### Hashtags: #spacetech, #convertyoursmartphone

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### Tags: Hardware

**Challenge Description**

Your challenge is three-fold: develop a USB-like dongle that converts a smart phone into a nanosatellite/CubeSat; develop a StarTracker app to convert a smart phone camera into a star tracker; and/or create a mission analysis using a sample launch vehicle. You can create a PhoneSat by providing solar power to charge the battery, an attitude control actuator (either a vibrator/reaction-wheel or magnetorquer), and low gain antenna for communication. Smart phones already have gyro, so one satellite sensor is already provided. The phone’s vibrator function could also act as an actuator, but is only capable of 1 axis control so the dongle would need to provide control over the other axes. You can create a StarTracker app that will convert your smart phone camera into a star tracker to determine in-orbit attitude pointing. For the mission analysis, you can use a launch from a space-tourism commercial launch or a government provider and create a ConvertdSAT-like scenario.

**Background**

Existing solar charging products are available that charge a mobile phone battery. You could implement a similar scaled down version of a phone solar charger, which also provides control actuators using a phone vibration mechanism or constructing a magnotorquer.

**Solution Ideas**

Here are some ways for you to frame this solution:

· The interface to the smart phone can be the phone's data and charging connector;

· The phone can provide computational power such that the apps can implement the attitude control based on the built in sensors;

· The smart phone nanosatellite can be designed for low earth orbit and potentiall be launched from any available launch system;

· Communication can be either via the dongle and Low Gain Antenna, or using the phone's built-in antennae;

· Miniaturization is key - since all components must fit into a USB-like dongle that is the same size and mass as your smart phone; and

· External chassis and structure can be kept to a minimum. The intent is to have no external structure apart from the phone and the dongle.

**Sample Resources**

* <http://epubs.surrey.ac.uk/26828/>
* <http://en.wikipedia.org/wiki/Magnetic_torquers>
* <http://en.wikipedia.org/wiki/Attitude_control>