

Hong Kong Student Science Project Competition 2023

Template of Extended Abstract (Investigation Design Proposal)

(Word Limit: 1,600 words, Pages: 3 pages only)

Team Number: SDPE214

Project Title: 聲大變電 Sound to Energy - The Beginning of a Sonant Future!

Project Type: Investigation Design Proposal

To our best knowledge, there is / is not * similar work in the field; (if there are,) related research links are as below:

<https://youtu.be/n5nU19zZBzl>

The enhancement our project proposed / the difference with related research are:

We further to investigate the use of different material on the device and its modification so as to enhance its effectiveness in converting sound energy to electrical energy in different environments.

**Please delete if not applicable. The competition values the originality of works. Students must do enough literature research to ensure that their works are unique and list relevant reference materials before starting research or invention.*

I. Background

Traditional fossil fuels like coal and crude oil are non-renewable. Even as of now, countries worldwide are still heavily reliant on the burning of fossil fuels, with 80% energy worldwide being contributed by the fuel's combustion. However, fossil fuels are a limited resource, and abuse of it would deprive the Earth of its existence. It has always been considered to be environmentally-unfriendly as it brings about various environmental issues, including excessive release of greenhouse gases (i.e. carbon dioxide) into the atmosphere. In general, the lives of many would be at stake if the globe does not take the initiative to come up with solutions to this problem. To avoid the shortage of energy and to replace non-renewable energy that may lead to global warming, governments are gradually developing new energy sources. Much of the renewable energy such as solar energy and wind energy requires expensive panels and turbines to generate energy. Also large space would be needed to set up energy generating equipment, which is not suitable for cramped cities like Hong Kong.

II. Objective(s)

Among all kinds of energy sources, sound energy, as a less explored energy alternative, might have the potential to be the source of generating electrical energy.

III. Hypothesis

For our investigation, we make use of two possible designs for the Sound to Energy Device, namely the "Reverse Loudspeaker" and the "Tuning Fork". By investigating the use of different materials and different settings on the devices, their usefulness and application on retrieving energy from different locations or environments can be optimized.

IV. Methodology

For the "Reverse Loudspeaker" device, we firstly confirm the presence of free cone resonant frequency and its effect on enhanced vibration of the cone. Secondly, by varying the mass and stiffness of the cone and voice coil, different resonant frequencies will be produced, which could

then be tested in various places to show its effectiveness.

For the “Tuning Fork” device, we make it up using different kinds of material such as metals or plastic and modify its size and shape to obtain the maximum energy conversion.

V. Expected Results and Impact of research

It is expected the present investigation will show significant enhancing results in the conversion of energy from sound to electrical. The study can demonstrate the definite use of sound as the energy source and also intrigue other scientists to further look into the relevant research.

VI. If your team will compete for the Sustainable Development Award, please indicate the specific sustainable development goal the project is related to, and provide justification for competing for this award. (Word limit: 300 words)

VII. If your team will compete for the Social Innovation Award, please list the target group or social issue the project focuses on, and provide justification for competing for this award. (Word limit: 300 words)

VIII. Conclusion

In solving the energy crisis on earth, the sound energy which has not been regarded as one of the energy sources can now be shown to produce electrical energy. More devices with varying modifications like the “Reverse Loudspeaker” and “Tuning fork” in the present study will surely help relieve the problem of energy shortage on earth.