

Solar Based Water Carrier

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Abstract— Seventy six million people in India lack access to an improved water source, putting them at risk for waterborne diseases. Exacerbating the problem of poor water quality is inequitable access. Out of 29 Indian states, only seven have achieved full coverage of protected water source for their villages. Large segments of the population don't have access to improved water sources at all, and are forced to travel long distances in search of clean water, or purchase it from vendors at exorbitant prices. This is the problem Wello wheel is tackling. Interestingly, their first sale was in Rajasthan, where tribal village leaders negotiated the purchase of their first rough water wheel prototype in exchange for locally-woven camel hair rugs. After validating the product, they worked with local manufacturers to fabricate the products. Wello looks at itself as a design venture which builds innovative products for the rural market.

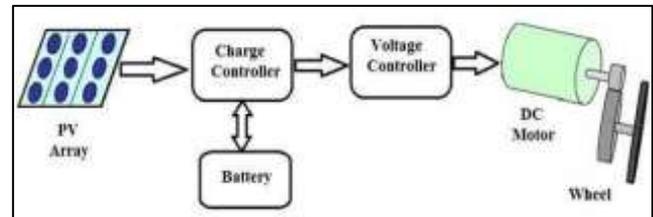
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I. INTRODUCTION

The task of water collection consumes 25-40% of a person's day. More than 75% of Indian households don't have access to piped water in their homes. Girls and women carrying plastic jerry cans of water on their heads is a common sight in rural areas of poor countries. The Water Wheel eases that burden by storing water in a round 50-litre container that doubles as a wheel. It was inspired by the shape of the traditional matka. It carries three to five times the amount of water as compared to traditional methods and in the process, reduces the time and physical burden of water collection. Created after consultations with villagers in the dry northern Indian state of Rajasthan, the Water Wheel is made from high-quality plastic that can withstand rough terrain. By reframing the water crisis as an opportunity, Wello has reinvented the wheel and developed an innovative business model that empowers individuals to use the Water Wheel as an income-generating tool to lift their families out of poverty. The introduction of waterwheel has seen better health of women due to reduced head-loading, greater productivity with time spent on water collection halved and improved access with 50% more water. Wello's innovative business model enables us to make Water Wheels available at an affordable price. Its familiar shape maintains cultural relevance and its reinforced axles protect Water Wheel skin from wear and tear.

The Wello water wheel is a 45 litre rolling drum that moves 3-5 times more water than possible using traditional methods, decreasing the amount of time spent by 60%. It's a low cost, mobile solution that makes it easier to collect water from a distance. The wheel cuts down on the trips, eases the burden and saves time which can be used more productively. In trails, it has been shown that a family using a waterwheel can recover many hours each week. This means instead of carrying water a girl can go to school. More water also means better health and hygiene.

II. BLOCK DIAGRAM



III. LITERATURE SURVEY

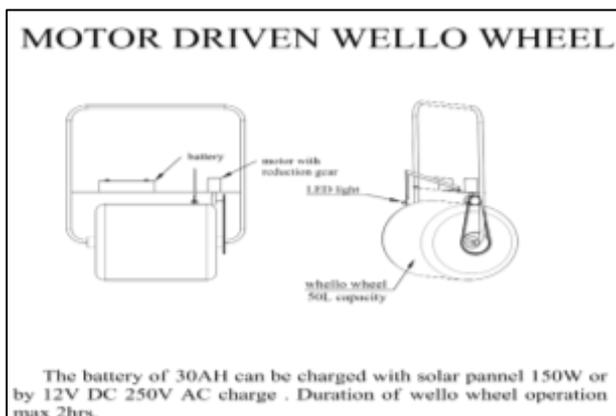
- [1] This paper presents the modeling and simulation of a series wound DC motor, where the model is linear, first order and with stationary parameters (resistance) in variant time described in finite differences. In addition, it includes losses which commonly affect the electrical motor efficiency, these are: magnetic, mechanical and electrical losses. At the same time, random perturbations statistically limited were added, these perturbations could be considered as temperature rising in the DC motor when increasing the values of some of the losses. Finally, were obtained a set of simulations using Monte Carlo method.
- [2] Era of human pull and pedal drive rickshaw stands for long time and seek technology intervention to drive motor powered, fueled by solar energy rickshaw The evolution of man to machine age represents an expansion of human capacities. Enhanced human control over environment, through the ability to elicit from instruments of production, has improved range and exactitude of response. It is in the nature of machinery Era and a corollary of technical development control over machine need no longer be vested in its immediate operator, rickshaw puller. This possibility of technology development is seized upon by the capitalist mode of production and utilized by them to the high extent. The proposed solar power rickshaw development model have multiple organizational involvement, with Council of Scientific & Industrial Research (CSIR) as research and technology development, Department of Scientific and Industrial Research (DSIR) for promotion research and development (R&D) in private sector, Ministry of New & Renewable Energy (MNRE) subsidy to sensitize rickshaw owner for technology adoption and for covering trial risk of new renewable energy technology, Ministry of Environment & Forest (MoEF) for benefit sharing under PoA-CDM and Department of Post (DOP) for encouragement for rural mobile post office. The business plan on solar power rickshaw for mobile post office for postman has been workout in this study keeping in view that postman is best media for dissemination of information during his daily travel on an average 20 km.[2]

- [3] Water is the essence of life and so it enables life on the earth. Today, we are living in the world where clean water is increasingly scarce and it needs to be conserved. The water usage has increased tremendously throughout the globe. The amount of water available per head has decreased globally. So, the access to clean drinking water available per capita has gone down. There are various modern and traditional approaches employed to enhance the water management. Reuse of water is an example that has served as an essential water resource management. This research paper focuses on the reuse of the greywater in the houses using an electromechanical system. The proposed work employing a pH sensor and particulate sensor that operates the Electro-mechanical System comprising of Motor and flaps for the diversion of water. The motor facilitates the opening of appropriate flaps in the system. Using the pH sensor and particulate sensor in conjunction with water separation mechanism, considerable amount of water can be saved for other purposes. After sensing of chemical (pH) and the solid particles (particulate sensor), water can be diverted to the sewer line or not, and after passing both the tests, water can be reused. The system with proper positioning of the flaps, operated by the electro-mechanical system can accomplish this separation. The electromechanical system receives its input from the sensors. Precise 90 degrees of rotation of the motor shaft and the linkages to operate the flaps is accomplished by using embedded system. The two flaps which are positioned inside of the Y joint, one opens the recycle tank and the sewage tank. The whole process is analyzed, experimentally tested and modelled from the view point of informatics, simulations and optimized before the final implementation of the work.[3]

IV. METHODOLOGY

- This works on the principle of push pull system.
- This provides additional support when required.
- This support is provided by introducing dc motor powered by battery, charging will be by solar panels.
- This makes movement of the wello wheel much easier especially on gradients.
- This works when it is required keeping in view of saving on battery and solar panel cost.

V. MODEL



VI. ADVANTAGES

- **AESTHETIC:** Familiar shape maintains cultural relevance.
- **CONVENIENT:** 45l capacity is 2- 5x more efficient than head loading twice as much more water in half the time.
- **HIGH QUALITY:** Balanced size and shape designed to increase the performance on tough terrain.
- **ECONOMIC:** Simple design with motor control reduces physical strain.
- Utilization of renewable energy i.e., solar energy.

VII. DISADVANTAGES

- Initial cost is high but maintenance cost is affordable.
- Performances reduces due temperature variations.

VIII. CONCLUSION

- As the module is battery supplied it reduces the physical strain of a person about 80% for performing a required task(water transportation).
- Utilization of renewable energy source.
- 50litre capacity is 2-5 times more efficient than head loading twice as much more water in half the life.
- It can also be used for providing light in the house and for charging purposes.
- The water can also be fetched in the night times also as we provided with light and battery.
- The model can be moved in both directions hence easy transportation.

IX. FUTURE SCOPE

- Automation can be done.
- Sensors can be adopted for detection of obstacle.
- Speed variation can be done with increasing number of gear arrangement,to make tangent comfortable
- Large capacity like 100L, 200L etc can be developed.
- With two band wheels it can be generalized to road carriages.
- Two battery battery arrangement one for storage while other for running. (Panels can be kept at home).
- Wello wheel itself can be used as sump /tank, with tap on its sides.

REFERENCES

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- [2] <https://ieeexplore.ieee.org/document/7888126>
- [3] <https://ieeexplore.ieee.org/document/8256898>