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Team 3 Report
Flow Visualization

The purpose of my video is to explore beyond what the naked eye may observe in regular speeds. With high speed camera technology, phenomena may be observed that are not observable normally. With my video I wanted to visualize the air pressure changes and waves that occur in the mouth as air is released and built up again very quickly. Zack Stein, Stephen Wong, and Da Zhou worked with me to accomplish this feat.

The flow was entirely self contained within Zack's mouth. Zack puckered his lips closed, began to blow out, and air filled his cheeks. When his cheeks were completely filled with air, there was a sudden release of air from them followed by an immediate refilling of his cheeks with air. The process continued and picked up speed quickly (by the third wave it was full speed). The result is a very rapid filling and releasing of air in his cheeks that may only be fully observable with a high speed camera. A very similar effect occurs when a brass musician plays a trumpet, trombone, or similar instrument. To add a stylistic effect to the video, specifically in a comedic nature, I placed a sheet of Plexiglas in front of Zack and sprayed tap water at it from off camera while Zack wobbled his face.

The flow of air in and out of Zack's mouth is visualized by his cheeks being puffed up and waving back and forth as the process repeats. In order to use the high speed camera, many lights needed to be used. We used three large lights that pointed towards Zack from the same side as the camera.

The field of view is about two and a half feet wide and one and a half feet tall. I didn't want to go much bigger so that you could see Zack's face close up. The camera

was placed five feet away from Zack so that he could properly fill the frame. The lens was a 50mm fixed lens (no zoom). The camera was an Olympus i-Speed high speed video camera. The original and final file are 800 x 600 pixels. The lens was set to an f-stop of 4.0 and the shutter speed was set to 3,000 fps. The f-stop was all the way open in order to allow as much light in as possible and because a shallow depth of field was acceptable. 3,000 fps wasn't entirely necessary for my final product as I ended up speeding up the video anyways in order to match the music, but nonetheless it was very interesting to observe the flow at the highest fps possible before too much light was cut out. The ISO is a fixed setting on the camera that may not be viewed. In Final Cut Pro X I cut up the video, sped it up, and sometimes reversed it so that the wobbles in Zack's face matched the wobbles of a dubstep song.

The image reveals a comedic and scientifically important phenomena that occurs as air is built up and released in the mouth. I like the way the video turned out. The video matches the music very well and the result is comedy gold. The intent was therefore fully realized in this experiment. To improve the project, now that I know I didn't need to film at such a high frame rate for the video specifically, I would shoot it again at the proper frame rate at which I no longer needed to speed up the video so that more light could be allowed in providing a clearer image.