

**DESIGN, FABRICATION AND PERFORMANCE EVALUATION OF WATER  
WHEEL TURBINE FOR IRRIGATION CANAL USE  
FOR BATTERY CHARGING**

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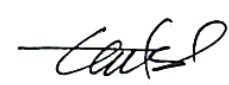
  
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## **BIOGRAPHICAL SKETCH**

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In 2014, she entered Central Luzon State University and took up Bachelor of Science in Agricultural Engineering which was then later changed to Bachelor of Science in Agricultural and Biosystems Engineering in 2015 and majored in Agricultural Mechanization and Renewable Energy. In 2016, she passed the Department of Science and Technology - Junior Level Science Scholarship (DOST-JLSS) examination and was signed as one of the DOST scholars in 2017. She also attended seminars such as: Startup: “Innovation”, “Technology” and Entrepreneurship Forum in RET Amphitheater in Central Luzon State University.

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## ABSTRACT

**CORTEZ, JANNAH MARIE ALTHEA R.** Department of Agricultural and Biosystems Engineering, College of Engineering, Central Luzon State University, Science City of Muñoz, Nueva Ecija, **June 2019, DESIGN, FABRICATION AND PERFORMANCE EVALUATION OF WATER WHEEL TURBINE FOR IRRIGATION CANAL USE FOR BATTERY CHARGING**

Adviser: MARLON T. DELOS SANTOS, M.Sc.

This study was conceptualized to develop a water wheel turbine which is suitable in harnessing the kinetic energy of flowing water in irrigation canals for battery charging.

The objectives of the study were to design a waterwheel turbine for irrigation canal use and battery charging, fabricate a waterwheel turbine using locally available materials, evaluate the performance of the waterwheel turbine in terms of turbine power and turbine efficiency, and perform a cost analysis. The fabrication of the study took place in the College of Engineering, Central Luzon State University. Testing and evaluation was held at the National Irrigation Administration (NIA) lateral canal within the CLSU compound, Science City of Muñoz, Nueva Ecija.

The performance characteristics of the waterwheel turbine were evaluated in terms of turbine power and turbine efficiency. The treatments used in the study were the different depths at which the paddle of the waterwheel turbine was submerged. The experimental design was Completely Randomized Design (CRD) and data were analyzed using Analysis of Variance (ANOVA). Comparison among means was tested at 5% difference using Least Significant Difference (LSD).

Results showed that the highest turbine power was attained at 30 cm depth wherein the paddle was submerged with a value of 506.26 watts and the highest turbine efficiency

was recorded at 96.33% at 10 cm depth wherein the paddle was submerged. The result also showed that the waterwheel turbine has an output of watts 149.6 watts using a 220 V AC synchronous generator at a natural stream velocity of 1.4 m/s. Cost analysis showed that the water wheel turbine has an initial cost of Php 25,850.20. Its annual operational cost is Php 5,156.44 which includes the fixed and variable cost. It has an operating cost of Php 5.98/kWh. Based on the capacity of the water wheel turbine at 861.70 kWh/yr and the charged rate of electricity consumption which is at Php 12/ kWh, the break-even point is at 377.03 kWh. The payback period is 4.99 years.

Keywords: water wheel turbine; irrigation canal use; battery charging

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