شبكة المعلومات الجامعية

التوثيق الإلكتروني والميكروفيلم

بسم الله الرحمن الرحيم

HANAA ALY

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جامعة عين شمس

التوثيق الإلكتروني والميكروفيلم

قسم

نقسم بالله العظيم أن المادة التي تم توثيقها وتسجيلها
علي هذه الأقراص المدمجة قد أعدت دون أية تغيرات

يجب أن

تحفظ هذه الأقراص المدمجة بعيدا عن الغبار

HANAA ALY

APPLYING INDUCTIVE POWER TRANSFER FOR RECHARGING PORTABLE DEVICES USING PHOTOVOLTAIC MODULES

By

Maryam Salama Mohamed Hussein

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 supervision of

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Approved by the Examining Committee:

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Title of Thesis:

Applying Inductive Power Transfer for Recharging Portable Devices Using Photovoltaic Modules

Key Words:

Battery Charging, Constant Current Constant Voltage (CCCV), Coils design, Inductive Power Transfer (IPT), Photovoltaic (PV) .

Summary:

The excessive growth in the capabilities of portable devices leads to more energy consumption, while dealing with the traditional charging system often represents a danger to the user. The incorporation of renewable energy, especially photovoltaic modules, into wireless charging has been utilized to resolve these problems providing convenient and eco-friendly methods of transferring power for recharging portable devices.

In this thesis, integrating the usage of the photovoltaic energy and the inductive power transfer charging system is applied to charge portable devices. A new variable frequency control technique for inductive power transfer is proposed to overcome the switching frequency limitation and increase transfer efficiency without increasing the switching frequency. Also, a design methodology for the AC inductor design is introduced.

At first, the effect of frequency and system specifications on inductor design is studied using MATLAB. Then, the designed inductor is simulated at different distances using ANSYS Maxwell, as 3-D finite analysis program, for determining the maximum transfer distance for that design. Secondly, a high-frequency resonant inverter based on energy injection and free oscillation control techniques is investigated for inductive power transfer. Thirdly, the impacts of wired and wireless charging on the battery state of charge and efficiency under constant current charging constant voltage (CCCV) charging are examined and compared. Finally, a hardware setup is done for implementing inductive power transfer.

DISCLAIMER

I hereby declare that this thesis is my own 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 reference sections.

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Date: / / 2020

Signature:

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