CALIFORNIA STATE SCIENCE FAIR
2016 PROJECT SUMMARY

Name(s)
Solomon A. Kazmie

Project Number
J1413

Project Title
LifeLine: Thinking Outside the Black Box

Abstract

Objectives/Goals
To develop, demonstrate and test an iPhone-based data logging, position tracking and navigational path retracing system.

Methods/Materials
I used Apple#s XCode and Swift to design and program an iPhone app which uses GPS signals to track and log the phone#s position and orientation. I used MapKit to add a realtime map display and used MessageUI to program the app to send the logged path coordinates in an email report.

I added a stack-based #retrace mode# that calculates and guides the user back along their path to the apps point of origin. I deployed the app on numerous devices to test the iPhone#s position tracking, logging and retrace capabilities under a wide range of conditions.

Results
Using my LifeLine app on several devices in a variety of regions, terrains and natural conditions, I collected more than 10,000 data points across a 350 mile radius.

Conclusions/Discussion
My iPhone-based LifeLine systems functioned reliably and consistently, on land and on water, in all tested environments, including desert, lake, mountain, canyon, forest, fields, swimming pool, park, freeways and city streets. I had to add a slider to adjust the #retrace mode# to function for cars as well as pedestrians. In addition to its use in flight recovery, #Retrace mode# alone could be a life-saving tool in hiking, camping, sailing, scouting, recon, search and rescue situations.

Summary Statement
I wanted to use off the shelf iPhone#s to enhance the traditional black box flight data recording system by linking the black boxes with a distributed network of smartphone-based data storage nodes, which can also function when jettisoned a

Help Received
A family friend introduced me to the Swift programming language and helped explain Apple#s map annotation protocol.