AMBIENT RF SIGNAL AND HEAT RADIATION ENERGY HARVESTING AND MANAGEMENT

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Abstract—The study is about using an RF source to capture energy. The matching circuit is used to transfer the power from the antenna to this location. So that more power can be obtained from the tower, the rectifier circuit converts the incoming RF signal to a DC signal that is supplied into the battery, and efficient rectification boosts the output power. Wind, solar, vibration, heat, and radio frequency (RF) energy harvesting are developing as attractive alternatives to traditional energy resources. Energy harvesting is the method of electronically catching RF signals and heat radiation from a mobile phone, storing the energy in a battery, and using it as needed.

Keywords—RF signal, Heat Radiation, Microcontroller, Peltier effect.

Introduction

In Energy Harvesting, the process of electronically harvesting and accumulating energy from a range of energy sources that are judged wasted or otherwise unsuitable for any practical purpose is known as Energy Harvesting. More often the heat energy is released by the mobile and then it will be collected by the peltier made it to used for charging purpose, these residual energies are released into the environment as wasted potential energy sources. The potential energy will be used to power these devices for the duration of their lives. The greatest potential, however, is in a new class of battery-free gadgets that would enable applications that would otherwise be prohibitively expensive due to the cost of battery replacement. The power is transferred from the antenna, there by employing impedance matching to acquire more power from the tower, and the rectifier circuit converts an incoming RF signal to DC signal that is fed into batteries, an effective rectification boosts the output power as a USB cable to the mobiles.

In this method, the mobile battery is charged using the heat produced from the mobile phone due to heat radiation. The heat produced is analysed using peltier and further used for charging the mobile phone. In this Proposed System charging is done by using RF energy harvesting. The power is transferred from the antenna to the tower using impedance matching in order to get more power from the tower, and the rectifier circuit converts an incoming RF signal to a DC signal that is fed into the battery, resulting in an efficient rectification that boosts the output power. The RF energy from the receiving antenna can be converted to DC form using a rectifier circuit at an ideal operating point, and the rectified output sent to a storage unit for an optimum power level optimised output delivered to charge a device such as a mobile phone, etc.

DISADVANTAGES OF EXISTING SYSTEM

- High power consumption.
- RF energy harvester is positioned for optimal directional alignment and polarization with respect to the transmitting antenna.
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- High power consumption.
- Alignment and polarization with respect to the transmitting antenna
- Low power density (environment)
- Low efficiency (RF2RF)
- High efficiency conversion - complicated system
- Limitation of ISM band

![General Block Diagram](image)

**Fig. 2.2 General block D**

**PROPOSED SYSTEM**

This paper presents two ways of harvesting energy, the ways are as follows:

- RF Signal
- Heat radiation

In this method, the mobile battery is charged using the heat produced from the mobile phone due to heat radiation. The heat produced is analysed using peltier and further used for charging the mobile phone. In this **Proposed System** charging is done by using RF energy harvesting. This paper covenants with the gathering of energy based on the RF source here the power is transfer from the antenna, there by using the impedance alike is done so that to gain more power from tower and the rectifier circuit transform an incoming RF signal to dc signal that is fed into battery an efficient rectification improves the output power.

**Power Supply**

Power supply is a reference to a source of electrical power. A device or organism that supplies electrical or other types of energy to an production load or group of loads is called a power supply unit or PSU. The term is most universally applied to electrical energy supplies, less often to mechanical ones, and rarely to others. A 230v, 50Hz Single phase AC power supply is given to a step down transformer to get 12v supply. This voltage is converted to DC voltage using a Bridge Rectifier. The changed pulsating DC voltage is sifted by a 2200uf capacitor and then given to 7805 voltage regulator to obtain constant 5v supply. This 5v supply is given to all the components.
in the circuit. A RC time constant circuit is added to discharge all the capacitors quickly. To ensure the power supply a LED is connected for indication purpose.

**BRIDGE RECTIFIER**

A bridge rectifier sorts use of four diodes in a bridge organization to achieve full-wave rectification. This is a widely castoff configuration, both with individual diodes wired as shown and with single component bridges where the diode bridge is wired internally.

![Bridge Rectifier Circuit](image)

**FIG: CIRCUIT OF BRIDGE RECTIFIER**

**C. VOLTAGE REGULATOR:**

LM7805: 3-Terminal 1A Positive Voltage Regulator

![LM7805 Voltage Regulator](image)

**Features:**
- Output Current up to 1A
- Output Voltages of 5, 6, 8, 9, 10, 12, 15, 18, 24V
- Thermal Overload Protection

**RECTIFIER**

A rectifier is an electrical device that converts alternating current to direct current or at least to current with only positive value, a process known as *rectification*. Rectifiers are used as components of power supplies and as detectors of radio signals.
5.1 MICROCONTROLLER

5.1.1 INTRODUCTION OF AT89S52:

The AT89S52 is a low-power, high-enactment CMOS 8-bit microcontroller with 8K bytes of in-system programmable Flash memory. The device is mass-produced using Atmel’s high-density nonvolatile memory technology and is compatible with the Indus-try-standard 80C51 instruction set and pin out. On-chip flash consents the program memory to be reprogrammed in-system or by a conformist nonvolatile memory programmer. This powerful microcontroller is suitable for many embedded control applications.

5.1.2 FEATURES OF AT89S52:

- Compatible with MCS®-51 Products.

- 4.0V to 5.5V Operating Range.

- Fully tatic Operation: 0 Hz to 33 MHz

- Three-level Program Memory Lock.

- 256 x 8-bit Internal RAM.

- 32 Programmable I/O Lines.
- Three 16-bit Timer/Counters.

5.1.3 DESCRIPTION OF AT89S52:

The AT89S52 is a low-power, high-performance CMOS 8-bit microcontroller with 8K bytes of in-system programmable Flash memory. The device is factory-made using Atmel’s high-density nonvolatile memory technology and is compatible with the Industry-standard 80C51 instruction set and pin out. The AT89S52 affords the following standard features: 8K bytes of Flash, 256 bytes of RAM, 32 I/O lines, Watchdog timer, two data pointers, counters, a six-vector two-level interrupt architecture, a full duplex serial port, on-chip oscillator, and clock circuitry. The Indolent Approach stops the CPU while allowing the RAM, timer/counters, serial port, and interrupt system to continue functioning. The Power-down mode saves the RAM innards but freezes the oscillator, disabling all other chip functions until the next interrupt or hardware reset. This powerful microcontroller is suitable for many embedded control applications.

5.1.4 BLOCK DIAGRAM:

![Block diagram for microcontroller](https://www.edxjl.com/ijiar)

**RF RECEIVER:**
An RF receiver module receives the modulated RF signal, and demodulates it. There are two types of RF receiver modules: super heterodyne receivers and super-regenerative receivers. Super-regenerative modules are usually low cost and low power designs using a series of amplifiers to extract modulated data from a carrier wave. Super-regenerative modules are generally imprecise as their frequency of operation varies considerably with temperature and power supply voltage. Super heterodyne receivers have a performance advantage over super-regenerative; they offer increased accuracy and stability over a large voltage and temperature range. This stability comes from a fixed crystal design which in the past tended to mean a comparatively more expensive product.
ANALOG TO DIGITAL CONVERTER:
4-channel stereo multiplexed analog-to-digital converter WM8775SEDS made by Wolfson Microelectronics placed on an X-Fi Fatal1ty Pro sound card. An analog to digital converter (ADC, A/D, A→D, or A-to-D) is a structure that converts an analog signal, into a digital signal. An ADC may also afford an inaccessible measurement such as an electronic device that converts an input of the voltage or current. Typically the DO is a two's complement binary number that is comparative to the input, but there are other possibilities.

SOFTWARE SPECIFICATION
8051- C51 C Compiler:

CONCLUSION:
The proposed system was able to add new capabilities to the internal loop by making little corrections to its control demands, ensuring the compliance with restriction. At the end the system it was able to ensure that the captured RF signals and the heat radiation from the mobile are accumulated in a battery and use it whenever necessary.
Thus the experiment by capturing RF Signal and converting into a DC voltage and the heat generated while using the phone is converted and the results of the above mentioned one are successfully recorded.

REFERENCE:


