Checklist of Deliverables for Final Project

Chris Wilkens and David Rush

Juggling Simulator

Video Input (modifications to Javier's video module by Chris)

1. Reverse video and upgrade video buffer for color output
2. Downsample incoming video to utilize more of each frame

Video Processor (Chris)

1. Detect red pixels – This will first be accomplished using simple thresholds. If time permits, a more advanced approach may be attempted. This can be demonstrated by drawing "red" pixels as bright red on the screen.
2. Locate two hands – Hands will be located by computing the center of mass for red pixels. For simplicity, we assume that one hand is on the left side of the screen and one is on the right. This can be shown through the hand sprites of the output module.
3. Calculate hand logic – Convert position signals to logical motions. This logic can be demonstrated with output to the hex display, if necessary.
4. IF TIME PERMITS, convert video to RGB – Schedule permitting, the video stream will be converted from YUV to RGB for display. If this is not possible, the Y component will be used to display a grayscale image.

Output Module (Chris)

1. Display two hands – This will display two sprites for hands at the locations specified by the video processor.
2. Display 32 balls – This is the maximum number and is unlikely to appear normally, but it can be demonstrated using a test-jig.

Ball Management (David)

1. Demonstrate functional gravity simulator that controls balls in air (gravity set by switches) –can be shown as standalone with modified lab 4 code
2. Show that balls can be caught and thrown with the starting position and velocity of the hand when the hand throws
3. Show that balls can be caught by the hand when the hand is in a catch position and the ball is falling and in the proximity of the ball
4. Show that balls can be added and removed from the system by button inputs
5. Show that the system can be reinitialized by a reset button
6. Show that ball logic, position and velocity are stored in a BRAM module (output of BRAM can be shown in simulation if the whole module isn't working)
7. Show that display module outputs the correct ball number and location taken from BRAM when it is requested from the output module

Controller (David)

1. Demonstrate level to pulse signals for buttons to add and remove balls and reset
2. Demonstrate debounced gravity signals from switches