

## FUNCTIONAL CAPABILITIES OF VIRTUAL LABORATORY COMPLEXES

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### ABSTRACT

This article presents the functional possibilities of conducting laboratory exercises in the virtual state of "Automobile theory", which is considered the main basic science for the undergraduate education of vehicle engineering in the context of the TechVLab program.

**KEYWORDS:** Virtual laboratory complexes, TechVLab program and its functionality.

### INTRODUCTION

Computer modeling of phenomena and processes is one of the promising directions of introduction of modern information technologies in education. Computer models are compatible with the content of a traditional lesson and help the teacher to display many effects on the computer screen, organize new, non-traditional learning activities for students. The transition to a developed economic knowledge and information society is based on the concept of consistent (continuous) lifelong learning. Undoubtedly, an important role in this process is allocated to electronic education. Free access to various information and educational resources on the network, a new type of social interaction provided by web 2.0 technologies. Obviously, rapidly developing information technologies require innovative approaches in educational management [1,4,5].

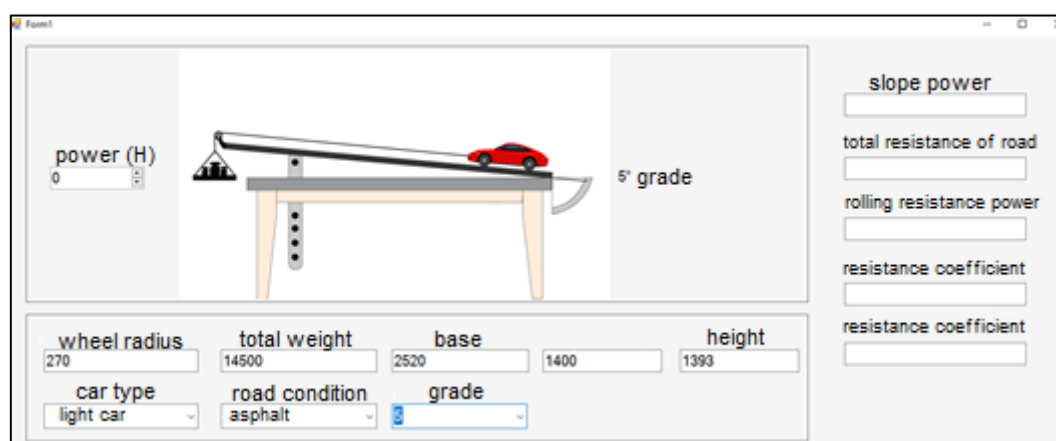
The essence of the concept of "virtual laboratory" is to express a set of hardware and software tools added to a regular computer, which gives the possibility to work on a computer with the help of a virtual tool that is a component (like working with an ordinary electronic device). An important part of the virtual instrument and virtual laboratory is a software tool with an effective graphical user interface (that is, providing a convenient, interactive mode of user interaction with the computer) in the form of visual graphic samples in the usual subject area with a graphical menu system[2,6].

Virtual — (Virtualis - possible) - an imaginary object or a state that does not exist in reality, but can occur under certain conditions. Under the influence of information technologies, the term "virtuality" acquired a new meaning related to virtual reality. In this case, "virtuality" is understood as a certain condition that eliminates the difference between the real and the imaginary (virtual) world.

According to A. V. Trukhin, a virtual laboratory is a software-hardware complex that allows conducting experiments without real (real) equipment used in the laboratory. In this case, it is understood that, firstly, it is a remote laboratory containing a real laboratory, hardware and software, as well as means of communication, and secondly, all processes are simulated using a computer [3,7,8].

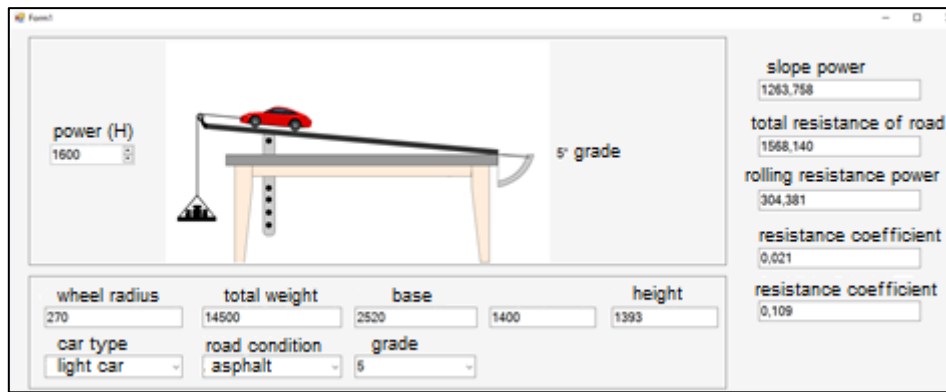
Based on the above, it is necessary to use modern pedagogical technologies in conducting laboratory classes in the subject "Automobile theory", which is considered the main basic science for the educational direction of 60711400 - vehicle engineering in the higher education system. Therefore, as we know, laboratory equipment and road conditions are necessary for laboratory training in the field of vehicle engineering. This requires a lot of inconvenience and a lot of money. Therefore, it is possible to conduct these trainings with the help of virtual laboratories using modern pedagogical technologies and methods.

It is possible to carry out laboratory works from the subject of "Automobile theory" such as "Determining the passability of a vehicle over road obstacles", "Determining the total resistance of the road", "Determining the lateral stability of the vehicle" in a virtual state. The TechVLab program was developed to conduct these laboratory exercises. With this program, there are several functional options for virtual laboratory exercises. In particular, let's consider the functional possibilities of the laboratory exercise "Determining the total resistance of the road" from the subject "Structure and theory of vehicles" (Fig. 1).



**Fig.1. Virtual laboratory work “Determining the total resistance of the road”**

With the help of TechVLab software, a special experiment to determine the angle of the car can be determined by applying force to the front of the car with the help of scale stones pulled by a rope. The student of this enters the parameters of the car into this program. For example, car wheel radius, total weight, base, wheelbase, height, road condition, car type and slope angle are entered in special cells. After that, the car is placed on the test track at a certain angle. Scale stones pulled by a special rope in front of the car are gradually increased. This process is continued until the first start of the car. As a result of the experiment, the slope force of the car overcoming the slope at a certain angle, the force resisting the rolling, the resistance coefficients and the total resistance forces of the road are determined (Fig. 2).



**Fig.2. Virtual laboratory work “Determining the total resistance of the road”**

### CONCLUSION

In conclusion, with the help of this program, a student can perform laboratory exercises in a virtual state. An engineering student can get accurate solutions and results with the help of the functionality of this lab work. You can perform this process several times and using different methods and compare the results. It helps engineer pedagogues to develop professional competencies.

### REFERENCES

1. I.U.Rahmonjonov, N.N.Niyozov, L.A.Nematov. Virtual laboratoriyalar va o'quv simulyatorlari: afzallik va kamchiliklar. Ta'lim va innovatsion tadqiqotlar. 2023-yil 4-son. ISSN 2181-1709.
2. O.O'rinova, F.Nabiyeva. Fizika fanini o'qitishda virtual laboratoriyalarning ahamiyati. Ilm fan xabarnomasi ilmiy elektron jurnali. www.worldlyjournals.com. 3-son , Iyun , 2024. Worldly knowledge nashriyoti, 214-218 bet.
3. Truhin A.V. Virtual kompyuter laboratoriyalarining turlari // Ochiq va uzoq ta'lim. - 2003 yil. №3 (11). - C. 12-21.
4. Усманов С., Абдурахманов З. Рақамли таълим муҳитини яратиш концепцияси //Современные инновационные исследования актуальные проблемы и развитие тенденции: решения и перспективы. – 2022. – Т. 1. – №. 1. – С. 225-228.
5. Usmanov S., Abduraxmanov Z. Virtual educational system for the development of information and professional competence of future engineers //International Journal of Contemporary Scientific and Technical Research. – 2023. – №. Special Issue. – C. 55-63.
6. Abduraxmanov Z. VIRTUAL LABORATORIYA KOMPLEKSLARI VA FIZIK LABORATORIYA QURILMALARI METODIK TA'MINOTINING QIYOSIY TAHLILI //International Journal of scientific and Applied Research. – 2024. – Т. 1. – №. 3. – С. 49-51.
7. Zokhidjon A. INFORMATION AND PROFESSIONAL COMPETENCE OF FUTURE ENGINEERS: Abdurakhmanov Zokhidjon Jizzakh branch of the National University of Uzbekistan //Образование и инновационные исследования международный научно-методический журнал. – 2023. – №. 2.
8. Alikulovich U. S., Baxtiyor o'g'li A. Z. BO 'LAJAK MUHANDISLARNI KASBIY TAYYORLASH METODIK TA'MINOTINI TAKOMILLASHTIRISH //International Journal of Contemporary Scientific and Technical Research. – 2022. – С. 168-172.