# بسم الله الرحمن الرحيم

MONA MAGHRABY

# شبكة المعلومات الجامعية

# التوثيق الالكتروني والميكروفيلم

MONA MAGHRABY

شبكة المعلومات الجامعية

التوثيق الإلكتروني والميكروفيلم

# جامعة عين شمس

# التوثيق الإلكتروني والميكروفيلم

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***MONA MAGHRABY***

# DESIGN AND DEVELOPMENT OF ENERGY HARVESTING DEVICES FOR INTELLIGENT SYSTEMS

By

**Mai Mahmoud Abdel-Aziz Mohamed**

A Thesis Submitted to the
Faculty of Engineering at Cairo University
in Partial Fulfillment of the
Requirements for the Degree of
**MASTER OF SCIENCE**
in
**Electrical Power and Machines Engineering**

FACULTY OF ENGINEERING, CAIRO UNIVERSITY
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Under the Supervision of

**Prof. Khaled Ali El-Metwally**

Professor
Electrical Power Engineering
Faculty of Engineering, Cairo University

**Assoc. Prof. Abdelmomen usama mahgoub**

Associate Professor
Electrical Power Engineering
Faculty of Engineering, Cairo University

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Approved by the
Examining Committee

| | |
|---|---|
| **Prof. Dr. Khaled Ali Elmetwally** | Thesis Main Advisor |
| **Assoc. Prof. Abdelmomen Usama Mahgoub** | Advisor |
| **Prof. Abdul Latif Muhammad Al Shafei** | Internal Examiner |
| **Prof. Dr. Ahmed Abd-elsatar Abd-elfatah**<br>Ain shams university | External Examiner |

FACULTY OF ENGINEERING, CAIRO UNIVERSITY
GIZA, EGYPT
2021

**Engineer's Name:** Mai Mahmoud Abd El-Aziz Mohamed
**Date of Birth:** 08/02/1993
**Nationality:** Egyptian
**E-mail:** maimahmoud721993@gmail.com
**Phone** 01095927447
**Address:** Ismailia, Egypt

**Registration Date:** 01/10/2016
**Awarding Date:** / /2021
**Degree:** Master of Science
**Department:** Electrical Power and Machines Engineering

**Supervisors:**
Prof. Khaled Ali El Metwally
Assoc. Prof. Abdelmomen Usama Mahgoub

**Examiners:**
Prof. Khaled Ali El Metwally (Thesis main advisor)
Assoc. Prof. Abdelmomen Usama Mahgoub (advisor)
Prof. Dr. Abdul Latif Muhammad Al Shafe (Internal examiner)
Prof. Dr. Ahmed Abdul Sattar Abdel Fattah (External examiner)
(Faculty of Engineering, Ain-Shams University)

**Title of Thesis:**

# DESIGN AND DEVELOPMENT OF ENERGY HARVESTING DEVICES FOR INTELLIGENT SYSTEMS

**Key Words:**

Energy harvesters; piezoelectric; vibrations; power management system; power electronics circuits.

**Summary:**

The wireless sensor nets (WSNs) have an effective and efficient for Condition monitoring. Batteries are vital sources in many WSNs applications. But it poses a lot of problems. Energy harvesting can be an attractive solution. Piezoelectric energy harvesters (PEHs) used in this thesis which have different advantages. The integrated circuit (ICs), which supply the sensors, have been limited for low output power applications under 1 Watt. So, a proposed converter has attracted this issue of convert microwatt or milliwatt level power from the environment. It presented as a single-stage ac to dc converter, which is based on power factor correction (PFC) topology. Where the harvested energy is 300 μW, it has seen that a total power loss of the proposed system is 102.05 μW. So, the proposed topology proves to be superior over other techniques and suitable for low micro watt power applications.

# Disclaimer

I herewith declare that this thesis is my original work and that no part of it has been submitted for a degree qualification at any other university or institute.

I further declare that I have appropriately acknowledged all sources used and have cited them in the references section.

Name: Mai Mahmoud Abd El-Aziz Mohamed Data:

Signature:

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