Discovery Space

Overview
The team was asked to design an exhibit for a children’s museum located in downtown State College named Discovery Space. The sponsors at Discovery Space wanted us to design a green screen system that would allow a child between the ages of 7 to 12 to act as a meteorologist and give a simulated weather report. The goal was to let the child experience what a weather forecaster experiences and understand how a green screen system works.

Objectives
• The system should be able to record a video of the child behind a green backdrop and replace the backdrop with a still image
• The software should be able to replace all the green pixels with the background image pixels in real time
• The interface should allow a child to record a new video or replay a previous recorded video
• The interface should then allow the child to choose from at least 10 backgrounds
• The interface should be simple for a child to use

Approach
• We met with the sponsor a few times to draft out the requirements of the project
• We examined AccuWeather’s video blogging software that inspired the original idea
• We then took a tour of AccuWeather to see their green screen system and how it works
• We researched existing museums that had similar exhibits for children
• We received an email from WPSU showing a system that was built under a few thousand dollars
• We decided to use the open source libraries wxWidgets and OpenCV to build our own interface and chroma key software using Visual Studio C++
• We coded the chroma key and interface and tested the system using a webcam, green screen and lights

Outcomes
• We were able to build a green screen system under one thousand dollars that used open source libraries to do the chroma keying
• The interface was easy for a child to use
• The system replaced all the green pixels within some threshold with the background image in real time
• We coded a calibration tool to automatically calculate what shade of green it should remove independent of the lighting
• We were able to record and play back up to 10 videos