The Ebola Threat

- 11,325 people died in the most recent outbreak that lasted from 2014 to 2016
- People in contact with Ebola patients are at the highest risk of infection
- Symptoms include: Fever, headache, muscle pain, weakness, fatigue, diarrhea, vomiting, abdominal pain and unexplained bleeding
- It is transmitted through bodily fluids or objects that came in contact with an infected person, bat or primate

Figure 1: Doctors training for deployment in the 2014 outbreak of Ebola. http://news.trust.org//item/20141008090039-aydvf?view=print

Thermometer

- Better accuracy
- Cheaper
- Easier to access
- Requires close proximity to patients
- Takes longer
- Requires a physician

Thermal Camera

- Faster
- No need for an operator
- Safer for both doctors and patients
- Less accurate
- Expensive ($11,000)
- Difficult to purchase

Oregon State University

Screening for Ebola

Saving Lives Through Thermal Imaging

Current Problem

Currently, to check for Ebola, doctors must use thermometers to check core body temperature in patients. This process is slow and can potentially lead to infection of staff members and patients. With a large volume of patients, as there was in the recent Ebola outbreak, this method is extremely inefficient and can contribute to the spread of the Ebola Virus.

Our project aims to create a device that would be able to quickly estimate a person's core body temperature. The device would work from a distance using a thermal camera.

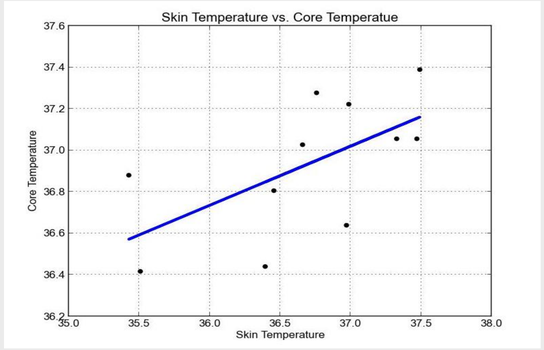


Figure 3: Mathematical Model trying to fit a line to the data points.

Future Use

The program as well as the structure is a proof of concept. If we'll evaluate that thermal image analysis is a reasonable method to detect Ebola, it will then be improved by graduate students and possibly used in the field.

In the future, the device will be able to direct patients to a specific direction. If a patient's core body temperature is elevated an arrow will light up, indicating them to go one way, otherwise an arrow would light up telling them to go the other way. This essentially quarantines the patients, reducing the spread of the disease.

Results

The model is highly dependent on data so our current model is not very accurate. The current model is a prototype so that when there is more data available in the future it will be able to generate better results.

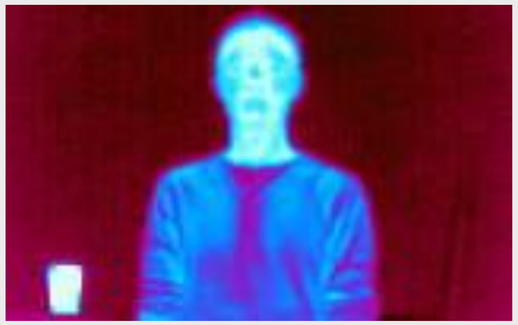


Figure 2: Thermal Image of a person next to a coffee cup

Thermal Imaging

The program connects to a thermal camera, take an image, and convert that image into a CSV file. The CSV file holds the temperatures of each pixel in the image. Then, the program finds the head of the person and produces the average temperature of those pixels. This average temperature is then passed to the model.

Mathematical Model

Data was collected and used to create a mathematical model that can predict core body temperatures. Once the model was created, it was then used to predict core body temperature based on skin temperature from thermal images.

Production Mode

The production mode is the final piece of this project. It combines the thermal imaging and the model parts. This creates a program that is meant to be used in the field which does all of the tasks at once. It takes the picture, extracts the important data from it, and then passes it through the model to output a predicted core body temperature.

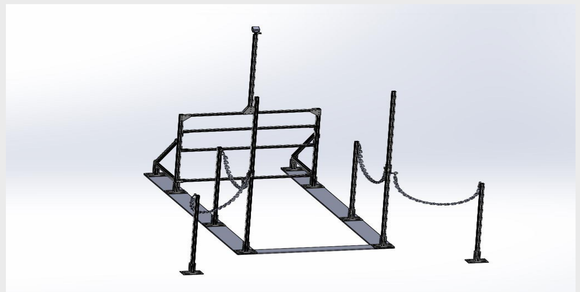
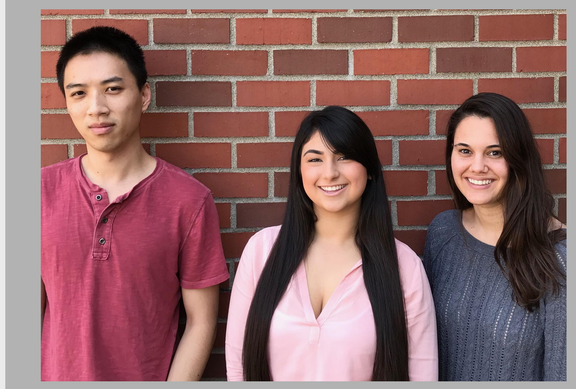


Figure 4: The Mechanical Team's structure that will hold the thermal camera.

Research Team



In the picture from left to right: Brian Huang, Bianca Beauchamp and Claude Maimon

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