Wireless Power Transmission For Low Power Micro Device

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ABSTRACT

Energy consumption is the biggest issue in wireless sensor network and mobile devices. In this proposed model, available radio signals in the region are converted to DC supply and stored in a battery. This power RF harvesting conversion is done by P2110. From the stored energy, controllers which operate at 5V can be powered. Microcontroller measures environmental parameter and transmits it to the co-ordinator. So that without additional batteries or any power source devices on 5V range can be operated.

Key words : wireless power transmission (WPT), RF energy harvesting

I. INTRODUCTION

[2]Now-a-days scientific technology improved in power transmission systems and wireless technology, it is a belief that wireless energy transmission has a firm foothold in today's technology which centered on reality. Radio waves are used normally in WIFI, radio, mobile phone and tv. The main concept of this paper is to convert the RF energy into DC energy within short distance. RF signals are transmitted and received through an antenna and converted to DC using powercast (IC P2110). This DC energy can be stored in batteries and super capacitor which is used in different applications.

System of used in wireless power transmission:

There are two main categories of fallow the wireless power transmission

- Magnetic induction techniques
- Microwave electromagnetic techniques

A.Electromagnetic induction:

[3][4]Electromagnetic induction produces electric current across a conductor and when it moves through a magnetic field. Energy transfer from magnetic but capacitive coupling can also be achieved .

This method of approach was already used in the different application example newly launched nokia Lumia 920 and electric toothbrush also used this type of charger

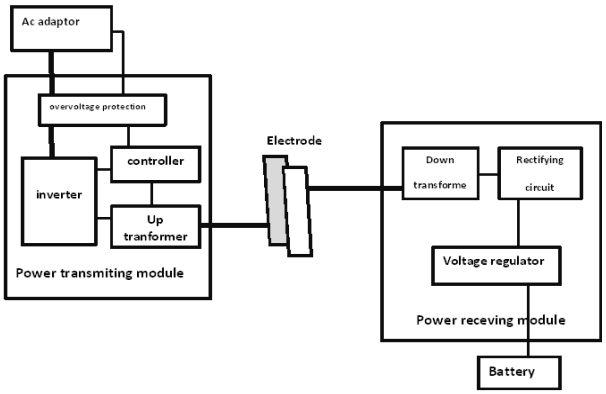

Fig. 1. Block diagram for induction type charger

This block diagram shows an example of electromagnetic induction application. This system was developed by Murata manufacturing company. This design has two modules power transmitting module and power receiving module. Transmitting module amplify the voltage and transmitting power to electrode receiver side receive the power to the electrode. Then the voltage will be stepping down using a step down transformer and rectifying the circuit use of AC to DC conversion and finally battery will be charged

B.Microwave

[3]For UHF transmission, microwave antenna used What microwave antenna does? It has a rectifying antenna (rectenna) array of dipole antenna that receive microwave energy and convert to electric energy .

Fig.2. World's first microwave powered aircraft

In 1980s, Canada's Communications Research Centre (crcc) created a small airplane, the world first microwave powered airplane it called Stationary High Altitude Relay Platform (SHARP), that uses microwave antenna to receive power beam from earth and will convert it to electric energy.

II. PROPOSED SYSTEM

BLACK DIGRAM

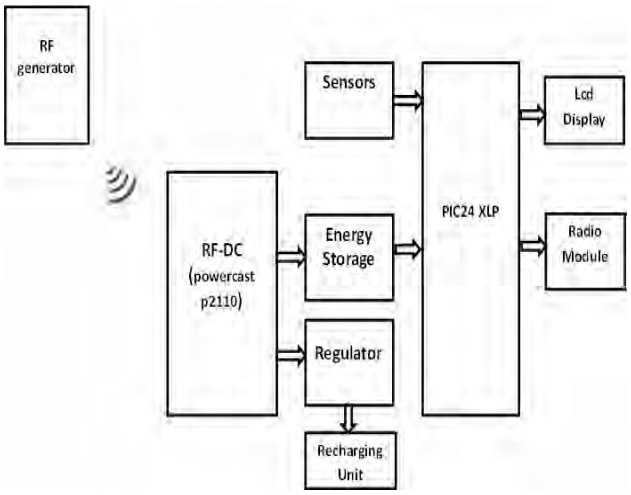

Fig.3. Block diagram

The block diagram shown above has two modules used which are energy transmitting module and energy receiving module . The energy transmitter module uses 900Mhz RF generate the energy transmitting in RF formats . The receiver side receives the RF signal using an antenna and the signal is converted to the RF to DC using power caste p2110 this RF energy harvesting IC . Then DC energy is stored in energy storing device ex (battery or super capacitor) then the energy is used for microcontrollers. different sensors connected in the microcontroller ex (humidity , temperature, light) sensors sense the environment then microcontroller process the data and transmit data through a low power wireless module .

III. HARDWARE SETUP :

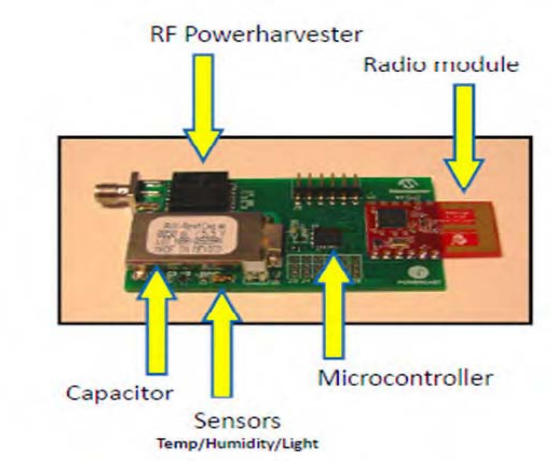

Fig. 4. Hardware setup for the proposed system

On the receiver side RF is the input signal, RF is the unbalanced input from the antenna and the system used in any standard or custom with 50 ohm antenna used on the receiver side .This power cast p2110 has been optimized operating at 902-928 MHz. The RF input will be isolated from the ground and then the DC blocking capacitor should be connected in series with the antenna .Then energy storage device used to store the DC energy use battery or super capacitor .Then DC energy used microcontroller PIC24xlp is the low power microcontroller .Different sensor connected into microcontroller temperature , humidity, light it used to sense the environment then microcontroller process the sensor data and data will be sent to radio module wireless protocol IEEE802.15.4 miwi is the ultra low power radio module this developed by microchip corporation .

IV. P2110 PERFORMANCE GRAPHS

[15]The 2110 performance graphs show in the figer.5&6. The DC output voltage from the P2110 is

Preset to 3.3V. However, it can be adjusted by adding an external resistor to increase or decrease the output voltage using the following equations

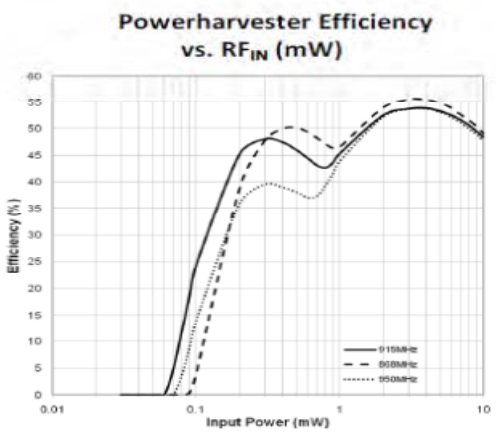

Fig. 5. Performance &Efficiency p2110 in (MW)

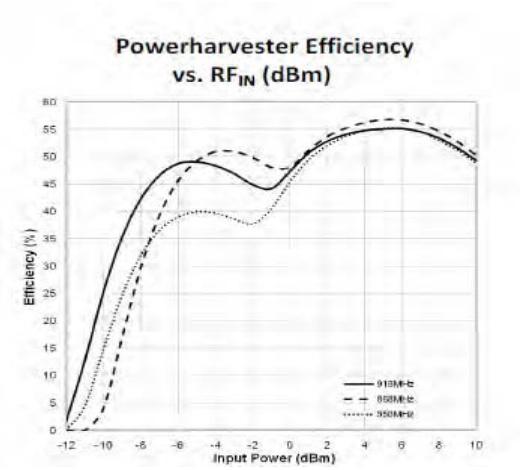

Fig. 6. Performance &Efficiency p2110 in (dBm)

A.DECREASE OUTPUT VOLTAGE

To decrease the output voltage, place a resistor calculated by the following equation from VSET to VOUT. The voltage can be set to a minimum of 1.8v

$$R = \frac{249k(Vout - 1.195)}{3.32 - Vout}$$

B.INCREASE OUTPUT VOLTAGE

To increase the output voltage, place a resistor calculated by the following equation from VSET to GND. The voltage can be set to a maximum of 5.25V.

$$R = \frac{297.47k}{Vout - 3.32}$$

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V. CONCLUSION:

The wireless power transmission system is established in which the RF signals of 900-950 MHZ can be harvested to DC power about 1.1-5.2v ,this implementation can be used in the electronic gadget's like mobile phones ,pda's ,smart grid , attach these devices can be charged for the usage literacy in the remote area's. the main advantage is that n number of device can be connect to the single transmitter device for the power charging in the wireless mode.

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