Power 2π:

Mobile Bicycle Generator

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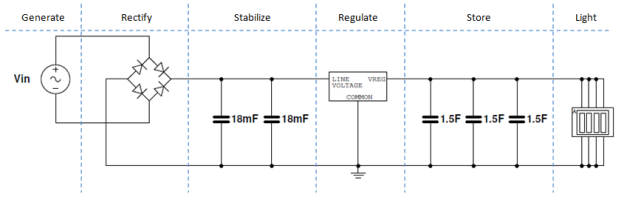
Introduction:

Power 2π is a mobile bicycle generator which directly employs Faraday's Law in order to power a safety light. Strong neodymium magnets on each wheel spoke pass by an iron-core solenoid, generating electromotive force (EMF) and inducing current. The resulting power is then rectified, regulated and stored before being fed into an LED bicycle light.

Motivation:

As an increasing amount of people adopt a more active and healthful lifestyle, the bicycle has become an important vehicle for both commute and recreation. At night, most riders use a simple battery powered light to avoid collisions and possible injury. Battery cells however, inevitably wear out and must be replaced, and some contain corrosive chemicals, which if not disposed of properly can end up in a landfill, creating an environmental hazard.

Power 2PI aims to create a sustainable, no-maintenance, eco-friendly design with nearly unlimited charge-recharge capabilities. This project's main focus was to shed light on current alternative energy solutions and to explore the need for further research in green technology.



Design:

The solenoid is comprised of 200ft of 30AWG magnet wire wound around a soft iron core. A full bridge rectifier converts the generator's AC input to a positive DC signal, effectively adding the positive and negative components. Two 18mF capacitors in parallel average out the rectifier's output to provide the regulator with a stable input. A SWADJ3 step-down adjustable switching regulator sets its output to a constant voltage. Three 1.5F supercapacitors in parallel are used to store power not dissipated by the bicycle light. During longer bike rides, this stored energy can be used to sustain the light when the bike is temporarily slowed or stopped, such as at intersections.

Conclusion:

Power 2π demonstrates an ecofriendly way to generate, rectify, regulate, store and ultimately utilize electrical energy for safety applications. The project aims to make electrical engineering concepts more accessible to the general public and to foster discussion of new ideas in the field.