International Research Journal of Engineering and Technology (IRJET) e-ISSN: 2395 -0056
Volume: 03 Issue: 06 | June-2016 www.irjet.net p-ISSN: 2395-0072

TO IMPROVE THE PERFORMANCE OF RF TO DC ENERGY HARVESTING USING ULTRA THIN CAPACITOR

B.Thenral[1], P.Iswarya [2], K.Arthi[3], B. Bakkiya lakshmi[4]

[1234]*Assistant Professor, Dept of ECE, Ganadipathy Tulsi's Jain Engineering College, Vellore, Tamilnadu, India*

Abstract - In today's world, radios exist in a multitude of items such as cell phones, computers, car door openers, vehicles, and televisions. The exponential growth in the ways and means by which people need to communicate - data communications, voice communications, video communications, broadcast messaging, command and control communications, emergency response communications etc. Modifying radio devices easily and cost effectively has become business critical. Software defined radio technology brings the flexibility, cost efficiency and power to drive communications forward, with wide-reaching benefits realized by service providers and product developers through to end users. A radio is any kind of device that wireless transmits or receives signals in the radio frequency part of the electromagnetic spectrum to facilitate the transfer of information. Traditional hardware based radio devices limit cross-functionality and can only be modified through physical intervention. This results in higher production costs and minimal flexibility in supporting multiple waveform standards. By contrast, software defined radio technology provides an efficient and comparatively inexpensive solution to this problem, allowing multimode, multi-band and/or multi-functional wireless devices that can be enhanced using software upgrades.

Key Words: RF to DC, Energy Harvesting, ultra thin capacitor.

1. INTRODUCTION

In the existing system, energy harvesting is derived alternate source of energy from various external sources. In this existing method for energy harvesting we use source such as the thermal energy, solar energy, and kinetic energy but such energy are stored in miniature electronic and electrical devices which are usually positioned in energy source points. The phenomenon of energy harvesting furnishes very less amount of energy.

1.1 DISADVANTAGES OF EXISTING METHOD

- High power consumption.
- RF energy harvester is positioned for optimal directional
- Alignment and polarization with respect to the transmitting antenna

1.2 PROPOSED SYSTEM

This Proposed System is an wireless charging by using RF energy harvesting .This project deals with the harvesting of energy based on the RF source here the power is transfer from the antenna, there by using the impedance matching is done so that to gain more power from tower and the rectifier circuit convert an incoming RF signal to dc signal that is fed into battery an efficient rectification improves the output power. Here the radiation from the receiving antenna in the form of RF energy can be converted to dc form by using a rectifier circuit at an optimum operating point and rectified output sent to storage unit for an optimum power level optimized output sent to charge a device.

1.4 ADVANTAGES OF PROPOSED SYSTEM

- Easier than plugging into a power cable.
- Corrosion does not occur when exposed to atmosphere.
- Safe for medical implants for embedded medical devices.
- Allows recharging through skin rather than having wires penetrate.
- It does not require wire for charging.

2. BLOCK DIAGRAM

2.1 FUNCTIONAL BLOCK EXPLANATION

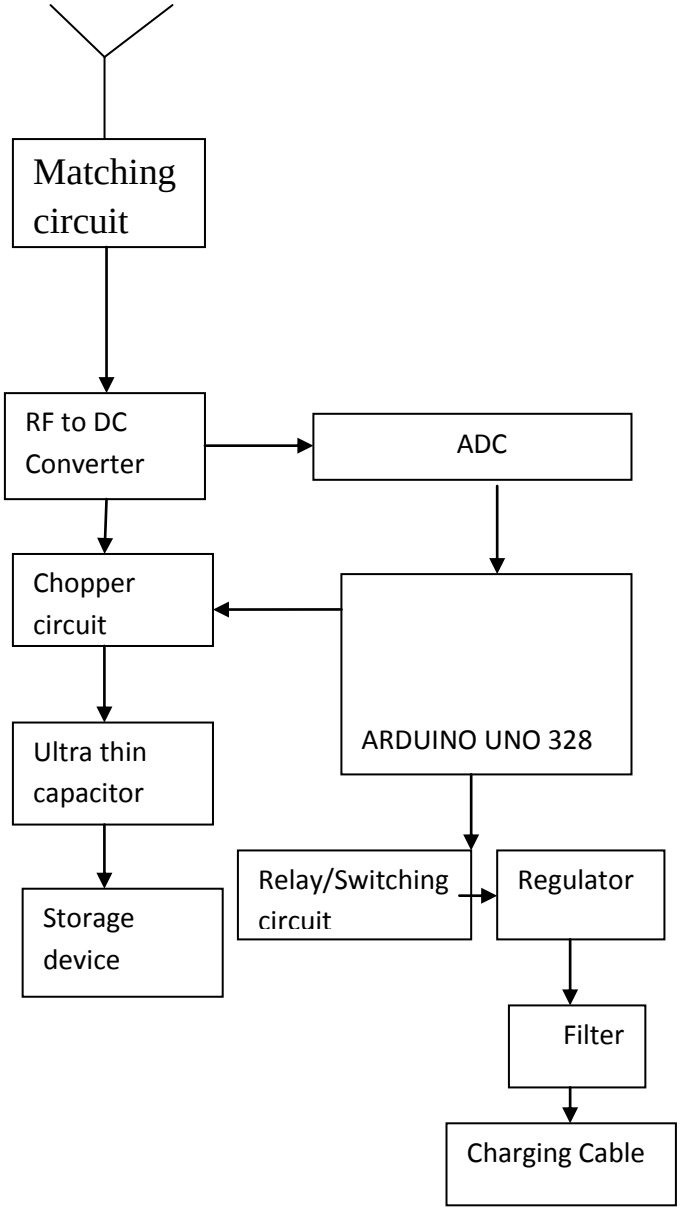


Figure.1

MATCHING CIRCUIT

The matching circuits provide the suitable impendence matching which redues losses and increase the efficiency.

RF TO DC CONVERTER

The RF to DC converter converts the incoming radio frequency into DC voltage .Input is given by the matching circuit.

CHOPPER CIRCUIT

The chopper circuit converts the input DC voltage from RF to DC converter in desired frequency.

ULTRA THIN SUPER CAPACITOR

The ultra thin super capacitor is fed with input from chopper circuit. This super capacitor is faster than normal battery and discharging time is larger than charging time.

RELAY

The relay circuit is nothing but switching unit. This unit switches ON when radio frequency is obtained by RF to DC converter.

STORAGE DEVICE

The storage unit is fed with output from ultrathin capacitor that is again fed to the regulator via relay unit while it is ON.

2.2 POWER CONVERTER

In electrical engineering, power engineering and the electric power industry, **power conversion** is converting electric energy from one form to another, converting between AC and DC, or just changing the voltage or frequency, or some combination of these. A **power converter** is an electrical or electro-mechanical device for converting electrical energy. This could be as simple as a transformer to change the voltage of AC power, but also includes far more complex systems. The term can also refer to a class of electrical machinery that is used to convert one frequency of alternating current into another frequency.

Power conversion systems often incorporate redundancy and voltage regulation.

One way of classifying power conversion systems is

- DC to DC
  - DC-to-DC converter
  - Voltage regulator
  - Linear regulator
- AC to DC
  - Rectifier
  - Mains power supply unit (PSU)

Switched-mode power supply

- DC to AC
  - Inverter
  - AC to AC
  - Auto transformer
  - Voltage converter
  - Transformer Voltage regulator
  - Cyclo converter

Variable-frequency transformer

according to whether the input and output are alternating current (AC) or direct current (DC).There are also devices and methods to convert between power systems designed for single and three-phase operation.

The standard power frequency varies from country to country, and sometimes within a country. In North America and northern South America it is usually 60 hertz (Hz), but in many other parts of the world, is usually 50 Hz.[1] Aircraft often use 400 Hz power, so 50 Hz or 60 Hz to 400 Hz frequency

Conversion is needed for use in the ground power unit used to power the airplane while it is on the ground .Certain specialized circuits, such as the fly back transformer for a CRT, can also be considered power converters.

Consumer electronics usually include an AC adapter (a type of power supply) to convert mains-voltage AC current to low-voltage DC suitable for consumption by microchips. Consumer voltage converters (also known as "travel converters") are used when travelling between countries that use ~120 V vs. ~240 V AC mains power.

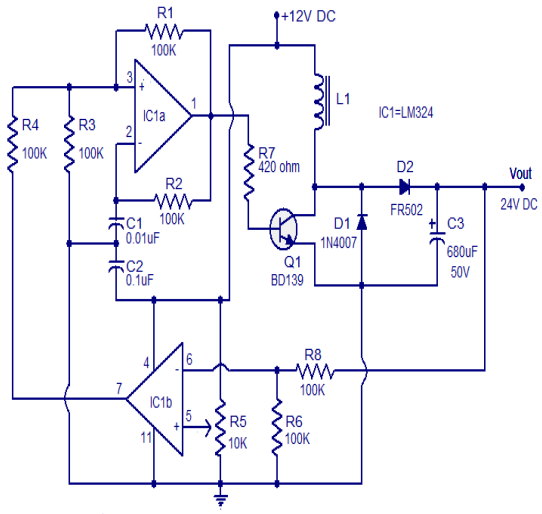
3 DC TO DC CONVERTER

A **DC-to-DC converter** is an electronic circuit which converts a source of direct current (DC) from one voltage level to another. It is a class of power converter.

DC to DC converters are important in portable electronic devices such as cellular phones and laptop computers, which are supplied with power from batteries primarily. Such electronic devices often contain several sub-circuits, each with its own voltage level requirement different from that supplied by the battery or an external supply (sometimes higher or lower than the supply voltage). Additionally, the battery voltage declines as its stored energy is drained. Switched DC to DC converters offer a method to increase voltage from a partially lowered battery voltage thereby saving space instead of using multiple batteries to accomplish the same thing.

Most DC to DC converters also regulate the output voltage. Some exceptions include high-efficiency LED power sources, which are a kind of DC to DC converter that regulates the current through the LEDs, and simple charge pumps which double or triple the output voltage.

DC to DC converters developed to maximize the energy harvest for photovoltaic systems and for wind turbines are calledpower optimizers.



3.1 CONVERSION METHOD

Linear regulators can only output at lower voltages from the input. They are very inefficient when the voltage drop is large and the current is high as they dissipate heat equal to the product of the output current and the voltage drop; consequently they are not normally used for large-drop high-current applications.

The inefficiency wastes energy and requires higher-rated and consequently more expensive and larger components. The heat dissipated by high-power supplies is a problem in itself and it must be removed from the circuitry to prevent unacceptable temperature rises.

Linear regulators are practical if the current is low, the power dissipated being small, although it may still be a large fraction of the total power consumed. They are often used as part of a simple regulated power supply for higher currents: a transformer generates a voltage which, when rectified, is a little higher than that needed to bias the linear

regulator. The linear regulator drops the excess voltage, reducing hum-generating ripple current and providing a constant output voltage independent of normal fluctuations of the unregulated input voltage from the transformer/bridge rectifier circuit and of the load current.

Linear regulators are inexpensive, reliable if good heat sinks are used and much simpler than switching regulators. Linear regulators do not generate switching noise. As part of a power supply they may require a transformer, which is larger for a given power level than that required by a switch-mode power supply. Linear regulators can provide a very low-noise output voltage, and are very suitable for powering noise-sensitive low-power analog and radio frequency circuits. A popular design approach is to use an LDO, Low Drop-out Regulator, that provides a local "point of load" DC supply to a low power consume

4. CONCLUSIONS

Now a day's lifetime of the battery is less even though the technologies are improving their path unless the operating of such equipments and devices are difficult because of energy recursion still we have so many energy sources they are solar energy, thermal energy, and tidal energy and so on. But the execution of such energy system has fewer lifetimes so the technology goes for new trend of charging or energy conversion. Thus the RF energy surrounding us increases day to day because of usage of wide variety of smart phones that's why we have an idea, RF energy is used for transmitting a signal from one place to another but here that the same energy is used for charging the mobile. Based on measurements and simulations it can be concluded that it is possible to use radiated power, off-air RF signal as source of energy harvester. Even though the output power of such harvester is relatively efficient, it is sufficient to charge the battery or mobile. Improvements on efficiency of the RF signal harvesting is important. This will enable more current to be recycled and operate the low power circuits.

REFERENCES

[1] I. F. Akyildiz, W. Su, Y. Sankara subramaniam, and E. Cayirci, "Wireless sensor networks: A survey," Comput. Netw. ,vol. 38, no. 4, pp. 393–422, 2002.

[2] CATRENE Working Group on Energy Autonomous Syst., "Energy autonomous systems: Future trends in devices, technology, and systems," 2009. [Online] . Available: http://alexandria.tue.nl/repository/ books/675451.pdf

[3] H. J. Visser, A. C. F. Reniers, and J. A. C. Theeuwes, "Ambient RF energy scavenging: GSM and WLAN power density measurements," in 38th Eur. Microw. Conf., 2008, pp. 721–724.

[4] M. M. Tentzeris and Y. Kawahara, "Novel energy harvesting technologies for ICT applications," in Int. Appl. and Internet Symp., Turku, Finland, 2008, pp. 373–376.

[5] R. J. Vyas, B. B. Cook, Y. Kawahara, and M. M. Tentzeris, "E-WEHP: A batteryless embedded sensor-platform wirelessly powered from ambient digital-TV signals," IEEE Trans.Microw. Theory Techn., vol. 61, no. 6, pp. 2491–2505, Jun. 2013.

BIOGRAPHIES

B. Thenral has completed her graduation in B.ECE in the year 2005 at GGR College of Engineering affiliated to Anna University, Chennai, India and completed her post graduation in M.Tech Applied Electronics in the year 2008 at M.G.R University, Chennai, India. She has been working as Assistant professor at Ganadipathy Tulsi's Jain Engineering College, Vellore, India for the past 11 years. She is working towards her research in the field of Mobile Ad-Hoc Network. Her area of specialization includes Microprocessors, RF & Microwave Engineering and Ad-Hoc Networks.