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Power Generation Using Footstep

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Abstract: **We need energy for every day today work of our life. There are many conventional methods of energy generation but these are depleting very fastly hence non-conventional energy system is very essential at this time to our nation. So an alternate method of non conventional energy generation is proposed in this project. In this project we are generating electrical power as non-conventional method by simply walking or running on foot step.Here Dynamometer is used for converting mechanical energy into electrical energy. The voltage generated by this sensor is stored in battery which will be later on transmitted wirelessly to charge the mobiles.**

Keywords: **Power Generation, Power Storing ,Wireless Power Trannsceiver, Charging.**

1. INTRODUCTION

In this project we are generating electrical power as non-conventional method by simply walking or running on foot step.Non-conventional energy system is very essential at this time to our nation. Non-conventional energy using foot step is converting mechanical energy into electrical.This project uses piezoelectric sensor.

The rise of piezoelectric technology is directly related to a set of inherent advantages. The high modulus of elasticity of many piezoelectric materials is comparable to that of many metals and goes up to 10e6 N/m²[Even though piezoelectric sensors are electromechanical systems that react to compression, the sensing elements show almost zero deflection. This is the reason why piezoelectric sensors are so rugged, have an extremely high natural frequency and an excellent linearity over a wide amplitude range. Additionally, piezoelectric technology is insensitive to electromagnetic fields and radiation, enabling measurements under harsh conditions.

During any energy conversion there will be losses in going from one form to another. The magnitude of those losses is what dictates the practicality of any type of wireless charging. Magnetic or inductive charging, in particular has been effectively used for some time to power various kinds of biomedical implants. Presently it is the safest and most enduring method to accomplish the job of transferring power to the inside of the body. In these systems, oscillating current in an external coil of wire generates a changing magnetic field which induces a voltage inside an implanted coil. The current resultant from this voltage can charge a battery or power the device directly.

2. PROPOSED SYSTEM HARDWARE

Elements of Block Diagram:

The block diagram and its brief description are explained in block wise and this consists of following blocks:

1. Dynamometer
2. AC Ripple Nutralizer
3. Unidirectional current controller
4. AVR
5. 16*2 LCD
6. Transmitter, Receiver module

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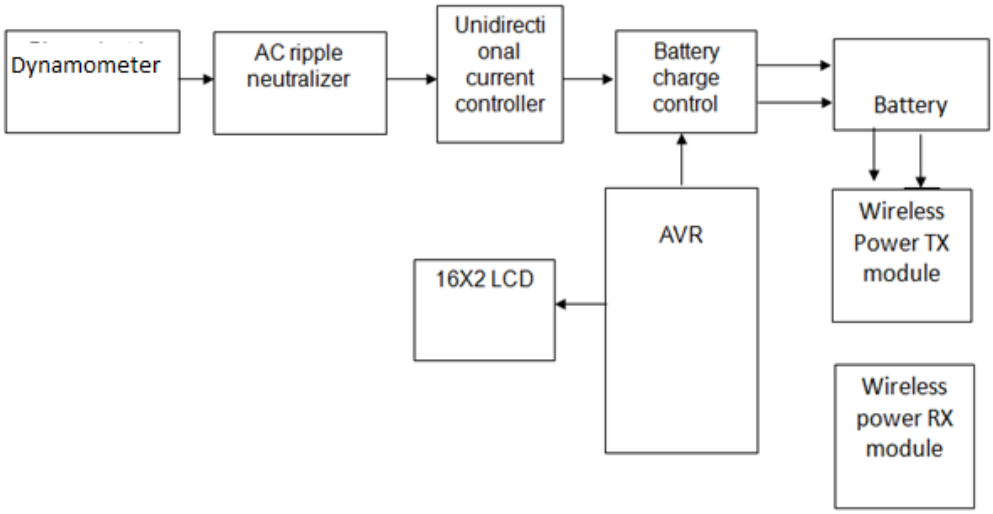

Figure1. Block Diagram

2.1 D.C motor as a Dynamometer:

DC Geared motors with robust metal gear box for heavy duty applications, available in wide RPM range and ideally suited for robotics and industrial applications.Very easy to use and available in standard size. Nut and threads on shaft to easily connect and internal threaded shaft for easily connecting it to wheel. Center Shaft Metal Gear Motor are designed keeping in mind robotic applications. These are very easy to use and mount geared motors and are known for its affordable pricing.

Figure 2: DC geared motors

Specifications:

Length - 47mm

Diameter - 37mm

Shaft diameter - 6mm

Voltage - 9-12V

Torque - 1-3kg/cm as per RPM

No-load current - 70mA (Max)

Weight - 120 gm

2.2 AC Ripple Neutralizer:

Capacitive filter is used in this project. It removes the ripples from the output of rectifier and smoothens the D.C. Output received from this filter is constant until the mains voltage and load is maintained constant. However, if either of the two is varied, D.C. voltage received at this point changes. Therefore a regulator is applied at the output stage.

2.3 Unidirectional current controller:

As the name indicates this circuit allows current to flow only in one direction. There are following devices that allows unidirectional current:-a. Diode b. Thyristors In this project we are going to use diode as Unidirectional Current control device. As we are already familiar with the most common function of a diode is to allow an electric current to pass in one direction (called the diode's forward direction).While blocking current in the opposite direction (the reverse direction). Thus, the diode can be thought of as an electronic version of a check valve. The diode used in this project is D=1N4007

2.4 Microcontroller Atmega 8:

Features:

High-performance, Low-power Atmel AVR 8-bit Microcontroller

Advanced RISC Architecture

– 130 Powerful Instructions – Most Single-clock Cycle Execution

– 32 × 8 General Purpose Working Registers

– Fully Static Operation

– Up to 16MIPS Throughput at 16MHz

– On-chip 2-cycle Multiplier

Peripheral Features

– Two 8-bit Timer/Counters with Separate Prescaler, one Compare Mode

– One 16-bit Timer/Counter with Separate Prescaler, Compare Mode, and Capture Mode

– Real Time Counter with Separate Oscillator

– Three PWM Channels

– 8-channel ADC in TQFP and QFN/MLF package Eight Channels 10-bit Accuracy

– 6-channel ADC in PDIP package Six Channels 10-bit Accuracy

– Byte-oriented Two-wire Serial Interface

– Programmable Serial USART

Master/Slave SPI Serial Interface

– Programmable Watchdog Timer with Separate On-chip Oscillator

– On-chip Analog Comparator

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2.5 16*2 LCD:

Liquid Crystal Display (LCD) is a thin, flat panel used for electronically displaying information such as text, images and moving pictures. Its uses include monitors for computers, television, instrument panels and other devices ranging from aircraft cockpit displays to every day consumer devices such as gaming devices, clocks, watches, calculators and mobile phones.

2.6 Wireless Power Transfer Module:

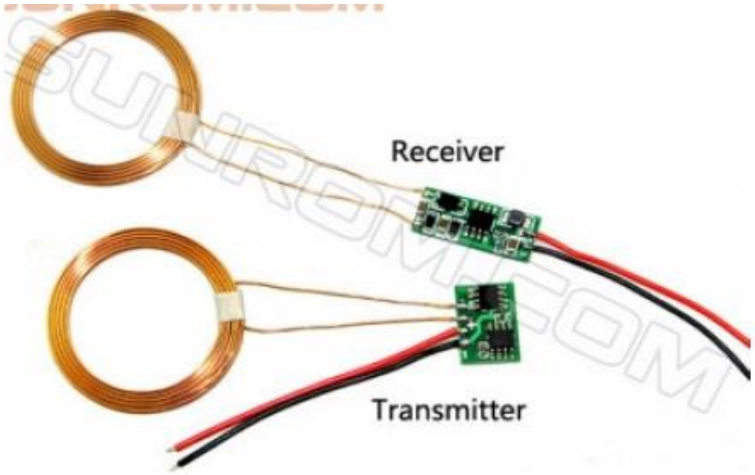


Figure 3: Power Transfer Module

The Wireless Power Transfer and Charging Module can be used in electronic equipments in Common use for close wireless charging or power supply. Consist of a Transmitter & Receiver and coil, it could serve as a replacement for the Wireless Power Supply with stable 5V output Voltage and maximum 600mA output current. Its small size and insulation coil is more suitable for using in wireless project. This module use an electromagnetic field to transfer electric energy between a transmitter circuit and a receiver circuit. An induction coil creates an alternating electromagnetic field from within the transmitter circuit powered with 12V. The second induction coil takes power from the electromagnetic field and converts it back into electrical current to the receiver circuit that outputs 5V – 600mA.

3. CIRCUIT DIAGRAM

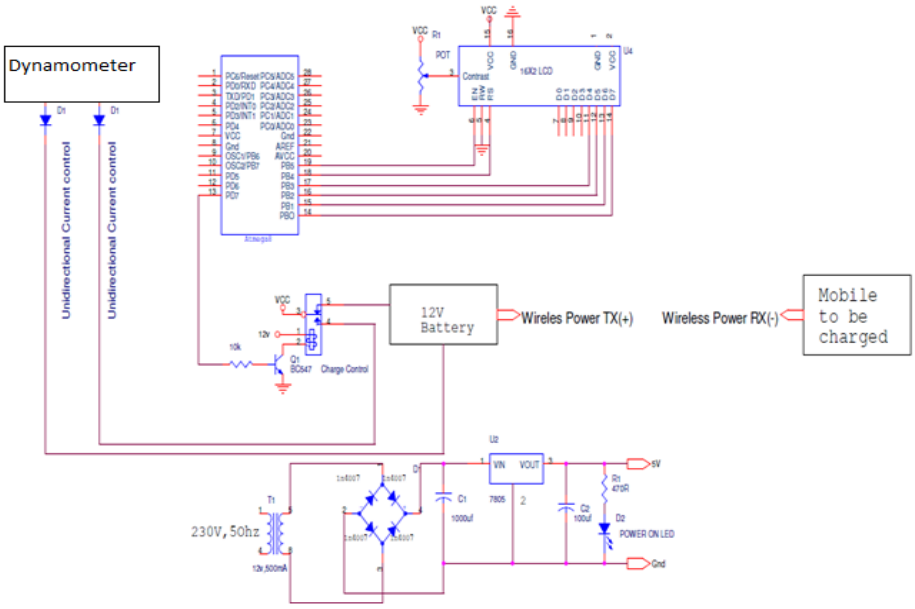


Figure4. Circuit diagram

Whenever force is applied on dynamometer that pressure rotate the shaft of DC motor and voltage is generated.

That minute voltage is stored in lead acid battery.

Stored voltage or energy is transmitted wirelessly to charge the mobile.

The transmission distance is around 20mm.

We can also drive AC loads by connecting one inverter.

3.1 Transmitter Circuit:

Transmitter Board has two ICs,

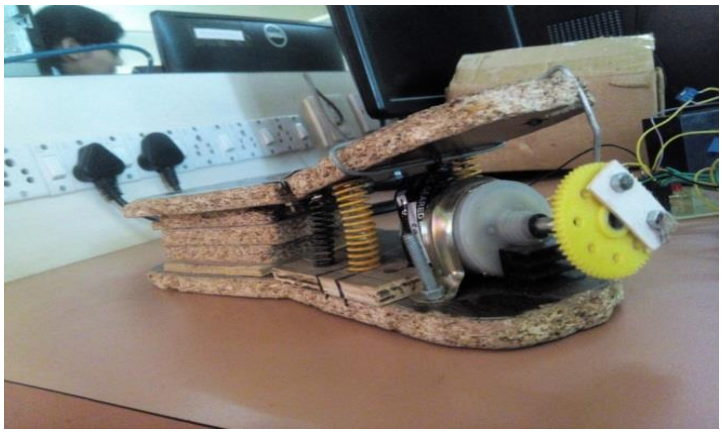
1) XKT-408A / 1215A – It is Generates sinewave signals – Same can be emulated by a custom programming in microcontroller to generate sinewave.

2) T5336 from Elcoteq – Seems like Mosfet Driver in SOIC8 package to drive coils upto 60V peaks on sinewave. Same can be designed with discrete mosfets in H-Bridge.

3.2 Receiver Circuit:

Receiver Board has one ICT3168 from Elcoteq Receiver Board Circuit – Seems like a MC34063 type design for power regulation but more efficient.

4. RESULT:



5. CONCLUSION

In this system we have generated the electric power as non-conventional method by simply walking or running on the foot step. We have completed this project. This can be one of the good economical, affordable energy solution to common people. This can be used for many applications. As India is a developing country where energy management is a big challenge for human population by using this project we can drive both A.C as well as D.C loads according to the requirement. Power generated is directly proportional to the force applied on the dynamometer and the number of rotations of shaft of the D.C. Motor.

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