

Practical Exercise -- 6.163, Strobe Project Lab, Fall 2005

Instructor: Dr. J. Bales

Background

You will work in pairs to collect HSV images of a water balloon bouncing off of a table. Note - the balloon will not be popped, it will simply be dropped from a height of about 1 foot, and then bounce off of the table top. We have been told that the balloon "Goes flat as a pancake" and "Does really cool stuff" during this experiment.

The water balloons should be 4 to 8 inches in diameter. We expect that, even when "as flat as a pancake," they will be no more than 15 inches in diameter. You have two halogen lamps you may use.

Process

1. You and your partner (from your lab group) will attend only 90 minutes of your lab session during the week of Sept. 13. We will send the schedule by email.
2. We will have set out the materials and equipment needed for your selections below.
3. Take the imagery you deem necessary to create the deliverables required.

Deliverables

1. Submit a frame grabs (or screen shots) from an HSV sequence that allows us to measure the diameter of the balloon when it is essentially at its flattest.
2. Submit a video sequence (either .cin or .avi) that shows what you consider to be either representative behavior of the balloon, or the most interesting behavior of the balloon.
3. A short (1 to 3 page) informal report in which you
 - i. Determine the velocity of the balloon just before it impacts the table.
 - ii. Determine (as best you can) its velocity after it has bounced up off of the table.
 - iii. Estimate the fraction of the balloons kinetic energy lost in the collision.
 - iv. Report the lens and camera settings used for each image and video sequence submitted.
 - v. Include a copy of your lab notes.

Due by email to Dr. Bales & TA/Lab Manager by 5 PM the day before your Practical Exercise

- A) You must choose which of these lenses you wish to use.
Lens 1: 28 mm focal length; f/stops of f/16, to f/3.5, minimum working distance of 0.4 meters.
Lens 2: 50 mm focal length; f/stops of f/22 to f/2.8, minimum working distance of 0.45 m.
Lens 3: 200 mm focal length; f/stops from f/32 to f/4, minimum working distance of 0.71 m.
- B) You must choose the color of the balloon, and the tabletop. The background may be the same as the tabletop, a black curtain, or no background (except the back of the lab).
Balloon: White, Blue, Green, Pink, Yellow
Tabletop: White, Black, Bright Red, Bright Orange, Yellow
Background: Same as tabletop, Black curtain, White paper, None.
- C) Describe the position of the lamps and camera relative to each other and to the subject. Include the height of the lamps and camera! You can write it up, or make a sketch or drawing.
- D) Describe how you will make quantitative distance measurements.
- E) Your first HSV sequence must use the initial setup you specify in your email.