Phone Charging Using Human Mechanical Energy

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ABSTRACT: Energy harvesting from human movements is an attractive way to obtain clean and sustainable energy. Frequent generated mechanical energy can charge electronic devices, such as a cell phone, wirelessly[1]. It operates on the principle of the use of mechanical energy, which is converted to electrical energy for charging devices. While phones have progressively gained more powerful processors and large touch screen interfaces, their power requirement has increased accordingly. Unfortunately, battery technology has not grown at a comparable pace. There is therefore a need to charge the batteries frequently. While traveling, people face a common problem with charging electronic appliances. The Mechanical [2]Hand Crank Mobile Charger[3] is a device that uses mechanical energy, converts it into electrical energy and capable to charge the mobile phones and other portable electronic devices. There is no any external electrical source is required. The gear train and the intermediate gears are used to transform mechanical energy from hand crank to DC motor.

KEYWORDS: Mechanical energy, Electrical energy, Phone charging, Motor, Gear.

INTRODUCTION: High demand of energy is continuously increasing. Many methods of extracting energy have been experimented with and the best is done to develop them. There are so many possible energy sources and methods are available for extracting conventional and non-con-conventional energy and resources .These types of energy sources are not suitable for all situations. At present, recent science and technology are still trying to improve ongoing energy demands for portable electronic devices. Of all the thus experimented methods of extraction, generation of electrical energy from mechanical energy proved to be the most efficient. It's the easiest way to generate power. For mechanical part gear, pulley, lever system etc can be used. But among them, gear system or gear box train system is easiest way to generate power in less space. Using hand crank [2]to wind up the gear box is most common way. In general mobile phone battery needs 3.5 to 5.0 volts dc and 175 to 700m/amp current (approximately) for charging.[4]Since we are using a 6volt dc motor as generator in reverse we will be getting the desired output easily. This paper presents the design and implementation of an efficient charging system which utilizes kinetic, solar, and grid power to charge common electronics devices. The small size of the UCF makes it easy to transport within backpacks for trips. In short word, we are trying to create a portable hand crank device that can be used in emergency situations to produce power where electricity is not available.

DESIGN PROCEDURE:

Gear details: One of them is driver gear another one is driven gear and other three of them are intermediate gears.

1. **Driver gear:** This gear is attached with the hand crank which is to be rotated by hand.
2. **Intermediate Gear**: These gears are set in between the driver and driven gears.
3. **Driven gear**: Fig.2 shows the gears which are fixed with the dc motor shaft which will be used as small generator.

4. **Gear Train**: In the gear train the gears are arranged in such a manner that they can be run efficiently.

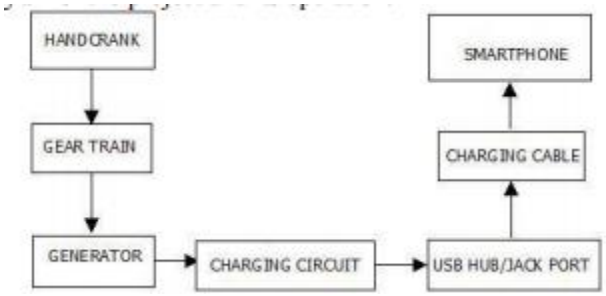

Figure.1: Block diagram

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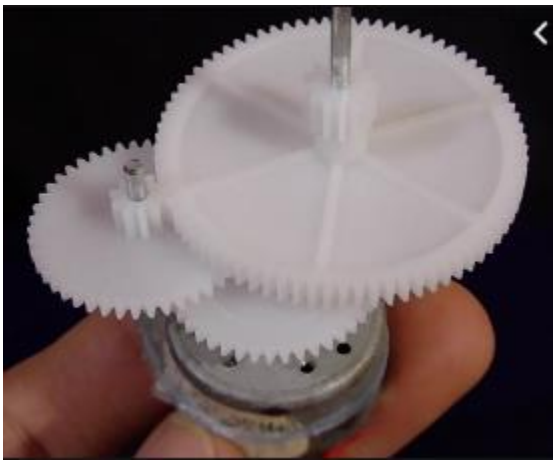

Figure.2: Gear train

DESCRYPTIONS FOR SETUP:

Generator: A small dc motor (6vdc) which is reversely used as generator. The motor is run with a rpm of 1240. The motor is not a brushless motor. So, the output current is not a good one it is about 300 m/Amp- 400 m/amp.

Bridge Rectifier: A bridge rectifier is a 2W rectifier. It is a round shape bridge rectifier. So easier to setup than four diode combination bridge rectifier and the heat production is also less.

Capacitor: The capacitors used here are 470 uf & 100 uf . These are polar rectifier as they are used in a dc circuit.

Voltage regulator: Voltage regulator is LM7805 in which is able to convert the output 6.2 Vdc of bridge rectifier into 5 Vdc. There is a heat sink used reduce the heat produced at the regulator.

Resistor: These two 1k resistors are connected in series with LEDs.

LED: There are two LEDs used here one in the input and another in the output to show the circuit is working in Fig.10 and Fig.11.

CIRCUIT ANALYSIS: Fig. shows a AC to DC conversion circuit. Here approximate voltage output of the generator is 7.5 VAC. The output of motor has fed to the AC terminals of bridge rectifier. The dc output terminals of bridge rectifier are connected to t. The dc input and dc output of voltage regulation. The capacitors are connected parallel with voltage regulator. One capacitor is connected across the dc output of the regulator and other capacitor 100 Mf is connected across the dc output. The two LED's one used along with two 1k resistors, one at input (RED LED) and other at output (GREEN LED). The bridge rectifier converts the 7v ac output of generator into 6.2 VDC which is fed to regulator (LM7805) which gives an output of 5v which is then fed to a USB hub port. The cell phone is connected by USB port starts charging when the hand crank is cranked.

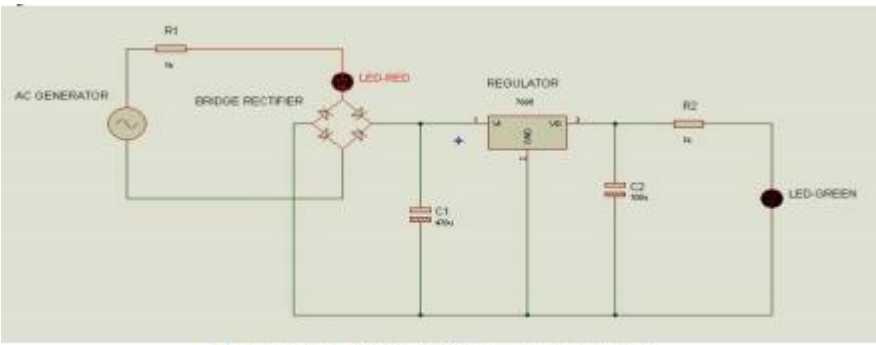

Figure 11: AC to DC conversion circuit

RESULT: The maximum output voltage observed at the output port (USB hub port/ jack port) is 4.96 VDC. When the motor is cranked at speed of 120 rpm the output voltage is nearby 5 VDC (i.e. 4.9 v dc approximately) The input ac voltage to the bridge rectifier is approximately 8.5 v when the hand crank is cranked at a speed of 132 rpm, which is reduced to 4.96 v by the voltage regulator LM7806.

CONCLUSION: We have measured all possible alternative energy sources that can be used in emergency situations and finally hand crank mechanism is the best option to generate voltage instantly and quite easily. Furthermore, the gear box train allows us to generate short amount of power through cranking. It is compact and rigid system, thus allows more portability. But our device, based on gear train system is quite bulky, less portable and performs poorly to charge up the latest smart phones and other electronic portable devices. We expected that the output voltage would be enough to charge up a simple Li-ion battery which has less current rating used in usual cell phones, we have succeeded in charging up such cell phone which has current rating less than the smart phones.

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