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Outdoor Convenient Generator

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Abstract : In Malaysia, the problem of crop damage caused by pests often occurs, especially at night. Farmers often face this 'nightmare' because their crops are their source of finance. Because of that, farmers will find solutions to deal with this problem by doing various things. Hydro generators are equipment that can repel pests easily. Farmers will not suffer damage to their crops due to the function of this generator. It is very user-friendly and easy to carry anywhere. This generator requires a heavy current of water to generate electricity on the dynamo. Also, this generator is environmentally friendly as it only needs water to function. It can reduce the declining fuel consumption in Malaysia. In Malaysia, the problem of crop damage caused by pests often occurs, especially at night. Farmers often face this 'nightmare' because their crops are their source of finance. According to responses from the sugarcane community, there is neither a chemical nor a microbial pesticide that can stop this catastrophic spread. The experimental control measures carried out discovered that these insects are attracted to the high-bright lights used as traps, but there is no electricity supply in the large farm area. Meanwhile, batteries that run out in an hour are used. Because the farm is surrounded by a water-filled stream, this project suggests a mini hydro generator. This is as strong as supplying enough power for a high-wattage lamp that has been successfully tested as an applicable solution. As a result, the quest for the best kind of propeller blade to suit the characteristic setup in this agricultural area began. There is a flaw in the design that demands the blade be able to pass trash out. This waste travels with the flow of the river; design changes are needed so that it is not constantly maintained or cleaned.

Keywords: Hydro, Generator, Water-filled, Stream

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1. Introduction

It is well known that kinetic energy is collected from flowing, pressurized water and utilized to operate a generator to create electric power. The magnitude of electric power produced decreases as the size of the hydroelectric power-producing equipment decreases.

Furthermore, the amount of flowing water from which kinetic energy may be collected decreases. As a result, the efficiency of converting the kinetic energy in the flow of water to electric power becomes substantial. When there are too many inefficiencies, only a limited quantity of kinetic energy is collected from the pressured, flowing water. As a result, as the size of the hydro-electric power producing equipment shrinks, the amount of electric power produced decreases.

To power the LED light unit and any other electric power-consuming equipment in the farmed trapping system, a power source is necessary. Traditional power grid systems draw electricity from a conventional electrical outlet or a battery power source to power all of the components in the farmed trapping system, including the high-brightness light unit. In the case of a farmed trapping system powered by electrical outlets, the system has limited mobility and stops to work when the electrical outlet power source is interrupted.

1.1 Literature Reviews

Hydro generators have been invented and employed in the industry in a variety of forms or prototypes. However, due to various difficulties such as size issues, design, limited space, and expensive cost (such built dam), the application of this machine is still restricted. By combining the concepts of smallness and efficiency, hydro generators can be made at a low cost.

Firstly, this product will cut some expenses by replacing some non-essential products with lower-cost, higher-quality alternatives. Goods are pretty expensive in this highly developed market, and the worth of a machine on the global market will grow to rely on a corporation. Many machines are sold at an exorbitant price. With this issue, consideration on cutting out unnecessary items and replacing them with better quality substitutes.

Second for the weight and design, the majority of the products on the market are made of iron. Iron machines have a relatively large mass and are difficult to move. At all times, water must flow through a tube with a diameter larger than 7.5cm. The issue is tackled by making the tube smaller such that the water current always went through it. Most devices that have been developed can create around 1000W of electricity, however producing a large number of voltages requires a significant amount of water and a high water current. The initiative that they have taken is to change the design and elements of the machine to create a device that is easier to operate and more comfortable as put in comperision as in **Table 1.**

Table 1: Design review

Problem Statement	Product NameAnd Description	Design	SuggestionFor FutureWork
The water flow must fully fill the water tube that is above 7.5cm diameter all the time	Micro Hydro Water Turbine Single Phase Generator Hydroelectric Magnet Full Copper Core can produce 500Wpower [1].		Make it smaller and lighter by using a different design and parts.

These units are quite pricey andare generally forpeople who are looking to go completely off-grid	HydroelectricTurbine Generator is a cross-flow turbine hydro-electric generator that can produce 1500W power [2].		Cut some costsby changing some unimportant material
Only a very small amount of energycan be produced using this product	Water Turbine Generator is an in-pipe micro hydro-generator that can produce 10W power [3].		Increase energy produced by using a more powerful motor
Requires a decent flow of water to charge devices properly	Waterlily USB Portable Power is a portable camping or hiking generatorthat can produce 15W power [4].		Make the blade lighter by using asmaller and lighter blade
Need to provide high head (high pressure) streamsof water which may make them inapplicable for some properties	Pelton wheel hydro-electric generator that can produce 350W power [5].		increase the pressure by making the pipe with a large opening and narrow end
To make full use of the capabilitiesof this product, you will need to have access to a decent flow of water on your property	Hydroelectric Generator is a multi-use hydroelectric generator that can produce 2000W power [6].		Use a smaller size of motor ordynamo so it is easier to rotate
Need to make our water path	Aluminium alloy turbine hydroelectric generator can produce 1000W power [7].		Make it more user-friendly bychanging the design

2. Materials and Methods

The materials and methods section, otherwise known as methodology, describes all the necessary information that is required to obtain the results of the study. Specifications and properties of materials, equipment, and other resources used in the current study should be described in this section. Should a bulleted list be required, it may be included and should look like dynamo kit, 3-inch fan blade, brake cable, and battery.

The LED light or any other piece of everyday equipment may be powered in a variety of ways. The use of a battery or dry cell is one method. It is the most prevalent type of electric power source. It is called a "dry cell" as it contains a paste of chemicals and does not contain any liquid. The dry cell is

popular because it is cheap, affordable, and has high availability. The main problems are that it cannot supply electricity for a long time and it cannot be charged when the battery is out. It must be replaced with a new dry cell to keep the equipment functioning.

Another source of electricity is petrol-powered generators. This type of electricity source is widely used around the world. Gasoline engines convert the chemical energy of gasoline into mechanical energy. The stator, a fixed component, is surrounded by a moving magnetic field produced by the rotor, a moving component driven by the mechanical energy of the engine (a set of conductors wound in coils over iron ore). Through this process, a voltage difference between the stators' windings is created, which produces energy. It can be used to provide electricity to structures like homes or workplaces when power outages are common. They can act as a backup power source to ensure the effective operation of equipment in the house or business. There are some problems with this type of power source, like needing to refill its fuel after a period of time, and it can cause pollution. It also makes loud noises.

The last source of electricity that has been taken into account in this project is solar cells. A solar cell is a solar panel that can generate electricity from light. One of the sample tools that use solar cells is the new version of the calculator. It is, for sure, a great power source, but sadly, it is not suitable to be used in Malaysia since the weather in this country tends to be cloudy.

2.3 Equations

The specific speed can be estimated mathematically as a function of maximum power and the net head (expressed as) [8] or flow rate discharge and net head (expressed as) [9]. The particular speed Ns in the first example is the turbine rotation speed (R.P.M.) working under a fall of 1 m and providing a power of 1 kW, as provided by (1).

$$N_s = \frac{N\sqrt{Pt}}{H_n^{3/4}} \quad \textbf{Eq. 1}$$

Where *N*: turbine speed in (r.p.m).

$\boldsymbol{H_n}$: net water head in (meter).

$\boldsymbol{P_t}$: turbine output power in (kW).

For the second case, the specific speed $\boldsymbol{n_q}$ is the turbine rotation speed (r.p.m) working under a fall of 1 m and a flow of 1 m^3/s. Once the turbine type, specific speed, and net head are determined, the basic dimensions of the turbine may be calculated. Each variety has its unique shape and structure, as seen in **Figure 1**. As a result, several dimensionality equations will exist depending on the turbine form and operation [10].

3. Simulation Water Flow

The user will need to put the fan of the convenient generator into flowing water to operate the generator. The first phase of the experiment is to try to put the fan in a normal river and mountain river. The second phase is to calculate the time needed to fully charge the battery. The last phase is to check whether the convenient generator can hold itself due to the vibration of the fan blade spinning. This test is done to ensure the endurance and flexibility of the product.

We discovered that this modest hydro generator design as **Figure 1** may also be utilized for wasting or consuming water in households. In addition to normal activities like farm irrigation and water well overflow on farms, trenches provide kinetic energy that has the ability to create electricity for energy storage reasons. The inherent water pressure and flow within the concrete pipe (culvert) from the utility's main drain, which is utilized for regular operations, is also used to rotate a small-scale hydro turbine, which drives a generator for the creation of electrical power. As a result, the goal of this project

is to create a small-scale hydro-generating system that employs consuming water provided to farms as an alternative electrical energy source for domestic usage.

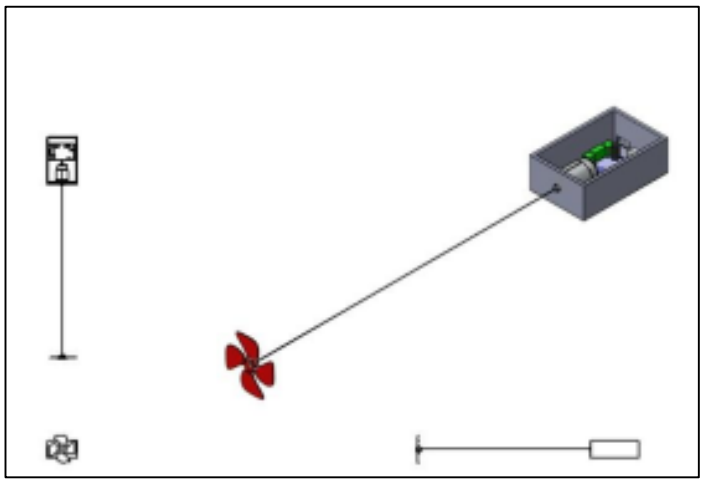

Figure 1: Hydro generator design

Figure 2: Generator prototype

Operate the generator as **Figure 2**, the user must immerse the fan of the convenient generator in flowing water. The initial stage of the experiment involves attempting to place the fan in a standard stream and a mountain stream. The second step is to assess how long it will take to completely charge the battery. The final stage is to see if the handy generator can withstand the vibration of the fan blade spinning. This test is performed to guarantee the product's durability and flexibility.

4. Conclusion

With features that cater to customers' tastes, hydro generator designs successfully help solve the problem of pests in their gardens. Since it does not use high-speed motors or engines to drive the hydro

generator, no noise is generated and no toxic fumes are emitted, making the unit more environmentally friendly than other generators. Furthermore, based on our research, we found that the machine is cheaper than other generators on the market. A typical hydro generator costs about RM350 per generator. However, our generator only costs RM70. This means our generators are more than 5 times cheaper than competitor generators. As a result, our devices are reasonably priced while overcoming pest problems with ease.

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