

American universities is the payment for education, which exists in almost all universities. State universities also receive direct appropriations from the state. Call attention to itself is also a significant proportion of university income that they receive from the federal government. Source of funding associated with the direct flow of funds in the form of grants for research work which distributed on a competitive basis. Unlike in the U.S.A, in most Russian universities, this share is insignificant yet and connected to, as a rule, arrival individual grants by the teachers. In the U.S.A, these grants are also obtained for specific projects of individual researchers from a variety of independent federal authorities. So, most part of the basic research funded by the federal government, and this item of income may also be about a quarter of all revenues to the treasury of the University. In Russia, it is also necessary to significantly increase this component in the funding of universities realizing research, using the mechanisms of orders from government agencies and institutional grants from the research funds which distributed on a competitive basis [2].

Problems students faced during the realization of research work have an effect on the quality of the scientific work. Proceeding from the position that on the one hand, the students don't have unlimited free access to scientific information in their narrow specialization and the other hand, they not always have the opportunity to exchange experiences at the international level, we cannot avoid the idea of decrease of the students' research work quality.

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Project work: designing a fish robot

Project work is regarded to be one of the most interesting, challenging and creative components of English language learning and teaching. Many researches and

teachers claim that students as active participants of the learning process get totally involved in project work when studying English as a first foreign language in a high technical school. [1]

This article aims at introducing the project designed by the second-year students of the Institute of Non-Destructive Testing of Tomsk Polytechnic University. The project is closely connected with constructing a robot for aquarium maintenance. It is important to note that this idea was born in our minds. Due to the high pace of life, people do not have enough time to care about their home pets, so we decided to create a robot which will help these busy people keep their aquarium fish and save time simultaneously.

While working over the project, various types of devices for aquarium maintenance were thoroughly considered and scrutinised. As a result, we came to a mutual decision to construct a robot which could combine all useful characteristics of the existing devices. Thus, a robot-fish FC-1 was designed to care about aquarium fish.

The FC-1' primary functions include fish feeding, water purification and maintaining adequate amount of oxygen in aquarium water. To perform these functions well, the robot is constructed to consist of eight basic components: a feeder, a cleaning filter, an oxygen generator, two sensors - optical and biosensor, a communication channel with power source and air, and, a module of control which is located inside the robot.

This robot belongs to a fixed-type robot. So it can be placed in any type of aquarium and is capable to work completely autonomously.

Now we will consider main principles of the robot's operation. As it was said earlier the robot has a feeder. This module throws fishfood in the aquarium water at some certain time intervals. A food container has to be replaced once a month.

To continue, we have to say that the robot has two sensors: an optical sensor and a biosensor. The optical sensor is required to determine the level of water contamination. The working principle of this sensor is based on the measurement of incoming intensity of light. In its turn, the biosensor determines the level of oxygen in water. The principle of this operation is based on a chemical reaction and its conversion into an electrical signal.

The next component to be described is a cleaning system. The cleaning system is a filter which circulates water in the aquarium and thereby purifies it. The filter has to be replaced once a month.

As for the next component, the robot has a module of control which is surely to be named the heart of the robot. Its function is to process signals received from the sensors and monitor other structural components functioning.

We would also like to note that the FC-1 is a standard robot which size is less than a soccer ball, but the size may vary depending on the size of the aquarium. The robot's power supply is a standard electrical outlet.

In conclusion, we would like to mention that this robot is just a prototype. There is much to be improved in our future work yet, for example:

- 1) the feeder needs to be modernized,
- 2) the module of control needs special software to be designed,

3) the power source for the FC-1 has to be changed for autonomous power supply.

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Main principles of designing a robot to help elderly people

Project work is surely regarded as one of the best methods to develop students' communicative competence when studying English as a second language. This method encourages students to raise the awareness of the target language and culture, improves their communication skills, and enhances the knowledge of vocabulary items and grammar structures while solving professional tasks in English [1].

Being the second-year students of the Institute of Non-Destructive Testing of Tomsk Polytechnic University, we are greatly motivated to perform different tasks and assignments which focus on the development of creative analytical thinking and production of engineering ideas. The best stimulus to achieve these goals is to offer students to do a project work. This paper represents the outcomes of the project connected with designing a robot to help elderly people.

We suppose that modern people spend their lives working hard for six days a week, as a result they come home very late and tired. Their daily life rhythm prevents them from communicating with beloved people, especially grandparents. Unfortunately, they turn to be incapable to visit them every day, therefore, communication between people fails. This is surely a significant problem which has to be solved with the help of engineering technologies. So our project aimed at improving and modernizing elderly people's lives by means of a robot which can do any kind of help, including monitoring elderly people's health, and keeping them in a good mood.

For this project to be a success, we carefully considered all the components of the robot's structure, and its technical capabilities that make it mobile, multi-purpose and useful. Surely, our robot consists of components resembling a human body's parts, for example, arms, legs, a head and a trunk. Each of the mentioned components enables the robot to perform several basic and specific functions due to its special sensory system.

The robot is equipped with acoustic and visual sensors for information perception and response to the voice of the robot's owner. Elderly people often feel sad and alone. In other words, they need someone to talk to, complain or boast of