



**CALIFORNIA SCIENCE & ENGINEERING FAIR
2018 PROJECT SUMMARY**

Name(s) Rohan A. Karunaratne	Project Number 38724
Project Title A Real-Time Tactile Image Generator for the Blind and Visually Impaired	
Abstract Objectives/Goals The goal of this project was to successfully create tactile image by taking a digital image, breaking it up into a 6 by 6 array, and then assigning each array to one push rod which will go up and down based on how far away the object is. There by allowing a blind person to "feel" an image of his surroundings in real-time. The purpose of this project was to help blind and visually impaired people "see" their surroundings by creating a tactile representation of their surroundings. With the help of this technology, the blind and visually impaired navigate more efficiently through the world.	
Methods/Materials Materials: SG90 Hobby Servos (x36), 3D printer, Computer with Python and Arduino programming software, Spring Pins, Arduino Uno, PCA9685 servo driver, Jumper Wires, Camera. Procedure: 1. Design the fixture to hold the servos, the push rods, and pistons 2. 3D print the designs using the 3D printer 3. Install the servos and push rods so the fixture works 4. Take an image from a camera. Write python code to break the image up into a 6 by 6 array. Depending on the luminosity value of each sector, make the pistons go up and down using Arduino code. The Arduino should communicate with the PCA via I2C to drive the servos. 5. After working with a still image, write python code to take live video to pixelate the video into a 6 by 6 array that can continuously update depending on the video.	
Results I plotted a chart that shows the extension of the push rod vs the luminosity values. In the chart, a blue line represents the theoretical position the push rod should take, while an orange line shows were the measured extension. The theoretical equation is as follows: $10\text{mm} * (1 - \cos(3.14 * \text{Luminosity Value} / 255))$.	
Conclusions/Discussion Overall, this project can help the blind navigate through their every day lives. If I can reduce the size of my project, blind people can use this in their everyday lives. Follow-up Project: While light and dark represent a visual image, the actual contours of the object may make more sense to a blind person feeling the object because light and dark are not a full representation. It may be better to	
Summary Statement In this project, I created a machine that could take images from a camera and make them into a tactile image with applications for the blind and visually impaired.	
Help Received I got help from my cousin with some of the code regarding com ports. I used my dad's 3d printer to make my parts. The assembly, 3d designs, and majority of the code was done by me.	