WWW.IJRPR.COM

International Journal of Research Publication and Reviews

Journal homepage: www.ijrpr.com ISSN 2582-7421

Cycle Purifier

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INTRODUCTION

Water is an essential part of life, accounting for about 70% of the human body . If people do not drink water for more than 48 hours, they will die, so water is indispensable. The typhoon is a common natural disaster in Taiwan, although it brings rainfall; but the flash floods also cause turbid water in the disaster area. Besides, the typhoon may also be powered off, and the general pressurized water filter cannot operate. Even after the windstorm, the turbidity of the raw water at the tap water level is also high, and it is necessary to improve the short-term and appropriate drinking water in the disaster area.

Water purification can be defined as the act of processes for removal contaminants from untreated water to produce the potable, safe and pure enough water for human consumption. During this process, an appropriate membrane will be removed the contaminant substances such as suspended solids, bacteria, algae, viruses, minerals such as iron, and other chemical pollutants like fertilizers. World Health Organization (WHO) has issued several guidelines for drinking water quality requirement that are generally can be followed in order to have an access to safe drinking water for consumers. During the late 1800s, scientists gained a greater understanding of the sources and effect of contaminants drinking water. In 1855, epidemiologist Dr. John Snow proved that cholera was waterborne disease that linked with a contaminant. In the 1880s, Louis Pasteur explained microscopic organisms could transmit disease through media like water. In 2014, unexpected severe flooding has been occurring in the East Coast region such as Kelantan, Terengganu and Pahang with the number of victims is more than 100,000 people. During or post disaster situation, the difficulty to get a clean and safe water will increase because the water treatment plants are damaged and water cannot be supplied to the disaster area. Beside that an electricity supply also will be lost if it was decided for safety purposes or infrastructure has been destroyed. In an emergency case, an active person needs to drink at least half gallons or 2 liter of water each day. However, children and illness person will require even more. An estimation of clean water usage at least 1 gallon or 3.8 liter per person, per day and the rest were for food preparation and hygiene. After the flood disaster occurs, people are too difficult to find a source of water supply and if the condition persists, it will harmful to the public health. In other conditions, flood victim need to get water from tanker and need have to wait for hours to get better water for survival.system call level, which creates personal profiles for users to monitor users' activity as forensic features. The SMS uses a local computational grid to detect restricted activity in a real-time manner The proposed work is regarded with Data Mining technique and intrusion detection mechanism.

PROBLEM STATEMENT

Developing countries around the world face debilitating challenges accessing safe and clean drinking water. Alarming statistics led us to the idea that that we could use a simple mechanism of transportation that is common in these areas, such as the bicycle, to help aid their water and sanitation struggles. Our goal is to design a bicycle attachment to purify and transport water from contaminated sources that is active while the rider is pedaling. This attachment, though not a permanent solution, would be a contribution to the improvement of their quality of life.

LITERATURE SURVEY

As a mechanical engineer, before undertaking any task I checked the feasibility of the project. In this project, my role is as team members. This report provides an insight into the design and fabrication of a BICYCLE WATER PURIFIER.

I wanted to know more details of the project before commencing; hence, I researched the topic thoroughly by referring to journals and articles online. Additionally, I obtained more information by taking references about the topic.

Water Crisis

Water is the prerequisite for all human and economic development. Safe, clean drinking water is scarce. Nearly one billion people in the developing world don't have access to it [25]. Water scarcity is either the lack of enough water or lack of access to safe water, but the problem goes beyond just water. In the developing world the availability of clean water is often consuming and expensive. In some areas of Sub-Saharan Africa women and girls specially, are given the task of walking miles at a time to a water source such as ponds or streams to collect water for their families. More often than not the water being collected is unsafe and full of diseases. Having access to clean water has the capability of improving four of the major problems in the

developing world; these are education, hunger, health and poverty. When children are freed from gathering water they can return to class. Especially young girls, who are commonly responsible for the task, are able to stay in school through their teenage years [18]. The United Nations estimates that Sub-Saharan Africa alone loses 40 billion hours per year collecting water; the same as an entire year's labor in all of France! A study conducted in 2010 by UNICEF as a progress report on their Millennium Development Goals (Figure 1) shows that more than a quarter of the population in Africa takes longer than 30 minutes to make one water collection round trip. Water leads to food security, with continued access to it less crop loss occurs and hunger is reduced. As of today many non-profit organizations have surfaced, all with one goal in common: help fix the water crisis worldwide. One of these organization is The Water Project which began their work in 2006. They mostly focus their work in Sub-Saharan Africa. Water.org was founded in 1990. With the experience they have gathered over the years, the organization is able to help in a more worldwide scale currently having active projects in the Asian countries of Bangladesh and India as well as the Caribbean country of Haiti. Charity Water is another large non-profit organization founded in 2004 by Scott Harrison. Over the years this organization has become one of the most important in the battle for safe water, having brought their projects to 20 countries around the globe in Africa, Asia, Central and South America.

Current Products

Currently two products consisting of bicycle powered filtration system exist. These are the Japanese-based Cycloclean and the winner of the 2008 Innovate or Die competition The Aquaduct.

Cycloclean

The only company that fabricates a bicycle powered water filtration system sold on the market is Nippon Basic Co, Ltd. Nippon was developed after two major Japanese earthquakes the Hanshin Earthquake in 1995 (magnitude of 7.2) and the Chuetsu Earthquake in 2004 (magnitude of 6.8) [15]. The product is essentially made for emergency use, it consists on having a purifying case attached on a rear seat of the bicycle and because of its design the user can ride it to any destination where it may be difficult for other types of transportation to access. The bike is capable of purifying almost any type of water source i.e. ponds, rivers, lakes, bathtub and pools [15]. The device is powerful enough to siphon water from a depth of five meters [28]. The purifying system consists of three filters, a pressure pump, two water hoses and one manual fitting as illustrated in Figure 2. Table 1 is an overview of the Cycloclean provided by Nippon. It should be emphasize that the system is capable of producing 5 liters of clean water every minute. However, the bike does have its disadvantages starting with its market price of $6,600 that makes it impossible for people from developing countries to purchase it. Furthermore, the bike only works in a stationary position and does not contain a form of storage.

4. MOTIVATION

The objective of providing pure drinking water throughout the world is one that has been an ongoing process for the past decades. Although we fully support the work done by charities such as The Water Project and Water.org, we believe that it will be a very long time until water can be provided as a clean source located locally throughout all developing countries. Therefore, our motivation was stemmed from the idea of quickly aiding those less fortunate areas, as well as providing a backup should those regions run into contamination problems within their local wells. In addition, our solution will exponentially reduce the time taken to retrieve the water, and allow time for more beneficial tasks to be accomplished in their native area. With our model we will be able to provide a working solution that mends the problem until a permanent clean water well can be produced within that community.

5. METHODOLOGY

The wheel of the bicycle is rotated with the help of chain driver and driven rim of the bicycle. The centrifugal pump is connected to the battery which is charged by the dynamo attached to the bicycle chain, it also rotates when the rim of the bicycle is rotated with the help of the rotation system. The shaft of the centrifugal pump rpm is depends upon the power supplied by battery (Max 12V). With the rotation of the great speed the vacuum is created in the centrifugal pump and this vacuum in this centrifugal pump suck the water from the water tank and it passes through the filter clean water discharge through outlet with some amount of pressure.Reverse osmosis removes contaminants from unfiltered water, or feed water, when pressure forces it through a semipermeable membrane. Water flows from the more concentrated side (more contaminants) of the RO membrane to the less concentrated side (fewer contaminants) to provide clean drinking water. The fresh water produced is called the permeate. The concentrated water left over is called the waste or brine. A semipermeable membrane has small pores that block contaminants but allow water molecules to flow through. In osmosis, water becomes more concentrated as it passes through the membrane to obtain equilibrium on both sides. Reverse osmosis, however, blocks contaminants from entering the less concentrated side of the membrane. For example, when pressure is applied to a volume of saltwater during reverse osmosis, the salt is left behind and only clean water flows through.

How does a reverse osmosis system work?

A reverse osmosis system removes sediment and chlorine from water with a prefilter before it forces water through a semipermeable membrane to remove dissolved solids. After water exits the RO membrane, it passes through a postfilter to polish the drinking water before it enters a dedicated faucet. Reverse osmosis systems have various stages depending on their number of prefilters and postfilters.

The RO membrane is the focal point of a reverse osmosis system, but an RO system also includes other types of filtrations. RO systems are made up of 3, 4, or 5 stages of filtration.

Every reverse osmosis water system contains a sediment filter and a carbon filter in addition to the RO membrane. The filters are called either prefilters or postfilters depending on whether water passes through them before or after it passes through the membrane.

Each type of system contains one or more of the following filters:

•Sediment filter: Reduces particles like dirt, dust, and rust

•Carbon filter: Reduces volatile organic compounds (VOCs), chlorine, and other contaminants that give water a bad taste or odor

•Semi-permeable membrane: Removes up to 98% of total dissolved solids (TDS).

6. FUTURE SCOPE

The future scope includes redesigning the structure of the model and the type of pump to get higher pressure. The RO filters can be made combinations with UV filters to get high quality of pure water. By increasing the speed of cycling action higher rate of water flow can be created. The model can be redesigned in to movable model from stationary model by using bicycle in which pump and filters can be attached using suitable mechanism, and it can be even used as a travelling device from one place to another place and hence pure water can be collected in separate container by the time the person reaches his destination.

7. CONCLUSION

The pedal operated water filtration system is a new system that is useful in developing countries like India to have daily access to safe drinking water all by harnessing the energy of pedal power. Reverse osmosis is a relatively new, but very effective application of a stablished scientific process. Whether it is used to meet the needs of a typical family of four, or the needs of an industrial operation requiring thousands of gallons per day, it can be a cost effective to provide the required quantity of highly treated water. With continual advances in system and membrane design that boost efficiency and reliability, RO can be expected to play major role in water treatment for years to come. In Reverse Osmosis Water purification by Cycling Action

•Simple in design.

•Portable.

•Economical.

•Effective way for providing potable water.

•Less maintenance

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