

## Background

NSWC Crane:

- Needs to be able to analyze targets in the field.
- Want to increase the accuracy of analysis.
  - By hand is not accurate enough because of the methods that are used.
- Want an iOS app for ease of use and availability of hardware.
- We will use image recognition to identify bullet holes in the large target.
- The app will normalize the image and approximate bullet holes.
- The user can manually adjust impact placement after recognition.

## Client Overview

- Clients:
  - Charles Zeller, Technical Warrant Holder, Small Arms & Weapons Crane Division
  - David Long, Air, Land, Sea, and Expeditionary Systems Small Arms Project Manager Crane Division
- Their Role:
  - Handle small arms testing division at NSWC Crane.
  - Manage the technicians who will be using our product to perform analysis on targets.

## Current System

- By hand or with a desktop system designed by Rose Senior Design Team (Can no longer be used).
  - The Rose system, SANTA used Visual C++ and OpenCV to accomplish the image recognition and report generation.
- Negatives of the Current System:
  - Technicians don't like being required to go back to the office to perform analysis on the test targets.
  - Using Rulers and by hand calculations doesn't yield results that are as accurate as desired.
  - The analysis method used in the by hand calculations uses a statistics method that is inferior to those which can be done efficiently with computers.
- New Restriction required a new system.
  - Cannot use USB devices (Cameras, SD card readers) any longer because of new security regulations.



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(NSWC - Crane)  
Charles Zeller  
David Long

## Design & Architecture

## Engines & Image Recognition

## The App

## Technologies Used

- iOS 5 & Objective-C: To build the application including the user interface and data storage.
  - CoreData: A CoreData schema was used to store the reports generated in the application.
- C++ & OpenCV: To process the target images and perform image recognition to find the bullet impacts.
- CSV: To allow the application to transfer reports and results from the iOS device to a computer through email..