

David Rush and Chris Wilkens

6.111 Final Project

Project Abstract

For our final project, we propose to build a juggling simulator. The simulator will take input from a video camera to locate the juggler's hands and display virtual balls on a screen. More specifically, the simulator will consist of four components: a controller, a video analyzer, a ball manager, and an output module. The most autonomous part of the system will be the controller. This module will handle parameter delegation to the various components of the system and synchronization. The second component, the video analyzer, will parse incoming images to determine the location and velocity of the juggler's hands, likely using special gloves to differentiate them from the rest of the image. It will then convert this information to logical motions, such as "throw" and "catch," that will be sent to the ball manager along with the position and velocity data. In addition, this module will send the raw camera image to the output module for display. The third and most central element of the system is the ball manager. This module takes the hand information from the video processor and determines the location and velocity of all the balls on the screen, computing physics and writes the appropriate pixel data to an output buffer for display. A particular feature of the ball manager is that it supports an arbitrarily scalable number of balls that can be dynamically modified. It also allows the user to change key parameters, such as gravity, to modify the juggling experience. The final module of the design is the output module. This takes the camera image and the buffered ball information and sends it to an analog X VGA output. Ultimately, this system should permit a person to realistically juggle an arbitrary number of balls and to

dynamically add and remove balls from the pattern. The balls will be overlaid on the camera image and displayed on a screen. If time permits, this would be extended to a two-player version in which the controller modules of two implementations communicate to allow pass-juggling. Our current plan is for David to implement the large ball manager module and for Chris to build the other components that surround it.