not critical to the hardware and software of a personal computer, contain hints and comments that practically guide the actions of the user, work out his mistakes;
- fourthly, virtual computer simulators, in our opinion, should be created, first of all, for the most modern devices that are not yet available in the laboratory and technical base of the university, also at the preliminary stage of preparation for work on regular equipment, during self-preparation for classes, in the case of distance learning, etc., that is, in cases where access to regular measuring equipment is limited or impractical;
- fifthly, a virtual computer simulator can be provided with additional functions that are not inherent in a real device, for example, to display physical processes that occur "inside" the device during a measurement experiment, inspection, as well as to provide reference information, to process and store measurement and diagnostic results, to test and monitor the level of knowledge of students, etc;
- sixthly, the virtual computer simulators considered in the article have an appearance that fully corresponds to the appearance of real devices, for this purpose,

non-standard ActiveX elements were created, which is also important in terms of the effectiveness of the learning process.

Hence, it is possible to formulate the objectives of the conducted research, which include substantiation of alternative ways to improve the fleet of measuring equipment by developing virtual measuring devices and improving the efficiency of the educational process by developing and implementing virtual computer simulators based on the created virtual devices.

This article puts forth the concept of implementing virtual simulators, based on virtual measuring instruments and the virtualisation of measurement processes, as a means of enhancing the educational process and improving the efficiency of advanced forms of professional training.

The research is based on an analysis of traditional measurement methods and tools, and it proposes the virtualisation of the measurement process as an alternative solution.

The study assesses the benefits and applications of virtual instruments.

It is observed that, in addition to their intended function as virtual measuring instruments, virtual devices demonstrate considerable potential for the development of virtual simulators. These simulators enhance the clarity and quality of education, particularly in instrument-based disciplines, thereby creating a foundation for their inclusion in existing or newly developed distance learning systems [1–4].

The research comprises an analysis and synthesis of the experience of utilising contemporary measurement methods and tools, an identification of the advantages and disadvantages of traditional measurement approaches, a substantiation of the selection of measurement process virtualisation as the most efficacious means of enhancing instrument equipment, an examination of the structure and methodologies employed in the construction of virtual instruments and an assessment of their applications, and a delineation of virtual instruments as a foundation for the development of virtual simulators that enhance the efficacy and clarity of the educational process and establish the prerequisites for the advancement and enhancement of distance learning systems.

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THE MANAGEMENT OF SCALABILITY IN CLOUD-BASED APPLICATIONS MODULE

Today's world is characterised by the rapid development of information technology, which is having a significant impact on all aspects of human activity.

The automation of business processes is particularly important, as it allows companies to improve their efficiency, optimise costs and increase the speed of response to market changes.

The use of cloud technologies is becoming an answer to the need for flexibility and scalability of IT infrastructure, allowing resources to be dynamically scaled up and down according to business needs [1].

Growing volumes of data and the need to process it require monitoring systems to be highly efficient and able to scale quickly.

However, traditional approaches often prove too inflexible or costly to deploy, prompting the search for new solutions.

In this context, cloud technologies offer the opportunity to efficiently deploy and scale monitoring and resource management systems, enabling high availability and reliability of IT services.