Name(s)	Project Number
Tyler E. Robertson	**S0326**

Project Title

Project POWER: A Swift Water Warning System

Abstract

Objectives/Goals
Every spring, people drown in local rivers because they underestimate the power and danger of the river flow from melting mountain snow. Project POWER (Predicting Onsite Water Entry Risk) is a portable swift water warning system that is designed to visually alert swimmers of dangerous water conditions.

Methods/Materials
The buoy is constructed of PVC pipes and rust resistant metals. A digital flow meter is connected to an Arduino microcontroller that controls the color of RGB LED strip lights located above the water line. When water velocity reaches a set threshold, the flashing LED lights change from green to red. The Arduino and LED lights are powered through a 12Ah charging battery, which is connected to a 9W solar panel. After calibrating the flow meter for accurate measurement and performing buoyancy tests in a pool, the buoy was tested in the Tule River with an across-the-river anchor line. Using a pulley system, the buoy was positioned in the area of highest water velocity at the center of the river.

Results
The buoy anchoring system worked well with the across-the-river control line. The control box remained waterproof and the LED lights changed color when the threshold water velocity was reached. The buoy demonstrated the ability to stay afloat in the higher currents. Flow meter accuracy was reduced due to the vertical position of the buoy in the river which limited the amount of water passing through the flow meter. An external flow meter was then tested resulting in more consistent river flow measurements.

Conclusions/Discussion
Project POWER demonstrated the potential to save lives by alerting swimmers of unsafe river conditions. Future designs will include a temperature sensor, audio alerts, and smart phone applications.

Summary Statement

I designed and built a swift water warning buoy that visually alerts swimmers of unsafe water currents.

Help Received

A member of the Tulare County Sheriff's Swiftwater/Dive Rescue team assisted with buoy placement on the Tule River.