Scalable Quality Control with Machine Vision for Home Smart Lighting Systems

deako SMART LIGHTING

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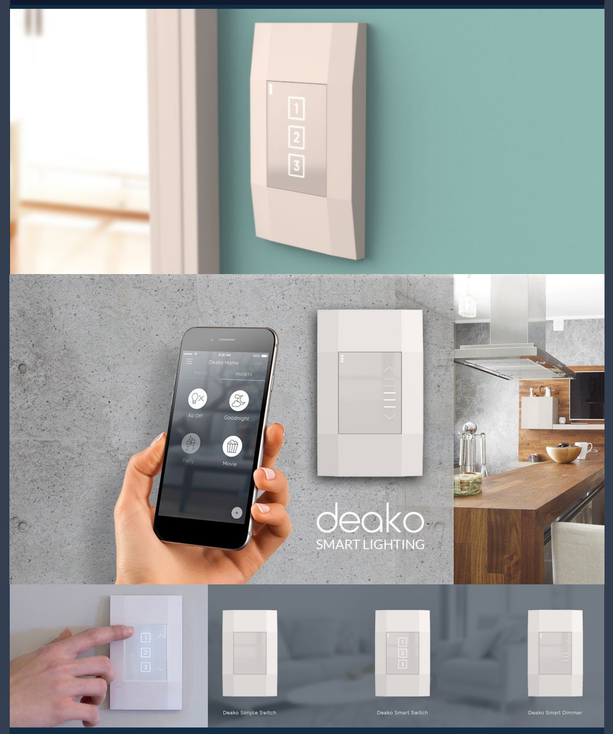
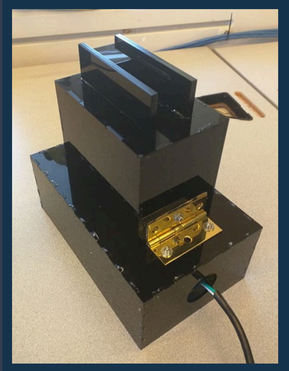
Purpose: Current QA for Deako's smart switches is **extremely slow** and **prone to human error.**
Our Objective: Develop a system to speed up and automate the QA process.

THE PRODUCT



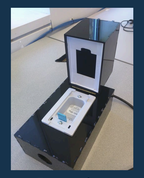
Smart switches that allow you to control your lights from anywhere using your smartphone

TESTBED HARDWARE



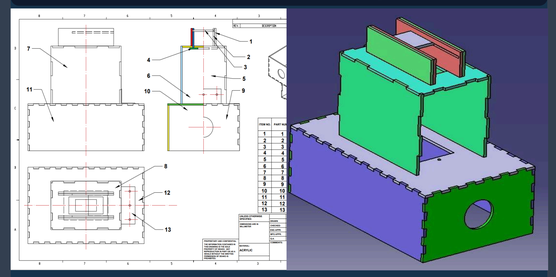
Full view

Camera Holder



Interior

SCHEMATIC

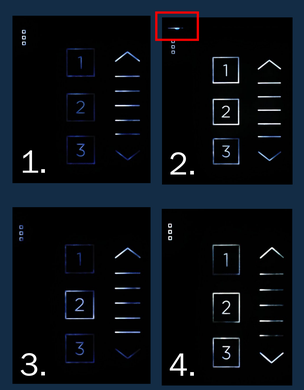


Assembly Drawing 3D Model

TEST CASES

Good Case

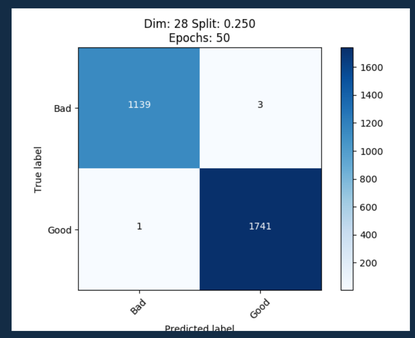
- LEDs are evenly lit
- LEDs are not dim
- No light bleeds at the top



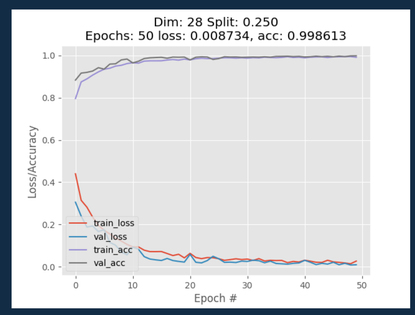
Bad Cases

1. All LEDs are too dim
2. Has light bleed
3. Severe uneven lighting
4. Subtle uneven lighting

RESULTS



- ~3000 images used for testing
- Only 0.14% False Positive Rate

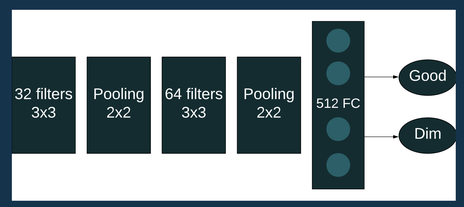


- 99.86% accuracy
- Low loss (no overfitting)

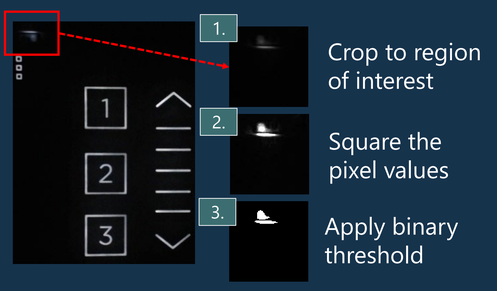
HOW OUR SYSTEM WORKS

1. Place switch into testbed

Using a convolutional neural network:
Classifies switch as GOOD or DIM



2. Check if LEDs are evenly lit



Crop to region of interest

Square the pixel values

Apply binary threshold

3. Look for light bleed

4. Display evaluation

Evaluating one switch: Under 9.54 seconds