**Motivation & Purpose:**

Our motivation for this project was to create a sleek and modern electronic system, that utilizes hand gestures to interact with an electronic book reader or pdf file.

The reason behind this system was to reduce the physical strain on the body due to poor reading posture over an extended period of time.

**Alternatives/Challenges:**

We explored an alternatives using the Kinect, and MatLab

The initial challenge consisted of figuring how to do image processing on a set of captured frames through the video input. Since our group members lacked any experience in image processing this required a lot of research, and testing through trial and error.

We initially implemented the webcam theory in Matlab, we successfully created commands to turn pages, zoom, and control the mouse. However, the performance was not very good, so we decided to move to OpenCV. After doing so we decided to try to implement voice commands using the inbuilt Mac OS voice recognition software.

**Methods/Theory:**

**Input: Hand Gestures** -> Webcam -> Receive Video Input To Laptop-> Extract Desired Colours -> Use A Median Filter To Reduce Noise In Image -> Convert Image To Greyscale -> Threshold The Image -> Remove Objects Smaller Than A Given Diameter -> Fill In Holes Within Objects -> Conduct Frame Differencing Calculations To Detect Movement -> Implement Relevant Commands -> **E-Book Command Displayed As Output**

**Implemented Functions:**

We implemented a variety of functions in MatLab/Swift. For improved performance as transferred to C++ using the OpenCV (Computer Vision) library.

Commands:

* Turning pages left & right
* Zooming in & out
* Mouse cursor control with left click functionality
* Voice commands

Hands Free

E-Reading Apparatus

**Original Concept:**

Project image of application onto the bedroom ceiling. Webcam would be placed on headboard easily allowing for gesture control.

**Voice Commands:**

