ABSTRACT

TITLE:	Electric Field Harvesting
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PRESENTED AT:	6th Annual Natural & Behavioral Sciences Undergraduate Research Symposium Program, Fort Lewis College, 2011

ABSTRACT: The growing number of battery dependent small power consuming portable electronic devices warrants research of harvesting energy as a mode of augmenting or in some cases replacing batteries. There are several sources of electric fields that can provide this energy, some occurring naturally. Many of these sources have been thoroughly examined. The fair-weather electric field of the Earth is an electric field that is created by thunderstorms and the interaction of the ionosphere with the solar winds and is continually present all over the earth because of charge generation in the Earth-Ionosphere cavity. Large storms produce very large electric fields, which are more evident because of the phenomena of lightning. Also, electromagnetic radiation from power lines can be harvested as an alternating current signal. The goal of this project is to create a working prototype that can harvest energy from these electric fields. Louis Vleminqc created a novel approach to turning high voltage and low current sources into useful power with a spark gap based relaxation oscillator. This circuit along with power regulating chips LTC3588-1 and LTC4071 has the potential to safely charge lithium ion batteries through the harvesting of electric fields. We built, tested, and modeled the spark gap based relaxation oscillator and built and tested the power regulating and lithium ion battery charging circuit. Attempts were made to harvest the potential energy of electric fields but the mountainous terrain of Durango makes this difficult.