

**DESIGN, FABRICATION AND PERFORMANCE EVALUATION OF  
LOW HEAD PICO HYDRO POWER GENERATION  
SYSTEM USING CROSS FLOW TURBINE**

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An Undergraduate Thesis submitted to the Faculty of the Department of  
Agricultural and Biosystems Engineering, College of Engineering,  
Central Luzon State University, Science City of Muñoz,  
Nueva Ecija, Philippines in Partial Fulfilment  
of the Requirement for the Degree of


**BACHELOR OF SCIENCE IN AGRICULTURAL AND BIOSYSTEMS  
ENGINEERING  
(Agricultural Power, Energy and Machinery Engineering)**

**JUNE 2019**

**ACCEPTANCE SHEET**

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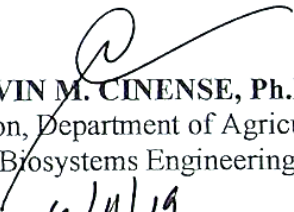
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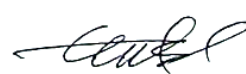
  
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## **Biographical Sketch**

Jhovirey Violago Victoria was born on May 22, 1998 in San Ildefonso, Bulacan. She is the second daughter among four children of Reynaldo G. Victoria and Violeta V. Victoria.

She finished her elementary education in the year 2010 at Bubulong Malaki Elementary School and secondary education in 2014 at Liceo de Buenavista. She has been an honour student during her elementary days and joined campus journalism as a photojournalist and had the opportunity to compete with other schools. She was a consistent Special Science Class student during his high school days and actively participating school activities and competitions.

In 2014, she passed the entrance exam in Central Luzon State University, and took the Bachelor of Science in Agricultural and Biosystems Engineering with a field of Agricultural Power, Energy and Machinery Engineering, because of her interest in agriculture which is one their source of income. She attended various seminars and trainings like the “Wise up: Training Services on Solid Works Operation” on April 13, 2016 and “Smart Farming: Engraining the Future” on April 11, 2018 at College of Engineering, Central Luzon State University. She also participated the “AE Planting Festival” held on April 15, 2016 at the university. She is a proudly beneficiary of CLSU Alumni Association Inc, Scholarship Program under “Engr. Tilah Grant Scholar” and a CHED Tunong-Dunong Scholarship Program.

## Acknowledgement

This study would not have been possible without the guidance and support of the people behind this success. The author would like to express her sincerest gratitude and appreciation to all the people who contributed in this study and most importantly, to God for giving her wisdom, knowledge, strength and infinite love.

To Dr. Marvin M. Cinense, her adviser and favourite professor, for the kindness, suggestions, unending support, encouragement, guidance and help for the improvement of the study;

To Engr. Claire Marie M. Castillo and Engr. Marlon T. Delos Santos, members of advisory committee for giving suggestions, insightful comments and criticisms for the betterment and improvement of the study;

To her parents, Reynaldo and Violeta Victoria for unending love, inspiration, sacrifices, motivation, advices, and greatest support. And to her siblings, Jhovel, Jhoreniel and Jhozette for prayers, encouragement and tireless listening to my problems in this study;

To her relatives, Ronaldo Violago and Rebecca Violago for financial support; to her uncles, Sherwin, Edwin, Jallen, and Arnold for being always one call away to help and support during the fabrication and testing; to her cousins Chev Caleb Roxas, Loraine Violago, Kaye Anne Violago, Nikka Violago, Ronielle Violago and Kyle Noah Violago for the unwavering support and prayers to finish the study;

To Bravelly Jehu F. Fernandez, for the inspiration, motivation, time and effort, encouragement in time of her down moment, for listening and helping in doing this study;

To College of Engineering Farm personnel especially to Engr. Roldan Quitos, Engr. Christopher, Kuya Mario, Kuya Mico, Kuya Ruben, and Kuya Niel Aaron for their time, guidance, suggestions, and for sharing knowledge and expertise to improve the study;

To Domingo Family especially to John Karlo Domingo, who offered his time and effort in assisting the author and stress-relieving moments while conducting the study;

To her classmates, especially to Menard Soni for giving his time and sharing his knowledge for the betterment of her thesis outline to manuscript, to Art Joshua Eugenio Capili for the help in the AutoCAD drawing, to Shroeder Valdez, for always been one call way to help during testing and to Sopas Squad, Alvin Laplano, Clark Rimocal, Johnny Reyes, Raymart Mc Carke, Florelexie Ancheta, Raya Peria, Cherish Mariano, and Claire Parayno for the relax moments;

To her roommates at Ladies Dorm 2 who became the author's sisters in school, especially to Maricar Jane Zubiri for sharing her knowledge in grammar and technical writing, to Charmie Alarcio, Aira Cantorne, Angelica Cantorne, Monica Mangalus, Vivian Cabilin, Abigail Soriano, Engr. Kiara De Vera for their encouragement, funny moments, and motivation to finish the study;

To her high school friends, Renier Luis Venturina, Joshua Rommel Enriquez, Patty Elaine Dela Cruz, June Vincent Blas, Jan Gael Francisco, and Aila Danica Parinas for unwavering support, help, relax moments and motivation to finish the study;

To her elementary classmates, Marvin Malinao, Daisy Cunanan, Trisha Espiritu, Kenneth Sevilla, Judy Ann Dela Cruz, Charlene Saldero, Lyca Idava, Laiza Nina

Bonifacio, Ricky Bonifacio, Patricia Valdez, Joyce Eugenio and Gerald Bonifacio for the support, encouragement and motivation to finish the study.

To National Irrigation Administration Division 1, for allowing the author to conduct and test the machine in the Thresher Crossing of Lower Talavera Reservoir Integrated System Lateral G irrigation canal;

To Angelo's Machine & Welding Shop, especially to the Babasoro brothers for the fabrication of the machine;

To the people in the irrigation canal especially to Leonides C. Orpiano and family for the help during testing of the machine and providing some materials and ideas to the author to make the study more successful.

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## ABSTRACT

**VICTORIA, JHOVIREY V.**, Department of Agricultural and Biosystems Engineering, College of Engineering, Central Luzon State University, Science City of Munoz, Nueva Ecija, **June 2019, DESIGN, FABRICATION AND PERFORMANCE EVALUATION OF LOW HEAD PICO HYDRO POWER GENERATION SYSTEM USING CROSS FLOW TURBINE.**

Adviser: **MARVIN M. CINENSE, Ph.D**

Renewable energy systems are commonly used in providing electricity in the areas that do not have access of electricity and one of these systems is the Pico Hydro Power Generation System (PHPGS). This study was conducted to design, fabricate, and evaluate the performance of a low head PHPGS using cross flow turbine. Specifically, the study aimed to design a low-head PHPGS that will install in irrigation canal; fabricate a low-head PHPGS using locally available materials; evaluate the performance of the low-head PHPGS in terms of efficiency; and, perform a cost analysis of the system.

Result of the performance evaluation, using a permanent magnet generator at  $0.1711 \text{ m}^3/\text{s}$  water flow rate, cross flow turbine shaft rotational speed of 182 RPM, generator rotational speed of 742 RPM, turbine torque of 0.27 kg-m; the low-head PHPGS could generate 9 watts, with the turbine efficiency of 36.28%.

Cost analysis of operating the Pico Hydro Power Generation System indicated a breakeven point of 1583kW/yr based on the investment cost of ₱10,395.00 (covering materials and labor cost), machine capacity of 0.216kW/hr and consumption rate of PHPGS of 1.75Php/kw-hr. The annual net income that can be generated is 2297.26Php/yr. The projected time needed to recover acquisition cost based on the machine capacity of 0.216kW/hr and operating time of 7,320 hr/year was 4.5 years.

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