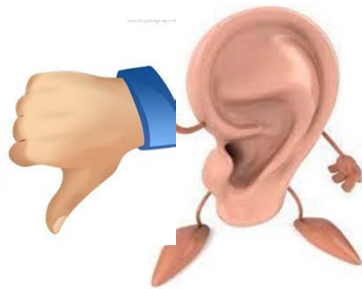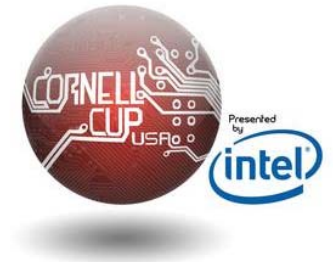Senior Design
Electrical and Computer Engineering
Howard University
Instructor: Dr. Charles Kim
Website: www.mwftr.com/SD1415.html

Sign Language To English

Team SLaTe8

Sarad Dhungel(Leader),   Reginal Etienne,

Claude Ndzami Kolloh,   Yonatan Yilma,

Prajjwal Dangal (CS, Jr),   Roshil Paudyal (MATH, Jr),

Renika Montgomery(CVEN, Sp),   Marcos Celestino (Brazil)

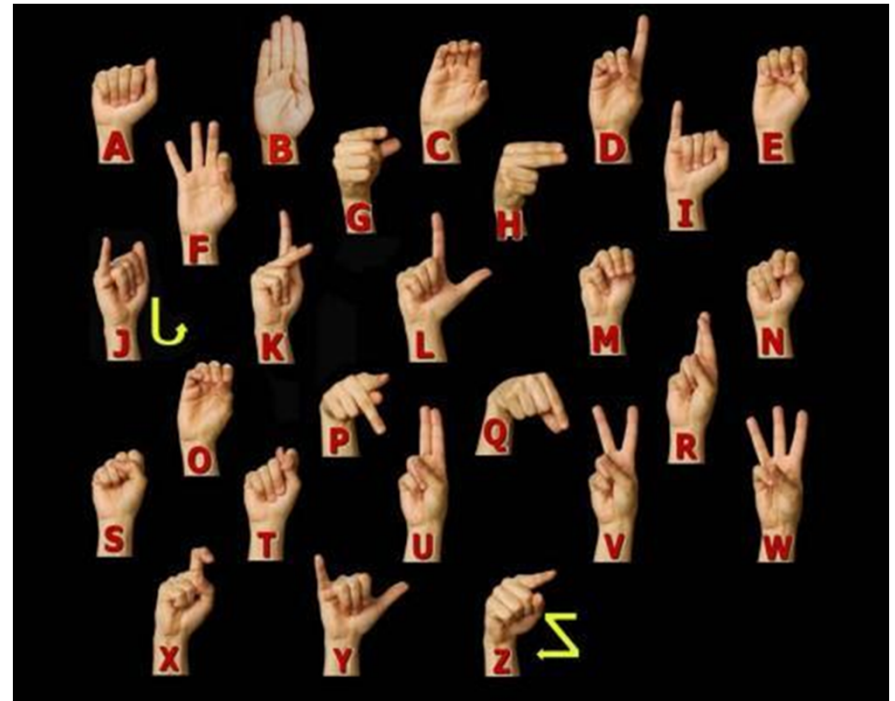Faculty Advisor: **Dr. Mohamed Chouikha, Ph.D**.

Background

Hard of hearing and deaf community
(28 million with significant hearing impairment in the U.S.A)

American Sign Language (ASL)

ASL is the predominant sign language of deaf communities in the US and most of Anglophone Canada.

Problem Statement

To develop a device that can help the hard of hearing/ deaf community communicate with a person not knowledgeable with sign language by translating ASL into English.
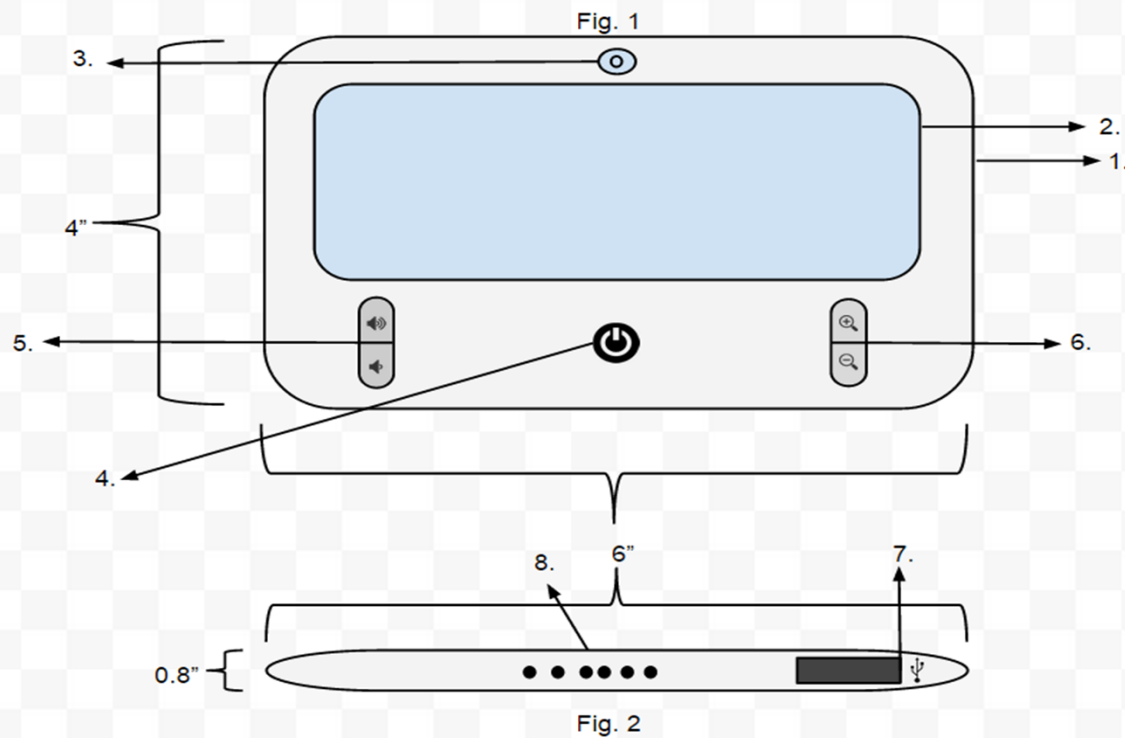
Intended Customer

Not only the hard of hearing / deaf

- Family of hard of hearing / deaf individuals
- Business
- Offices
- Public areas
- Retail
- ect.

Vision

Fig. 1

Fig. 2

Parts
1 – Protective Case
2 - Screen
3 - Camera
4 – Power Button
5 – Volume Control
6 – Zoom Control
7- USB Port
8-Speakers

Unique Aspects of Vision

- portable device
- two-way translation
- easy to use
- accurate
- fast response time
- cost efficient
- long battery life
- fastest communication method
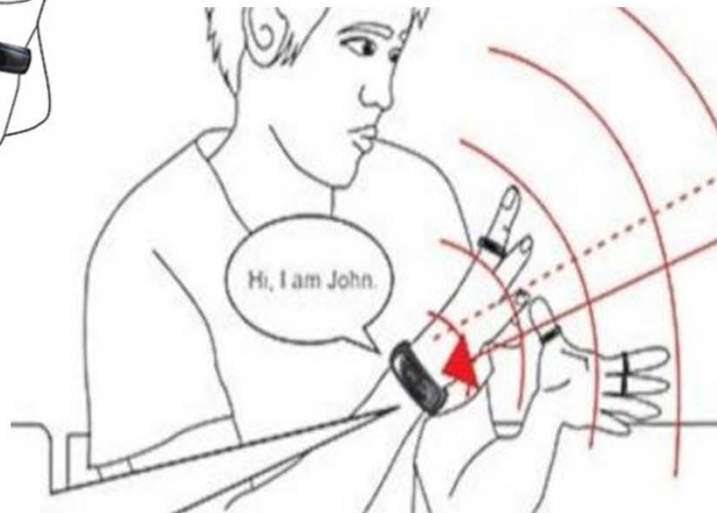
Current Status of Art

MyVoice

(University of Houston)

Students of Engineering Technology and Industrial Design Programs

Current Status of Art

The Sign Language Ring

Winner of the
2013 RedDot
Design Award

Current Status of Art

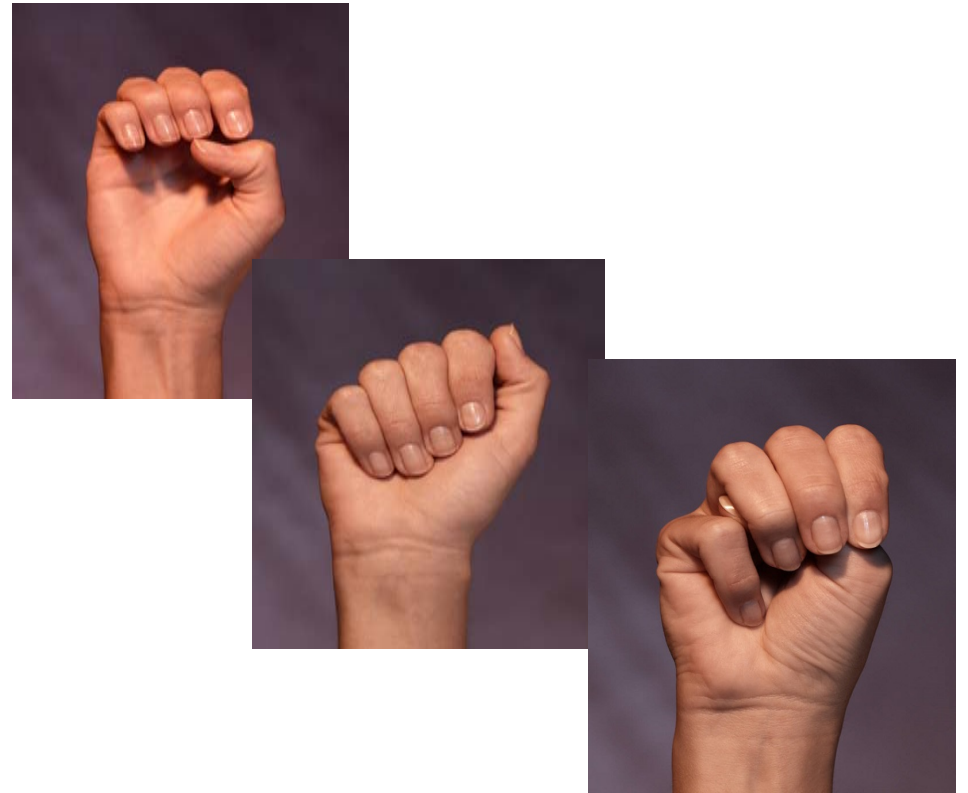- Kinect Sign Language Translator (Microsoft Asia)

"Nice to meet you"

Design Requirements

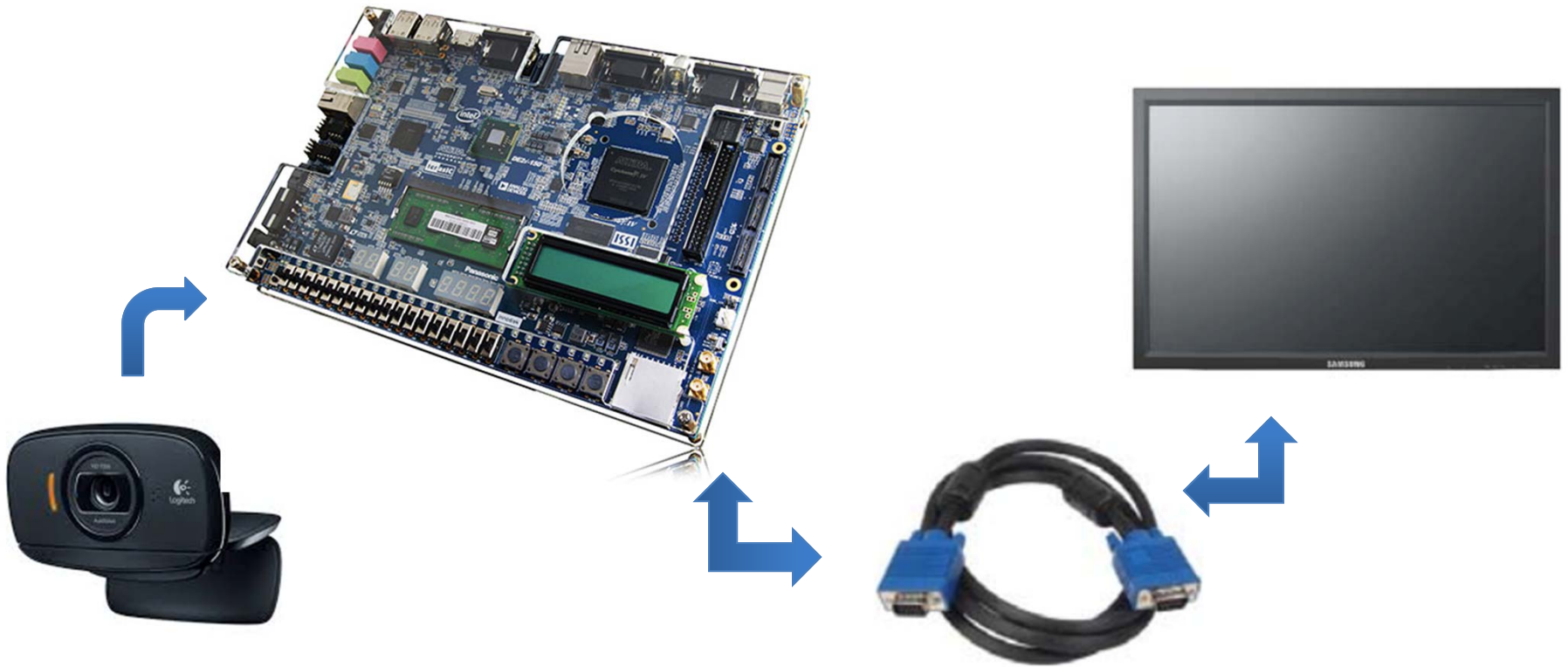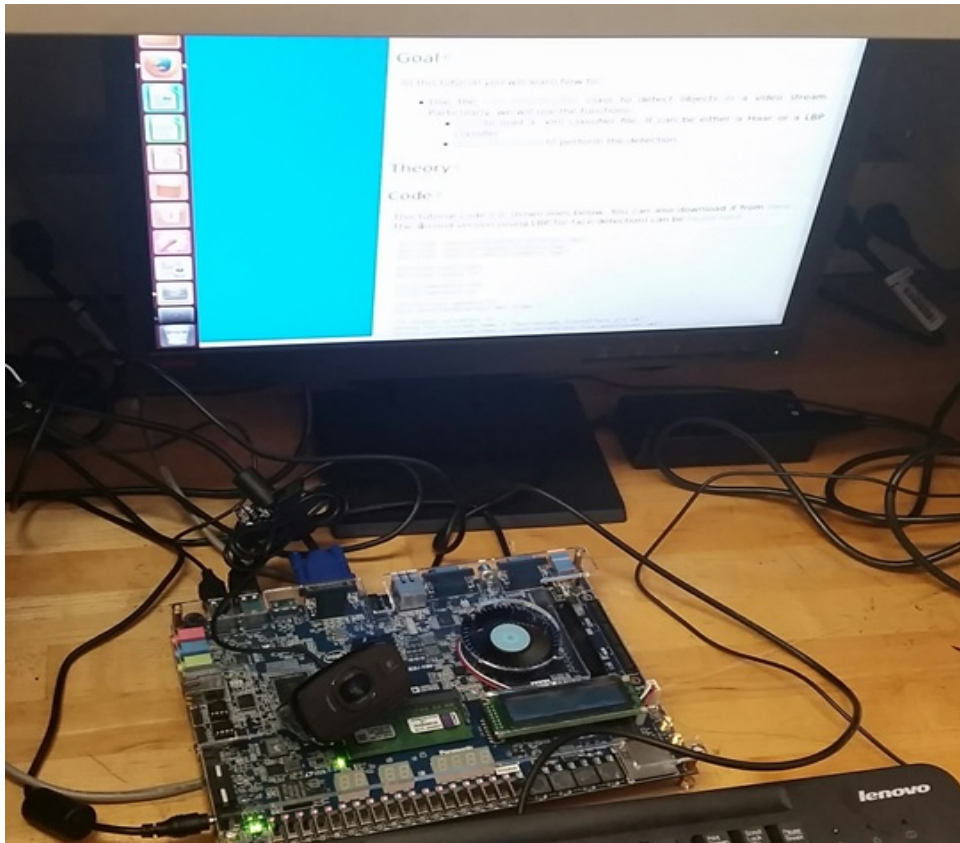| Intel-Cornel Cup Requirement	Use of Intel DE2i-150 Atom Board
FCC regulations	Specific Absorption Rate (SAR) of electronic devices (Electromagnetic radiation from DE2i-150 board)
Interface	External Camera and LSD screen

Limitations

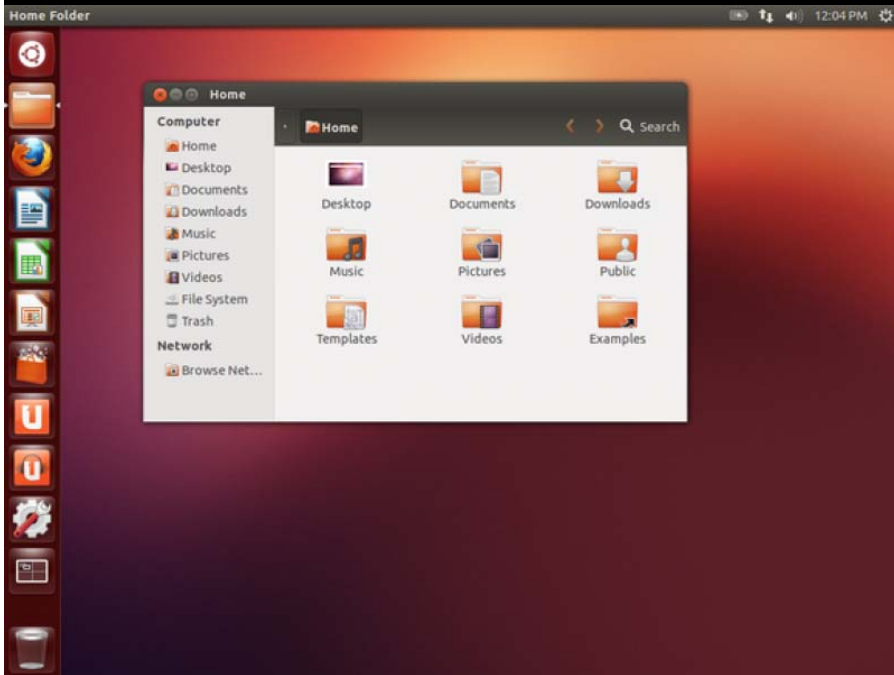## Motion Signs

Similar Signs

Final Design

Implementation

- **Intel De2i-150 board**

- **USB Logitech camera**
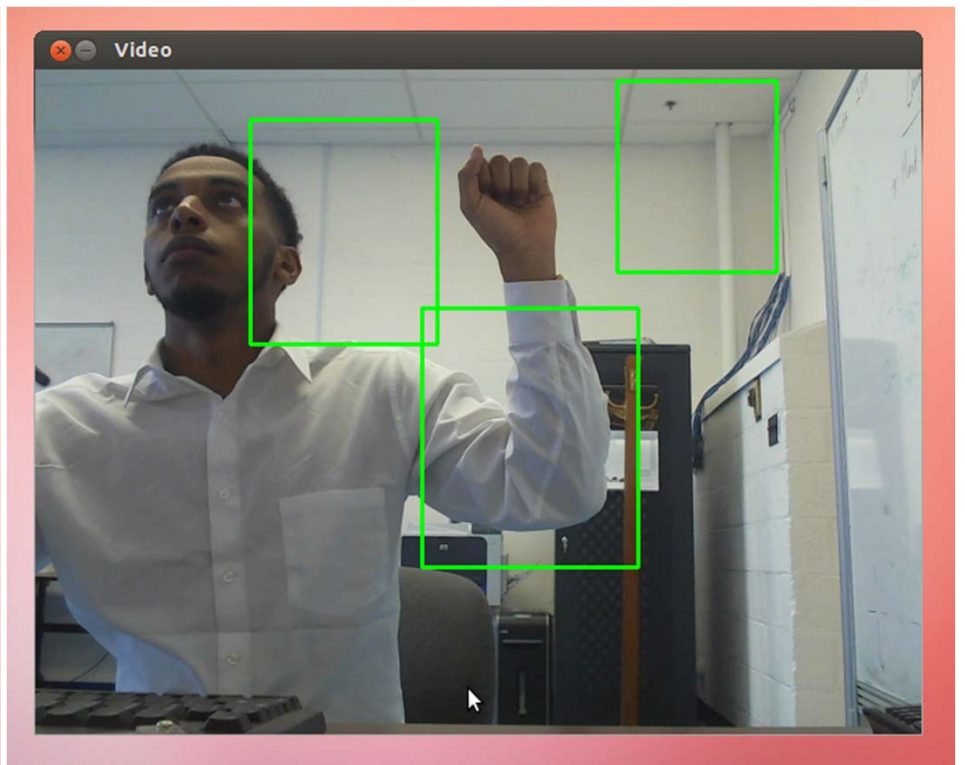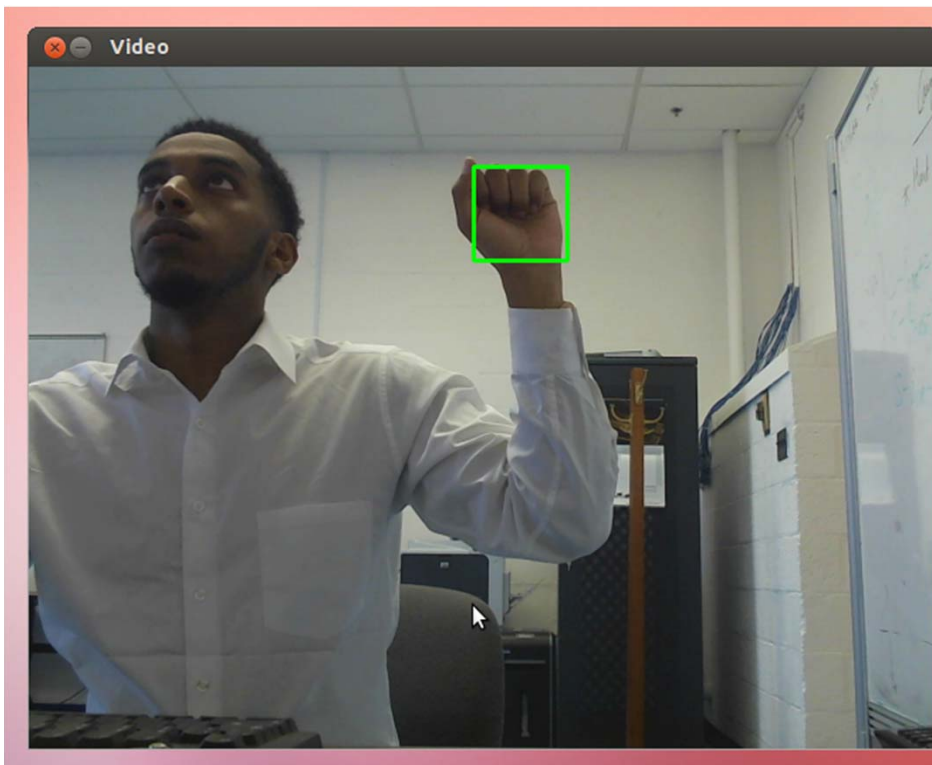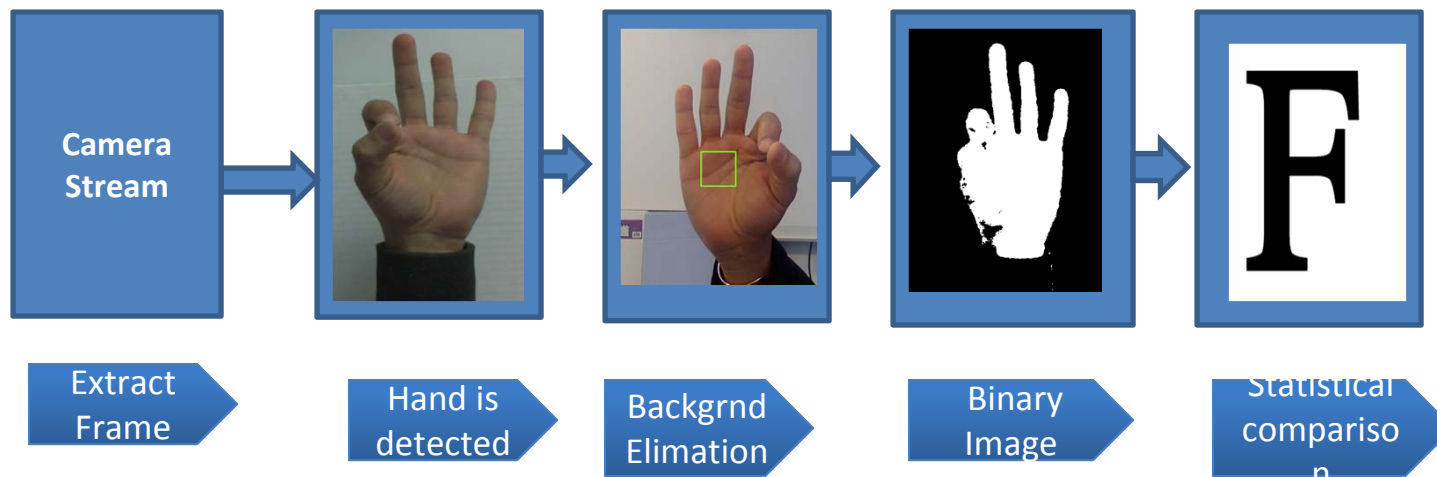
- **12 V DC Power**

- **Display Screen**

Implementation

Cascade Classifier

Trained the Classifier using Local Binary Pattern (LBP)

Solution Approach's General Flow

Image Processing

| Extract Frame | Hand is detected | Backgrnd Elimation | Binary Image | Statistical comparison |

Skin Color Analysis (HSV Method)

- Hand was placed inside the rectangle

- Then maximum and minimum value of the skin color of the region was selected

- The largest contour of the hand was detected by thresholding and remaining smaller contour were eliminated.

Distinguished Sign

- Currently we have sign of letters A, L, B, F, Y & C.

Test and Evaluation
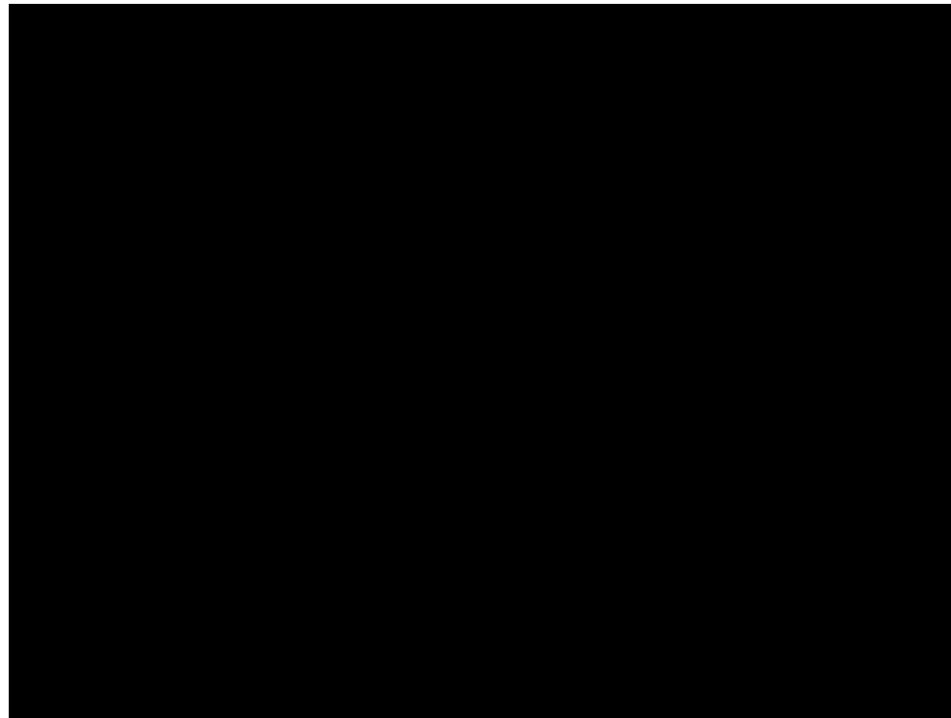
Evaluation

- Similar sign problems

- Need additional measurable to perform on entire alphabet

- Due to time limitation, we could only perform 6 signs

Cost & Resources

- De2i-150 Intel Atom Board **Provided by Cornell Cup**

- Logitech USB C5250 Camera **$40**

- An HDMI/ VGA LCD Display Monitor **Provided by Howard University**

Conclusion

- SLATE 8 used available resources to reach the goal of providing a device able to translate ASL to English.

- 15 million people with significant hearing impairment are under the age of 45. (i.e. large, young, tech savvy customer base)

- It was a great design experience that fostered team work and extensive learning.

Acknowledgment

- Howard University
- Department of Electrical and Computer Engineering
- Dr. Charles Kim (Professor and Advisor)
- Dr. Mohamed Chouikha (Advisor)
- Tim Brown (Lab Support)
- Communication and Signal Processing Lab

- Intel-Cornell Cup
- Dr. David R. Schneider (Creator of Intel-Cornell Cup)

Future Works

- Increase letters and improve accuracy for Cornel Cup Final in May 1-2 2015 (Orlando, Fl).

- Continuation project: Translation of Sign Words and Motion Gestures.

Questions