Bicycle USB charger

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***Abstract*: This project mainly aims to reduce the pollution I the city and make everyone to use bicycle at the side for preventing emission of harmful gases from the vehicles. This project provides basic construction of using dynamo and basic electronic circuit model to convert dc to ac. The basic electronic module constitutes the basic components like rectifier, capacitors and resistors.**

***Keywords*: bicycle dynamo, resistor, capacitor, bridge rectifier, usb cable.**

Introduction:

The project is mainly based on converting mechanical charge into electrical charges. The circuit gives a basic figure layout. It is been an efficient model for running the circuit and charging the Mobile phones during travel. We can able to get perfect efficiencies using this circuit. The Proposed model is a very efficient one. The Project mainly aims in giving a best efficient devices to do so the circuit been able to give a 5v supply.

Basic theory of the Project:

This circuit has been developed to add an usb port to the bicycle for charging the mobile phones. The input voltage is supplied by the dynamo of the range 6v, 3w in the bicycle. The basic layout diagram is been given below.

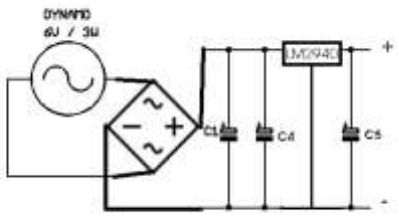


Fig1.1 The Basic layout of the diagram.

Working and construction of the system:

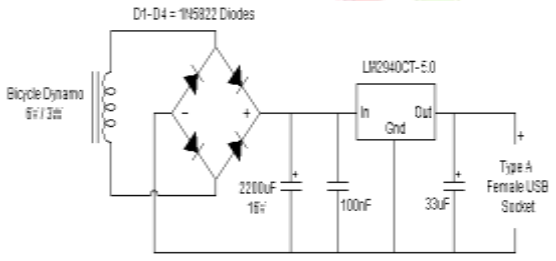
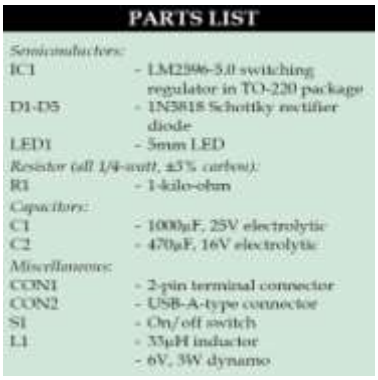


Fig1.2 The Proposed system circuit.



PARTS LIST

Semiconductors:

IC1	- LM2596-5.0 switching regulator in TO-220 package
D1-D5	- 1N5818 Schottky rectifier diode
LED1	- 5mm LED

Resistor (all 1/4-watt, ±5% carbon):

R1	- 1-kilo-ohm

Capacitors:

C1	- 1000µF, 25V electrolytic
C2	- 470µF, 16V electrolytic

Miscellaneous:

CON1	- 2-pin terminal connector
CON2	- USB-A-type connector
S1	- On/off switch
L1	- 33µH inductor
	- 6V, 3W dynamo

Fig1.3 The basic list of components.

Semiconductor:

IC- LM2940ct-5.0:

It is a basic 1A low drop out voltage regulator. It is manufactured by Texas instruments. It is a 16v, 20A converter which has advanced features of current conversion.

D1-D41N5822 diodes:

Schottky Diodes and Rectifiers Vr/40V Io/3A BULK

Resistor:

Here we use a resistor of range all ¼, 1 watt, +5% carbon and 1Kilo ohm.

Capacitor:

Here we use a capacitor of range 2200uf, 16v; 100nf; 3uf.

Miscellaneous:

Con1- 2Pin terminal connector,

Con2- usb A type connector.

S1-on/off switch

L1-33uh inductor

-6v, 3w dynamo

Working:

The circuit is based on LM2940CT-5.0.Its configuration, with minor changes, generally reflects the recommendations which is been included in Texas Instruments datasheet of LM2940CT-5.0. The IC is capable of providing all active functions for a step-down (buck) switching regulator and capable of driving a 3A load with excellent line and load regulation. The output of the regulator is 5V. It operates at a switching frequency of 150 kHz, thus allowing smaller-sized filter components than what would be needed with traditional lower-frequency switching regulators. Fig. 1.2 shows the circuit diagram of the bicycle USB charger. The alternating voltage generated by the dynamo is converted to DC by a full-wave bridge rectifier comprising Schottky barrier rectifier diodes D1 through D4 and a filtering electrolytic capacitor (C1). The output of the bridge rectifier, which is charged to peak value of AC voltage (nearly 10V), is input to switching regulator LM2596-5.0 to provide a regulated 5V (DC) output, which is suitable for charging mobile devices using the USB connector. The 5mm LED (LED1) in the circuit indicates output status. Feedback connection FB (pin 4 on IC1) is connected directly to output voltage at electrolytic capacitor C2. As with all switching regulators, C2 should have a low ESR (equivalent series resistance) rating. Besides, 33µH inductor (L1) should be rated for a DC

current of at least 1A. The dynamo output is connected to the circuit by switch S1. When the bicycle runs on the maximum speed the dynamo produces a maximum output but the range of the input value does not change. As the speed increases the input value remains the same. But the efficiency of the dynamo reduces. Even though the system is a successful one as it has some disadvantages.

Fig1.4 Proposed system.

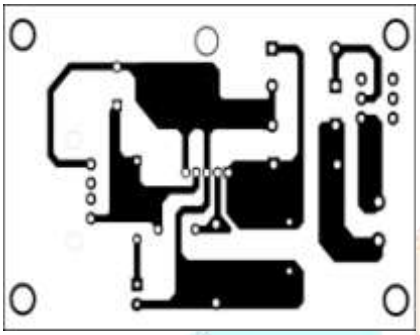


Fig1.5 Proposed system PCB layout.

Fig 1.6 System installed on the bicycle.

Conclusion:

The main feature of this system is to provide an efficient system to produce current not only to charge mobiles but also used in various applications such as head light lamps and many more devices that uses the 5v supply as their input voltage source and for processing them at good rate. As the system produces more efficient output but it has a drawback of getting faded away out of efficiency due to the high usage of the system.

Future work:

The system can be extended for future use by connecting many other devices. It is just a holder circuit it can be able to extend for the future use.

REFERENCES:

[1]Thomas Hiding Jorge Roth: Proximity Services with the mobile charging IADIS International Conference Applied Computing 2004, Lisbon, Portugal, March 23-26, 2004, IADIS Press, 437-444

[2] Blanch, A, Phillips J (2005).Mobile phone and its applications. Cyber Psychol. Behan., 8: 39-51.

[3] Carbon ell X, Gladiola E, Barany M, Belles' EA (2011) bibliometric analysis of the scientific literature on Internet, video games, and cell phone. Retrieved at January 23,from url.edu/condense/articles/JMLA.pdf

[4] Carroll J, Howard S, Peck J, Murphy J (2002). A Field study of mobile telephones by 16-22 years olds Journal of Information Technology Theory and Practice, 4: 49