

Interactive show Physics through All Senses

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Abstract. This contribution describes a long-term project called Physics through All Senses organized by the Department of Physics Education. This 90 minute-long set of experiments, which is intended for secondary school students, is inspired by human senses. This performance is not devised as a lecture with exact theoretical background, but as an interactive show engaging students. Another part of the paper describes selected examples of particular experiments and a new video contest which has been organized since September 2017 via social networks.

1 Introduction

Interactive show Physics through All Senses [1] was created in summer 2012 as part of a grant aimed at promoting the Faculty of Mathematics and Physics of the Charles University. The general goal of the whole project was to bring physics closer to secondary-school students, to present it as attractive and intelligible and to point out the possibility of studying physics on our faculty. At this moment the project is independent of other projects.

Since the beginning, the project is under the control of students and younger employees of our department. One of the other goals is to give the students of physics education the opportunity to train their skills for their future career. Furthermore, we aimed at strengthening the relationships with the community of secondary school teachers and at exchanging experiences with them.

Among teachers our performance is very popular, and it has been seen by about 10 thousand students till now.

2 The design of the performance

The performance is primarily intended for secondary school students. Two performers come to the school which invites us and perform there a set of experiments by 90 minutes. All our equipment is transportable by bus or by train; we need only a projector at the school. Therefore, we are able to present the show at any secondary school in the Czech Republic. The performance is free of charge for schools.

Over the years the scenario of the performance has changed several times but still contains about 25 demonstrational experiments which often require participation of the audience. Experiments are divided into groups according to human senses and one extra sense of technology.

3 Selected experiments

We are very limited by the equipment. Therefore, a lot of experiments that we do are low-cost experiments, but not all of them. Sometimes we use unusual equipment like USB microscope, NOVEC and so on. All of these experiments could be beneficial for teachers and students that have watched the show.

One of our experiments is experiment with a USB microscope. We use it to show differences between additive and subtractive color mixing. We also examine the structure of various materials and human skin. Another example is the experiment with Fresnel lens (Figure 1) which is meant to release the tension.

To explain the effects of atmospheric pressure we use a kitchen vacuum pump and beer. After exhausting some air from the container, the foam inside increase its volume thanks to the expansion of the air enclosed in the air bubbles (Figure 2).



Fig. 1 Fresnel lens



Fig. 2 Kitchen vacuum pump

Among other experiments that students can see during our show is the “Fakir’s bed”, hand force measuring sensor, induction heater or playing on tubes. Other examples of experiments can be found in [2]. Some instructions for selected experiments can be found on our website.

4 Competition

A new activity we started in September 2017 is a video competition. Every month we share a new video with the beginning of an experiment on our Facebook page [3]. The task is to answer correctly the questions about the experiment in the video. One of the competition experiments was the movement of a cardboard cart with a mounted cross-bow after firing an arrow.

One of the authors of the right answers wins some promotional items of our faculty and one physical toy printed on a 3D printer. We have had very favorable response at this competition, for example our colleagues told us about their relatives who discussed our videos. Every month more than two thousand people watch our video.

5 Conclusion

In the contribution we will describe the selected experiments we have a positive experience with. Our experience with the performance and the Facebook competition will be described too.

References

- [1] Fyzika všemi smysly [Online]. Available from: <http://kdf.mff.cuni.cz/fyzikavsemismysly/> [visited 2018 March 1].
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