Project Description

The solar charge controller is designed to regulate the voltage output of a solar panel. This ensures that the maximum amount of power will always be outputted from the panel, increasing efficiency.

The Max Power Point Tracking uses the Perturb and Observe algorithm that will ensure the panel's max power, under different lighting conditions, is being transferred to the lead-acid battery. Thermal sensors and overcharge protection circuits are used to keep the system safe for user operation. If temperatures get over 113 F or the batteries being charged become full, the system will enable relays that shutdown the charger and disconnect the solar panel. The fast charging works due to the shorted communication pins on our USB port, this results in a connected device to draw the appropriate amount of current, including what is needed to fast charge. Bluetooth technology pairs with an android application to create a user-friendly interface that displays technical details about the system as well as notifies users of activated safety features.

The voltage control of the system is done through a buck converter which has a variable oscillation frequency. This frequency is given by a microcontroller that runs the MPPT algorithm. The android application provides important information about the system, without being near the charger. To further improve upon this, two-way communication would be beneficial, such as turning off charging remotely. Currently, only one device can be charged at a time, future iterations would involve the ability to charge more than one small consumer electronics, as well as add the ability to also charge Apple products.