CALIFORNIA STATE SCIENCE FAIR
2011 PROJECT SUMMARY

Name(s)
Stewart H. Wirick

Project Number
31239

Project Title
Can a Smart Phone Be Charged by Radio Waves?

Abstract

Objectives/Goals
I always wondered if there was a better way to charge a mobile device than by plugging it into a wall socket, and if there was any way to harvest stray radio waves that would otherwise fly off into space. The purpose of my experiment is to find whether a smart phone battery can be charged by a radio antenna by stray RF, and if so, how much time would be required to charge from 0% to full battery capacity.

Methods/Materials
Materials: .5 Watt 915 MHz transmitter with power supply, 915 MHz "Powercast" P2110 Development Kit, Satellite TV dish, 10 ft copper wire, 915 MHz patch antenna, 915 MHz omni directional antenna, 10 volt Multimeter, 20 foot tape measure, stopwatch, "Cantenna" tuned to 915 MHz.
Procedure: Place 915 MHz .5 watt transmitter equipped with the 915 MHz patch antenna 5 feet away from Powercast P2110 Development Kit.
Set stop watch for 1 minute
Start the stop watch and record the number of times the built-in LED on the Powercast board blinks within the 1-minute time frame.
Record results
Repeat steps1-4 3 more times, but one achiteration, moving the Powercast P2110 Development kit 5 feet further away from the transmitter.
Repeat steps 1-5 but with all other antennas.

Results
The directional antenna would take 479 days to charge a Droid 2 battery from 15 feet. The omni-directional antenna would take a number of days so large from 15 feet that it could not be recorded in my experiment. This is because the LED never flashed at 15 feet during testing with this antenna. The directional antenna with the dish would take 80 days to charge a Droid 2 battery at 15 feet. The omni-directional antenna with the dish would take 563 days to charge a Droid 2 battery at 15 feet. With a highly directional antenna, enough power could be captured to power the "Powercast" circuit from 30 feet away.
(I chose to list 15 feet statistics in the results because they are the most practical.)

Conclusions/Discussion
With the Droid 2's battery capacity being 1400 mAH, 80 days would be required for the Droid 2's battery to be charged from 0% to full at an average of 12.5 feet from a .5-watt transmitter with no obstructions. This, however, could only be achieved if the receiver antenna was directional, and had an amplified gain

Summary Statement
I tested whether a smartphone battery can be charged by stray radio waves.

Help Received
Father helped building cantenna/test supervising/credit card