



Developing An Automotive Exhaust Driven Mobile Charging Device

Johnson Debbarma^a, Arup Datta^b, Sudip Bhowmik^c

^a Tripura Institute of Technology, Narsingarh, Agartala-799009, India

^b Tripura Institute of Technology, Narsingarh, Agartala-799009, India

ABSTRACT

Although the world is constantly developing high capacity battery with fast charging technologies for use with smart phones, a complete support for week long battery backup is still years away. So in the meantime, here's one small technological device that can relieve us when we are on a long drive on a two wheeler. This project is to develop a low cost exhaust gas driven USB supported mobile charging uni.

Keywords: Toroid, Diode, Capacitor, Resistor, Zener Diode, Transistor.

INTRODUCTION

It is a device that is used to charge mobile phones, tablets, cameras by utilizing the smoke from the exhaust. Nowadays, electronic devices like phones and tablets have become the necessity of every human being. One can't imagine life without it. Even while going on a long drive, we carry our phones with us. But smartphones nowadays do not have a good battery life. So, they need to be charged quite often. So, while going on a long drive, if we need to charge our phones or tablets, we can use this device instead of using a power bank. This device will mostly be preferred because it is cheaper than a power bank, but power banks are also needed to be charged. It is reliable and easy to operate.



Fig no. 1.1

COMPONENT DETAILS

TOROID

A toroid is a coil of insulated or enameled wire wound on a donut-shaped form made of powdered iron. A toroid is used as an inductor in electronic circuits, especially at low frequencies where comparatively large inductances are necessary. A toroid works as an inductor, which boosts the frequency to appropriate levels. Inductors are electronic components that are passive, so that they can store energy in the form of magnetic fields. A toroid turns and with those turns induces a higher frequency. You would use a toroid coil when working with electricity that has a low frequency. A toroid works as an inductor, which boosts the frequency to appropriate levels. Inductors are electronic components that are passive, so that they can store energy in the form of magnetic fields. A toroid turns, and with those turns induces a higher frequency. They are more economical and efficient than solenoids.

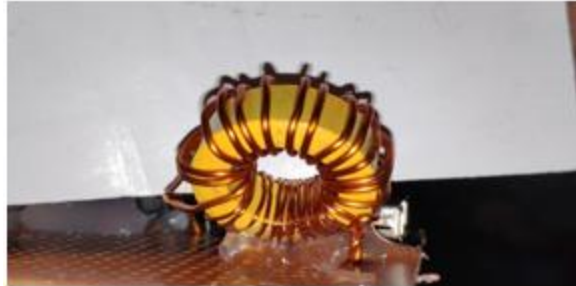


Fig 2.1- Toroid

DIODE

A diode is a specialized electronic component with two electrodes called the anode and the cathode. It is defined as a two-terminal electronic component that only conducts current in one direction (so long as it is operated within a specified voltage level). An ideal **diode** will have zero resistance in one direction, and infinite resistance in the reverse direction. Most diodes are made with semiconductor materials such as silicon, germanium, or selenium. The fundamental property of a diode is its tendency to conduct electric current in only one direction. **Diodes** can be **used as** rectifiers, signal limiters, voltage regulators, switches, signal modulators, signal mixers, signal demodulators, and oscillators. The fundamental property of a **diode** is its tendency to conduct electric current in only one direction.

The most common function of diode is to allow an electric current to pass in one direction while blocking it in the opposite direction. As such, the diode can be viewed as an electronic version of a check valve.

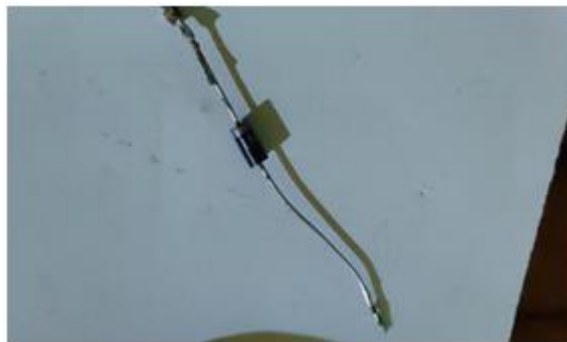


Fig 2.2- Diode

CAPACITOR

A capacitor is a device that stored electrical energy stored in an electric field. It is a passive electronic component with two terminals. It is a device for storing electrical energy, consisting of two conductors in close proximity and insulated from each other. A simple example of such a storage device is the parallel-plate capacitor. If positive charges with total charge $+Q$ are deposited on one of the conductors and an equal amount of negative charge $-Q$ is deposited on the second conductor, the capacitor is said to have a charge Q . Capacitors have many important applications. They are used, for example, in digital circuits so that information stored in large computer memories is not lost during a momentary electric power failure; the electric energy stored in such capacitors maintains the information during the temporary loss of power. Capacitors play an even more important role as filters to divert spurious electric signals and thereby prevent damage to sensitive components and circuits caused by electric surges. Its function is to store the electrical energy and give this energy again to the circuit when necessary. In other words, it charges and discharges the electric charge stored in it. It blocks the flow of DC and permits the flow of AC.



Fig 2.3- Capacitor

RESISTOR

A resistor is an electrical component that limits the flow of electric current. One or more resistors can be used to provide the correct amount of current to specific components within an electronic device.

Resistors are often soldered onto a printed circuit board to limit the amount of current that flows to different electrical paths. If too little current reaches a component, it may not operate. If too much current is allowed through, it can damage the component. Therefore, resistors play an important role in an electronic circuit.

The main function of resistors in a circuit is to control the flow of current to other components. Take an LED (light) for **example**. If too much current flows through an LED it is destroyed. So a resistor is used to limit the current. In electronic circuits, resistors play an important role to limit the current and provide only the required biasing to the vital active parts like the transistors and the ICs.



Fig 2.4- Resistor

ZENER DIODE

A **Zener diode** is a type of diode that allows current to flow in the conventional manner - from its anode to its cathode i.e. when the anode is positive with respect to the cathode. When the voltage across the terminals is reversed and the potential reaches the *Zener voltage*, the junction will breakdown and current will flow in the reverse direction - a desired characteristic. **Zener diodes** are widely used as voltage references and as shunt regulators to regulate the voltage across small circuits. When connected in parallel with a variable voltage source so that it is reverse biased, a **Zener diode** conducts when the voltage reaches the **diode's** reverse breakdown voltage.



Fig 2.5- Zener Diode

TRANSISTOR

A **transistor** is a semiconductor device used to amplify or switch electronic signals and electrical power. It is composed of semiconductor material usually with at least three terminals for connection to an external circuit. It is composed of semiconductor material usually with at least three terminals for connection to an external circuit. A voltage or current applied to one pair of the transistor's terminals controls the current through another pair of terminals. The **TIP41C** is a base island technology NPN

power **transistor** in TO-220 plastic package that make this device suitable for audio, power linear and switching applications. The complementary PNP type is TIP42C.

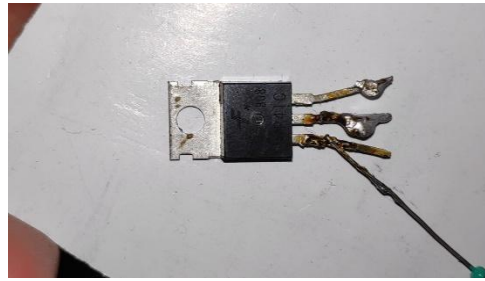


Fig 2.6- Transistor

SMPS FAN

For power generation we need a fan which generates Direct Current while rotating, means it converts mechanical energy into electrical energy. SMPS fan fulfills these requirements. We could use other CPU fans, it depends on our choice.



Fig 2.7: SMPS Fan

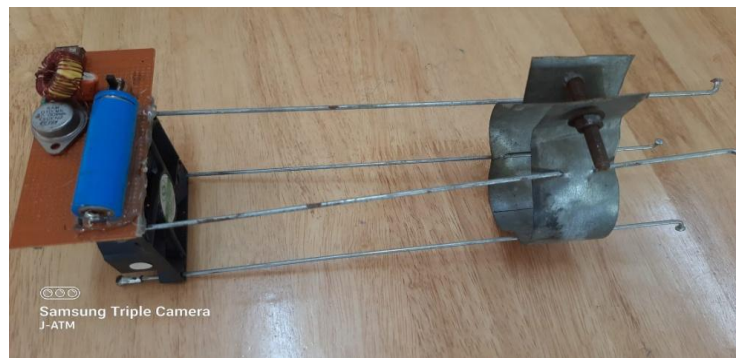


Fig. 2.8 Actual setup of the device

PROJECT PICTURE

CONCLUSION AND TESTING

The test conducted with the device developed is summarised below. And from the test result it can be concluded that the voltage developed is satisfactory.

Table:1 Test Result

Sl. No.	Brand & Model Name of Two-Wheeler	Speed (in KPH)	Voltage Developed (in Volt)
1	HERO Karizma-R	40 to 50	4 to 4.9
2	BAJAJ Pulsar150		3 to 4.2
3	HONDA Dio		2.5 to 3.5
4	TVS Apache		4 to 4.5
5	ROYAL ENFIELD		4 to 5
6	HONDA Unicorn		4 to 5

REFERENCE

[1] Saikumar P, ThamaraiKannan D, Yuvaraj G, Yuvaraj C. Wind energy based mobile phone battery charging and battery applications. International Journal for Research and Development in Engineering. 2014

[2] Reddy NRR, Sreekanth Y, Narayana M. Mechanical and electrical mobile charger. International Journal of Engineering Research and Applications. 2013

[3] Study and performance analysis of charging vehicle battery using bike exhaust gas, K.Kumaravel, Asst.Professor, P.Balashanmugam, Asst.Professor, G.Balasubramanian, Asst.Professor, Mechanical Engineering, Annamalai University,

[4] HuiFang Tian, Qinqin Zeng, Chao Huang. The Design and Modeling of Wind Turbine Blade. Machinery, 2009

[5] Design of exhaust manifold to improve performance of ic engine- a review Sachin G. Chaudhari1 , Prof.P.N.Borse2 and P.S.Nikam3

International Journal of Recent Innovation in Engineering and Research Volume: 02 Issue: 04 April– 2017

[6] Effect of Exhaust Back Pressure on Exhaust Emissions by Altering Exhaust Manifold Position 1Twinkle Panchal, 2DhruvPanchal, 3Bharat Dogra, 4Krupal Shah International Journal of Emerging Research in Management &Technology ISSN: 2278-9359 (Volume-3, Issue-11) Nov 2014.