

Designing of Solar Powered Dispenser

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Abstract - Public distribution system in real sense can be described as the base level government outlets which are to be established to provide easy access to all subsidized food items to the beneficiary general public and specially targeted to those families which are below poverty lines so that they can get the subsidized food items to fill their empty stomach but due to increasing corruption PDS is now become synonyms of adulteration and cheating which are still prominent. The main affected commodities of the PDS system remain the liquid one such as kerosene, cooking oil & milk and because of their direct attachment to the daily life, malpractices conducted in PDS shops directly affect the life of beneficiaries. The malpractice remains mainly concerned in the area of dispensing through unauthorized means of measuring. The reason behind this innovative system development is to provide an alternative to the government to modernize the existing manual measurement system through analogous approach so that the malpractices could be checked and eradicated from the system.

Key Words: Solar, Panel, Dispenser, Hardware, distribution

1. INTRODUCTION

Public distribution system (PDS) is an Indian food security system established by the Government of India under Ministry of Consumer Affairs, Food, and Public Distribution. It is managed jointly with state governments in India and distributes subsidized food and non-food items to India's poor. Major commodities distributed include staple food grains, such as wheat, rice, sugar, and kerosene, through a network of public distribution shops (also known as ration shops) established in several states across the country. Food Corporation of India, a Government-owned corporation, procures and maintains the PDS. In coverage and public expenditure, it is considered to be the most important food security network. However, the food grains supplied by the ration shops are not enough to meet the consumption needs of the poor or are of inferior quality. The average level of consumption of PDS grains in India is only 1 kg per person / month. The PDS has been criticised for its urban bias and its failure to serve the poorer sections of the population

effectively. The targeted PDS is costly and gives rise to much corruption in the process of extricating the poor from those who are less needy.

2. SOLUTION

ANALOGOUS SOLAR POWERED LIQUID COMMODITY DISPENSER SYSTEM FOR PDS

- Public distribution system presently acts as the most corrupt system.
- The liquid commodities are the most vulnerable because the shop keeper cheats the beneficiary consumer through their manual measurement instruments.
- As on average with each liter they save up to 250 ml of liquid commodity and cheat the beneficiary.

Solar powered liquid commodity dispenser can rid of all this anomalies from the system with minimum cost

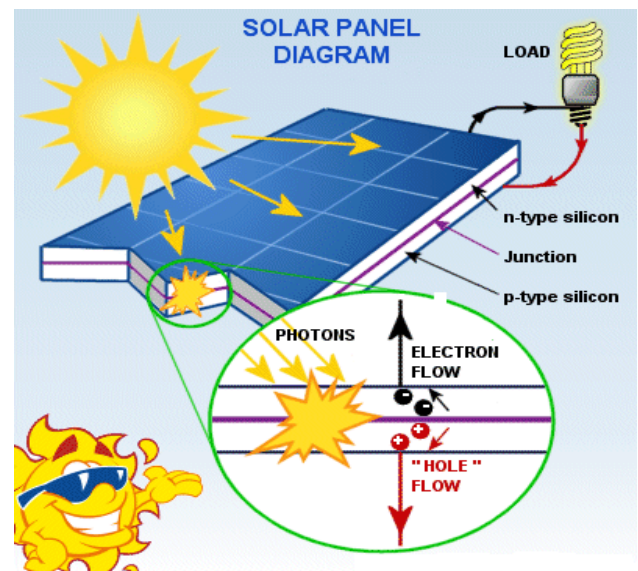


Fig-1: Solar Panel

2. DESIGN

In the current scenario, the dispenser is stationed at any commercial or a remote location which can be the urban or a rural area. While in idle state the system shows the glowing of a particular LED which indicates that solar panel is in the optimal state and is performing appropriately. The device that is parked stationary gives option to collect the commodity in two different measures that is the system has two switches that give the option to collect the 'x' amount of commodity and other switch gives the option to collect 'y' amount of commodity.

Though the system runs on the solar power but the following two figures show the charging time and the discharging time.

In the figure2, charging time of battery is shown:

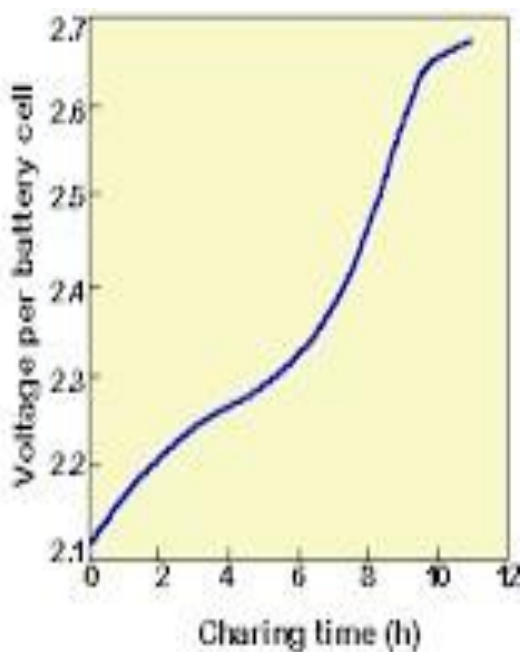


Fig -2: Charging time of battery

Now, figure three will show the discharging time of the battery.

Though, the solar panel provides the continuous source of power this is in the case of scenario when the solar energy is scarce.

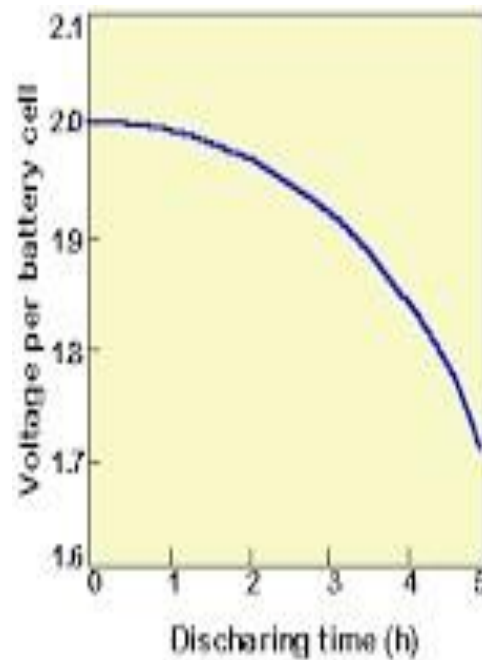


Fig -3: Discharging time of battery

To further the design implementation, there are two containers or technically dispensers. In the first dispenser, there shall be prefilled amount of a particular commodity. When the system gets command from the user for the particular amount of commodity, then that amount of commodity is transferred to another dispenser. Solar modules use light energy (photons from the sun) to generate electricity through the photovoltaic effect. The majority of modules use wafer-based crystalline silicon cells or thin-film cells based on cadmium telluride or silicon. The structural (load carrying) member of a module can either be the top layer or the back layer. Cells must also be protected from mechanical damage and moisture. Most solar modules are rigid, but semi-flexible ones are available, based on thin-film cells. These early solar modules were first used in space in 1958.

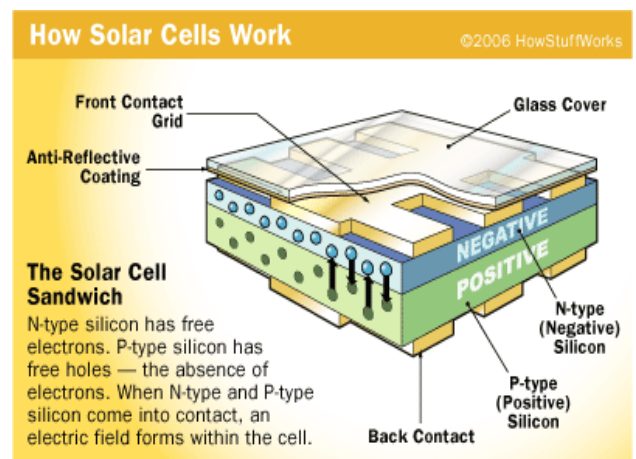


Fig -4: How Solar Cell Works

4. SYSTEM HARDWARE ARCHITECTURE

The system is based on three-tier architecture. It consists of a main Solar panel that acts as an energy extractor from the sun. The photovoltaic converter transforms the photon energy into electrochemical potential energy. To prevent the excited electrons from falling back into their ground state, there is some built-in asymmetry that pulls the excited electrons away before they can relax. The extra energy of the excited electrons generates a potential difference, $\Delta\mu$, and it is this force that drives the electrons into the external circuit and exerts work. The excited state (conduction band) and ground state (valence band) are separated by an energy gap, also called band gap. The band gap's function is to maintain the excited electrons at the high energy for a long time compared to the thermal relaxation time, so that they can be collected. Note that electrons in each of the different bands relax to form a QTE with a different QFL. Then, there is battery that stores all the energy that solar panel extracts from the sun. The charging and discharging time of the battery has been shown above for the technical purpose. Then the third and important part of the architecture is the circuit that contains the relay which is one of the important part of the system as it opens and closes the circuit electronically. The relay controls one electrical circuit by opening and closing contacts in another circuit. When a relay contact is normally open (NO), there is an open contact when the relay is not energized. A relay is an electromagnetic switch operated by a relatively small electric current that can turn on or off a much larger electric current. The heart of a relay is an electromagnet (a coil of wire) that becomes a temporary magnet when electricity flows through it. Then to compliment the circuit, a dc motor has been used which helps to transfer the liquid commodity from one container to another container.

5. APPLICATIONS

- Can transform the old and inefficient PDS stalls into a reliable world class public distribution system.
- Any private individual and even local vendors can use it for liquid commodity handling and distribution.
- Increases distribution speed and saves labor and cost.
- Can be used in both Urban and Rural areas.

- It can also be used in hotels and is eco friendly.
- Can be used in trade fairs and other exhibitions.

6. ADVANTAGES

Efficiency: Can be efficiently installed anywhere due to its portable nature. It can be carried anywhere and at any place that seems appropriate.

Maintanance: There is no to limited need of maintenance as it works on the green energy. Thus it saves the time to maintain it.

Production: With the system being cheap and economical, it can be produced in large stocks..

Savings: Greater worker safety leads to financial savings. There are fewer healthcare and insurance concerns for employers.

Freedom from human limitations: These set of advantages is due to the fact that human characteristics like boredom, fatigue, mistakes, etc. do not interfere with the functioning of a robot.

7. DISADVANTAGES

It is having only a single disadvantage as it can only be used to distribute liquid commodities but as its advantages are much higher than its disadvantages it can act as a game changer in the field of PDS systems as India has more than 30,000 PDS shops and none of the shop is having such automation.

8. CONCLUSION

Efficient utilization directly links to a sustained environment, better production that links to better incomes and quality lifestyle. Thus, Solar powered dispenser – the innovative public distribution system has been designed to cater to the needs of the people and end the corrupt lifestyle of the present system.

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