Hong Kong Student Science Project Competition 2022

Template of Extended Abstract (Invention)

(Word Limit: 1,000 words, Pages: 2 pages only)

Team Number: JAPE292

Project Title: Water Maker

Project Type: Invention

To our best knowledge and after thorough literature research, as at _25_/_03_/_2022_, there are / ~~are no~~* similar works. If there are, the reference links are as below:

1. https://fontus.at/products/
2. https://karawater.com/karapure

The enhancement our project has made for the existing related products or research is summarized as below:

Our invention use rain directly, low power consumption and UV disinfection.

***Please delete if not applicable. HKSSPC values the originality of works. Students must conduct literature research thoroughly to ensure that their works are unique, and to list relevant reference materials to complement the research or invention.**

I. Background

- Provide background information as to learn about the audience for whom the project is addressing
- Provide highlights of **literature review** and/or related technologies or devices, with the support of pertinent and reliable references
- Provide an overview of work, create a point of view as to define the needs and insights of the audience, and mention the **research or technology gap the project is trying to fill**

According to World Meteorological Organization's survey, the global population with insufficient water consumption for at least one month per year was 3.6 billion in 2018. This data will rise to more than 5 billion by 2050. In a nutshell, insufficient water resource is a serious issue, so it should be urgently tackled.

For the principle, the semiconductor cooler is a heat transfer tool. When a current pass through a thermocouple pair formed by a piece of N-type semiconductor material and a piece of P-type semiconductor material, heat transfer will occur between the two ends. The heat will be transferred from one end to the other generating a temperature difference to form the hot and cold ends. In order to achieve a lower temperature, a heat sink and a cooling fan is installed on the hot side of the Peltier.

II. Objectives

- State the **aim(s)** of project

Provide clean water to the place with a shortage of water resources by a self-sufficient water maker.

III. Methodology

- Briefly describe the **approaches** used e.g. use of equipment, materials, tests, and experiments
- Explain the selected implementation strategies with the **scientific theory**

Volume of the collected water will be measured under different temperature and humidity to measure the effectiveness of the invention. If the volume of the collected water can fulfill a four people family's daily demand, the invention is determined to be successful.

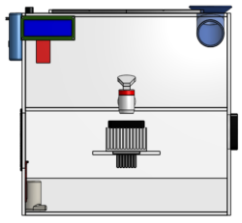
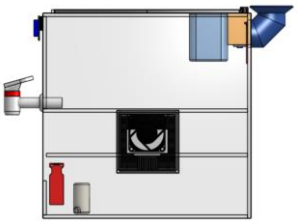
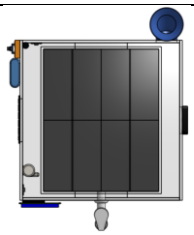
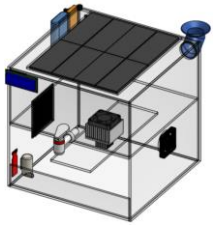
IV. Design of Invention

- Describe the **design** and the **principle** of invention (e.g. The ideation of the projects, the prototypes, or creative solution as far as applicable)
- Provide sketches / drawings / photos of the invention

The invention has two parts. The lower part is the water vapor collecting zone. Peltier is operating in this zone to produce condensed water. The water sensor in this part will measure the water level. Once the water level is high enough, the sensor will send signal to the system and then water pump will pump the water to the upper part. The fan on the right side allow ventilation inside the lower part. So fresh air can be replenished to keep producing condensed water.

In the upper part, it is a water tank with UV sterilizer system. On the back of the water tank, there is a pipe duct to collect rain. On the front of the water tank, there is a water tap which allow the water release from the water tank. Once the water level is high enough, it will send signal to the system to stop the water pump and Peltier to prevent overflow of water.

On the top of the invention, there is a solar panel which provide energy to the system. On the back of the invention has two batteries to store energy from solar panel and provide energy to the system. The system is controlled by the Arduino Nano board installed on the left.

			
Front View	Side View	Top View	Isometric View

V. Application / Market Need

- Explain the area of **application** and function of invention
- Indicate the market need and impact of invention
- Discuss **limitations** and compare with existing related works (if any)

Allow the countries with high shortage of water resources have clean drinking water.

The invention is made for the low water resource supply area such as India. Once the invention is installed in each family, people do not need to take a long journey to get clean water. It can save their time and spend on society development. The limitation of the invention is the power supply.

VI. Conclusion

- Make a **data-driven** conclusion of the project and the way forward of the invention process
- Justify if the proposed project meets the objective(s)

The average of the collected water is 2.639333333(L). Because a family of four need 12.8(L) water so the water maker can't provide enough water. The way to improve is to install more peltier to condense the water so that more water vapour can condense.

☐ **Our project is developed based on our school's previous project and the enhancement is as below:**