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Team Project 2

For my second team project I made a movie clip of a paintball exploding against a sheet of wood. I chose to do a movie because I feel it described what is going on when a paintball is exploding much better. I also had never made a movie before or used the high-speed camera so I felt like this would be a good learning experience for me. I was attempting to capture the phenomenon of the splatter pattern for a paintball.

To create the image we used a Tippman 98 Custom paintball gun and pink paintballs. To capture the paintball breaking we used the high-speed camera from Durning Lab. We filmed the paintball shot at 6000 frames per second. This made it able to play back at a slower speed in which to see the actual splatter of the paintball. In my video I played back the video at 30 frames per second; this was followed by an instant replay of the video at 7.5 frames per second. This helped to clarify the detail of the splatter. As the paintball breaks it forms a rim of paint that travels outward in a circular shape. If a paintball does not break in a circular pattern it means that the paintball did not strike the wood at a 90 degree angle. The velocity of the paintball has a huge impact on the size and speed of the droplets formed in the splatter [1]. Also, the roughness of the object that the paint hits will affect the circular shape of the splatter. The splatter of a fluid is most specifically used for analysis of blood splatter at a crime scene. One of the most helpful analysis of a splatter is studying the irregularities from the edges of the circular pattern

formed. If the edges are wavy it is a indication of a high speed impact and can be more associated with a bullet or blunt force trauma [2].

The visualization technique was very basic for this project. The video was taken outside on a sunny day and natural sunlight provided plenty of light for our application. Paint is already discolored, in our case pink, which allowed for easy visualization of the splatter.

For such an expensive video camera as the one we used it was relatively easy to use. We zoomed in on an approximately 12" by 12" field of view. We then set the high-speed camera to 6000 frames per second and focused it based on the lighting. The camera itself sat behind a piece of polycarbonate to protect it from paint. It was also sitting about 6 feet away from the wood and at an angle of around 30 degrees clockwise from the normal vector of the wood. For processing the video, I used iMovie for the first time ever. I was able to change the lighting and curves some and was able to choose the playback speed as well as add the instant replay to my video.

To me the image reveals a lot about what the physics are behind the splattering of a paintball. I was very impressed by the capabilities of the high-speed camera and would be excited to use it again. I was able to achieve my intent and much better than I thought due to the clarity of the video camera. To really study this idea it would be cool to study the distance of the splatter based on velocity; also, to study the shape of splatter based on the angle of impact. This would be useful and begin to develop equations behind the splatter formations.

1. http://www.clt.uwa.edu.au/__data/page/112508/fsb05.pdf

2. http://www.crimescene-forensics.com/Blood_Stains.html