CALIFORNIA STATE SCIENCE FAIR
2017 PROJECT SUMMARY

Name(s)
Annika Viswesh

Project Number
J0816

Project Title
Oculus Patch Assistant

Abstract

Objectives/Goals
2.5 M children in the U.S. have vision impairment due to Amblyopia. Treatment can take many months or years. Treatment is cumbersome, unorganized and inefficient. Doctors are NOT able to recommend the right duration and frequency of eye-patching due to poor measured correlation with visual acuity. The objective of this project is to make the treatment of Amblyopia, efficient and effective.

Methods/Materials
Macbook computer running the iOS operating system with an XCode IDE for programming using the SWIFT programming language. RFduino microcontroller development kit with an arduino IDE on a macbook computer. Fluid UI software on macbook computer for user-interface prototyping.

Results
I successfully created an iPhone application to manage and monitor Amblyopia treatment. The application successfully logged patient's historical patching data and emailed it to the doctors.
I performed 3 different trials; 20 test cases in each trial with simulated data
95% of the time, the application loaded within 10 seconds
95% of the time, the screen transitions took less than 10 seconds
90% of the time, the data was accurately saved and restored
95% of the time, email with the data was sent successfully

I also built a cheap, portable RFduino device that communicates with a smartphone application to sync patch logs. This device is useful to log patching data, when a smartphone is not available during the patching activity

Conclusions/Discussion
Doctors currently treat Amblyopia using a trial and error approach to recommend a regimen for daily eye patching. The Oculus Patch Assistant smartphone application logs patient patch logs and sends all the data records to the doctor via email. By collecting data across multiple patients, it is now possible to correlate improvements in visual acuity to factors such as age, sex, activities performed during patching, hours of patching per day. This paves the way for new treatment protocols to make the treatment of Amblyopia much more efficient and effective.

Summary Statement
I created a smartphone application to make the treatment of Amblyopia much more efficient and effective.

Help Received
I designed and built the smartphone application by myself.