

An Interactive, User-driven Physics Simulator

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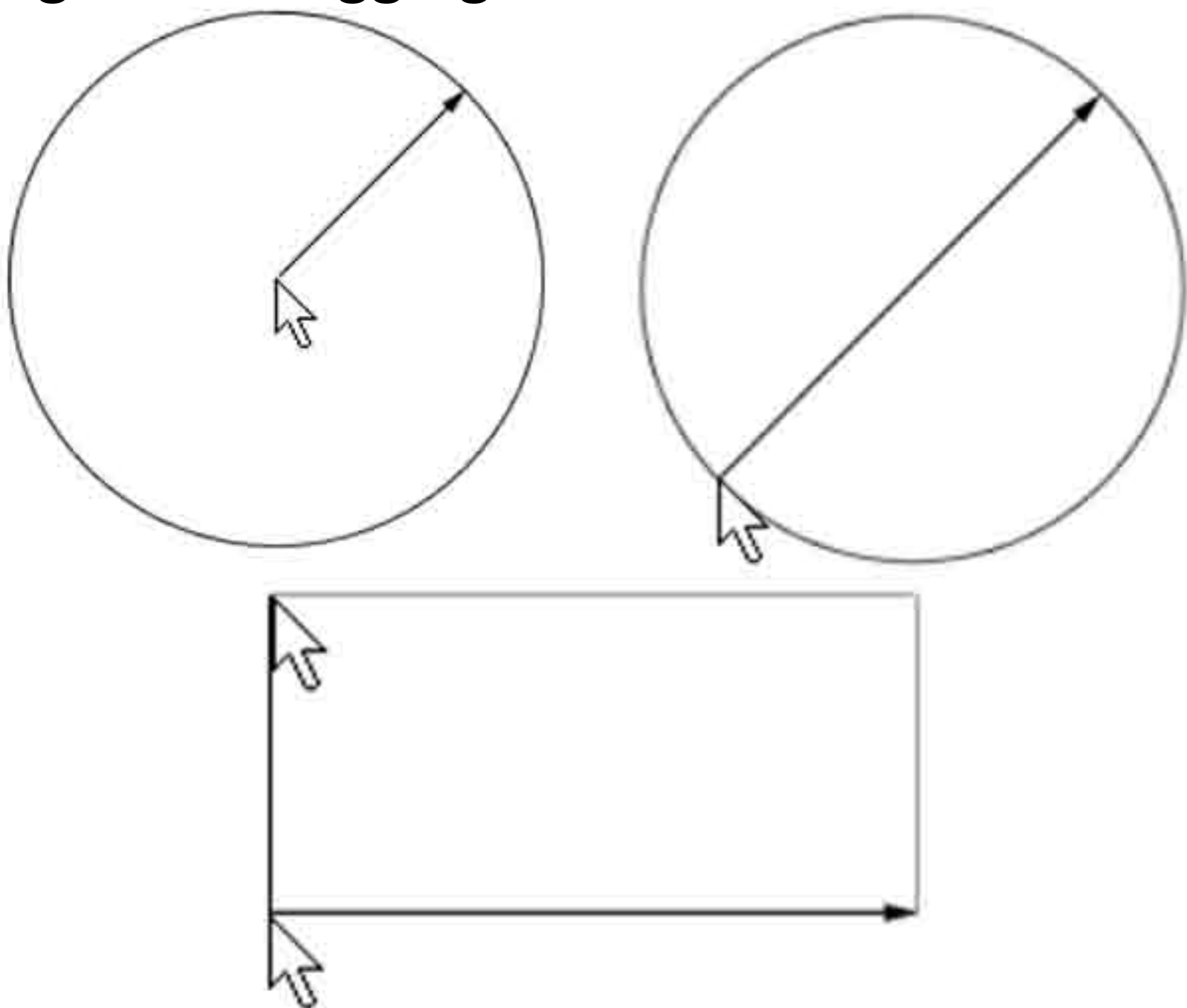
TJHSST Computer Systems Lab, 2007-2008

Abstract

Physics simulations are often of single concepts or immune to user control. My project aims to change that by allowing users to create a situation and then simulating the behavior of objects in that situation. Users will create objects through shape tools, then the program will convert them to polymorphic objects and run the simulation. Objects varying from the simple to complex will be modeled: single shapes or multiple shapes connected statically or with axles.

Input

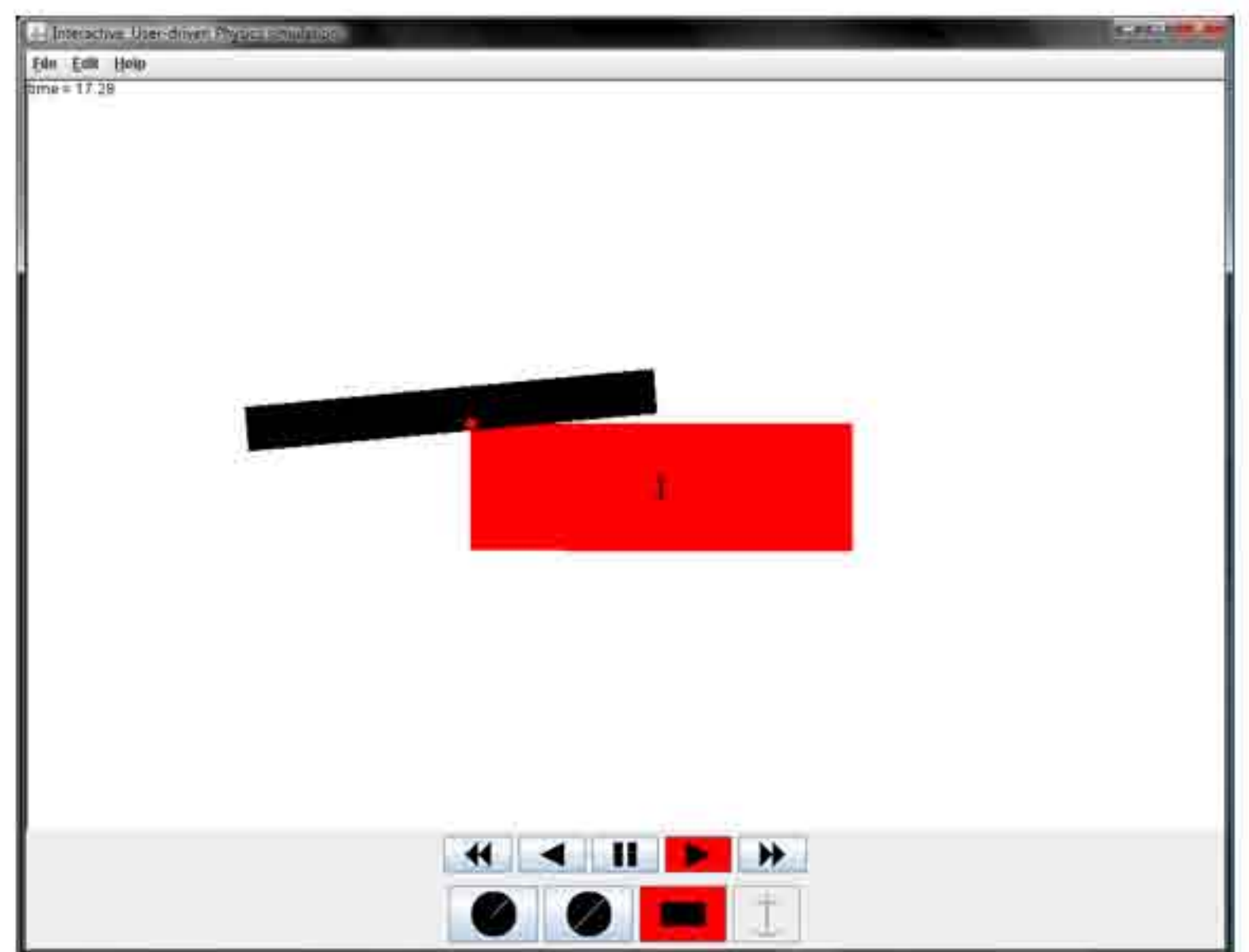
Although users cannot draw in my program, I wanted to employ an intuitive input method. I came up with two methods of creating circles and one of creating rectangles. They are explained in the diagrams below. An image of a cursor signifies a click, while a line with an arrow signifies dragging.



Background

ASSIST, the program that inspired my project, was made by a team at MIT. In ASSIST, the user uses a “sketchpad” system to draw a situation, which is then interpreted and fed into a commercial physics simulator. It was designed to help engineers in the beginning stages of planning a project, when precision matters less than ideas. My project is similar to ASSIST but focuses more on the physics of the user’s situations than on the sketching system.

Screenshot



Preliminary Results

My program accurately represents projectile motion and collisions with walls without regard to friction, and with an elasticity of one. It also detects collisions between rectangles and can resolve them to some degree. More work is needed to finish collision modeling.