RESEARCH ARTICLE OPEN ACCESS

Wireless Power Transfer, New Approach

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ABSTRACT
Many configurations representing wireless power transfer have been applied for this purpose. A simple and effective circuit is used in this research that contains components which are easily located for constructing the complete suggested configuration; we were successful in using Li Fi technology in transmitting power from one side to another through air.
Keywords: Wireless, Power, regulator, DC supply, AC supply, Transformer, Li Fi

I. INTRODUCTION

Wireless power transfer (WPT) refers to a family of techniques for delivering power without wires or contacts. The MIT institute introduces on 2007 a new method using inductive coupling power transfer [1].In 2008 Intel also developed wireless power transfer through inductive coupling. The figure below shows a basicblock diagram for wireless power transfer.

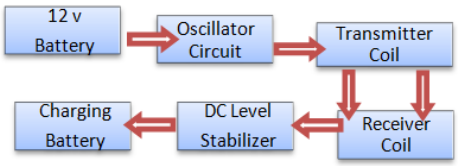


Figure 1: Block diagram for a general WPT

As it is clear from literature, the most common wireless power transfer technologies are the electromagnetic induction and the microwave power transfer. For efficient midrange power transfer, the used system must satisfy three conditions: (a) high efficiency, (b) large air gap, (c) high power [2]. The microwave power transfer has low efficiency. For near field power transfer this method may be inefficient, since it involves radiation of electromagnetic waves. Wireless power transfer can be done via electric field coupling, but this will provides an inductively loaded electrical dipole that is an open capacitor or dielectric disk.As the aim of this research is to create a system that can transmit power wirelessly; this can be achieved using many ways, one of those ways is the use of inductive coupling system connected to a power source [4]. The generated electromagnetic field will be used for power transmission through air. The coupling system involves transmitting coil L1sending energy to a receiving coil component L2. This is done by sending energy signal through L1 coil, and creating the magnetic field B. The L2 coil then creates an energy signal using the magnetic field B as shown in figure (2) below.

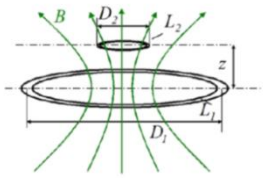


Figure-2 Inductive Coupling System

Design & Verification of WPT Circuit:

The suggested circuit consists from three parts. The first part is rectifier circuit as shown in figure (3) responsible for obtaining the DC voltage with a smoothing circuit which will help to get a pure DC voltage and eliminate all ripple voltages. This part has been tested for different frequencies and different input voltages as shown in table below. The obtained results were satisfactory.

Frequency	V_{in}	V_{out}	Frequency	V_{in}	V_{out}
2KHz	5V	3.347V	2KHz	10V	8.426V
20KHz	5V	3.161V	20KHz	10V	7.803V
100KHz	5V	3.479V	100KHz	10V	7.111V

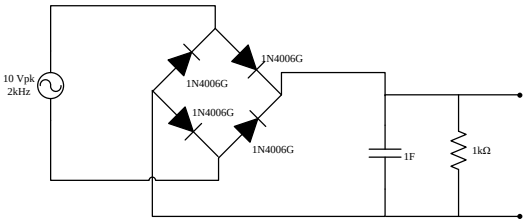


Figure (3) Rectifier Circuit

The second part of the circuit under consideration consists as shown in figure (4) from a circuit that will change the transmitted signal into pulses in order to transfer it to the third part of the circuit i.e. the Li fi part which will transmit the input signal through the opto- coupler figure (5). The output power capability of the WPT system is related to the maximum output power[6] of the DC-AC inverter.

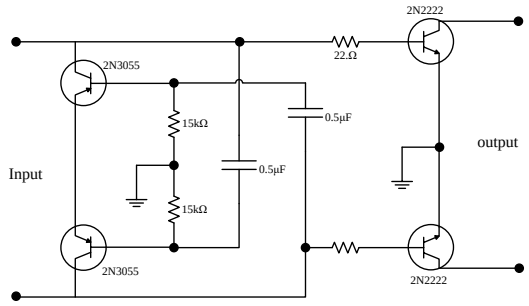


Figure (4) Inverter Circuit

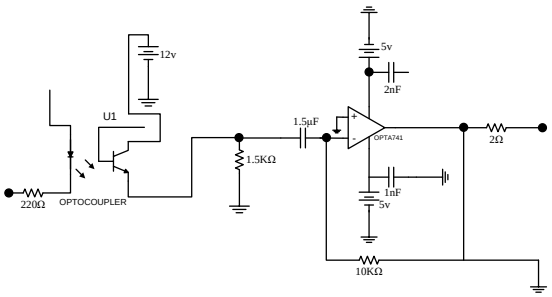


Figure (5) Li Fi circuit

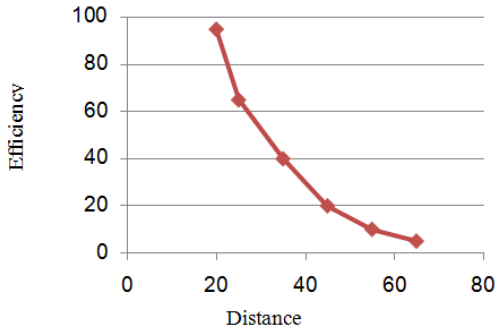


Figure (5) Relation between the efficiency and Transmitter receiver distance

Figure (5) shows the relationship between the distance that separate the transmitter and the receiver. It is clear that when the distance increases the efficiency of the transmission is reduced.

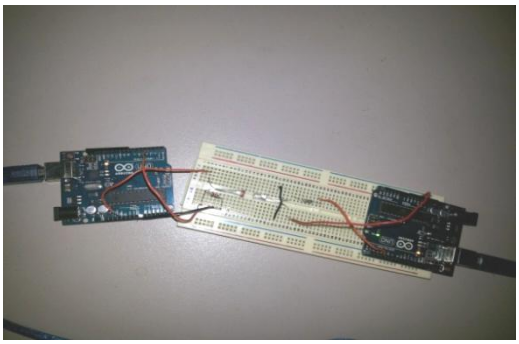
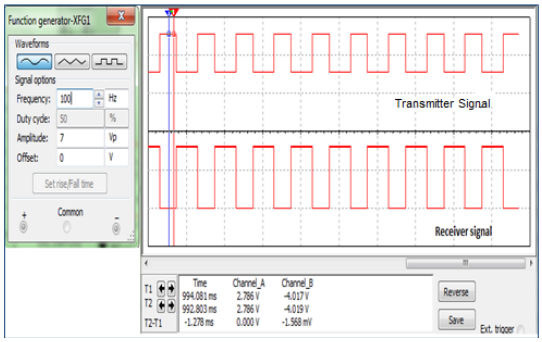


Figure (6) Li Fi Transmitter & Receiver



Figure(7) Input and the Output of the Li Fi circuit

II. CONCLUSIONS

The goal of this research was to design and implement a wireless power transfer system via Li Fi technology. After analyzing the whole system systematically for optimization, a system was designed and implemented. Experimental results showed that significant improvements have been achieved over other forms of WPT.

ACKNOWLEDGEMENT

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