BIOGRAPHICAL SKETCH

Allen Uhlik Jr. was born in Brooksville, Florida. He received his A.A.S degree in Pre-Engineering from Spoon River College in Canton, Illinois in May 2011. He then joined the undergraduate program at Tennessee Technological University where he received his B.S. in Electrical Engineering with a Minor in Mathematics in 2014. He then continued his studies at Tennessee Tech where he is currently a candidate for the M.S. degree in electrical engineering.

His research is focused on power electronics and the control of power electronic converters for solar maximum power point tracking and battery management systems for microgrids.

EDUCATION

Spoon River College, Canton, Illinois
A.A.S Pre-Engineering, 2011

Tennessee Technological University, Cookeville, Tennessee
B.S. Electrical Engineering, 2014

Tennessee Technological University, Cookeville, Tennessee
M.S. Electrical Engineering, August 2017

College of Engineering
TENNESSEE TECH

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TENNESSEE TECH

The Department of

Electrical & Computer Engineering

Announces the Thesis Defense

Of

Allen Uhlik

In Partial Fulfillment of the Requirements

For the degree of

Master of Science

Friday, April 28, 2017 at 3:00 p.m.

Held at

Brown Hall, Room 208

115 W 10th Street
Tennessee Technology University
Cookeville, TN 38505

FIELD OF STUDY

Power Electronics

THESIS TOPIC

"Modeling, Analysis and Control of a PV Supplied Multibus DC Microgrid with Battery Bus Regulation"

EXAMINING COMMITTEE

Dr. Joseph Ojo, Committee Chair
Professor, Electrical & Computer Engineering

Dr. Rabie Belkacemi
Professor, Electrical & Computer Engineering

Dr. Ghadir Radman
Professor, Electrical & Computer Engineering

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ABSTRACT

Photovoltaic (PV) arrays are a popular source in standalone microgrids due to their low-emission and renewable energy status. PV systems are capable of operating with almost zero maintenance cost making them ideal for remote ideas. However, due to the variability of the suns supply, the energy conversion of the PV cell, which is the primary component of an array, is not constant. Changes in irradiance greatly varying the current capabilities of the cell. Therefore, control of the array is necessary to ensure maximum power delivery to the load under changing environment conditions.

The nonlinear single-diode model for a PV array providing primary power to a low-voltage dc microgrid with battery backup is explored. A battery model capable of providing dynamic simulation capabilities is explored. Maximum power is extracted from the PV array using the incremental conductance maximum power tracking (MPPT) technique to force the PV system to provide as much power as possible throughout the day. Simulink is used to perform dynamic simulations when both linear and nonlinear ac and dc loads are present.