

PROJECT DESCRIPTION

Requirement : Create a simulation system similar to the system in this source :
http://phet.colorado.edu/sims/html/forces-and-motionbasics/latest/forces-and-motion-basics_en.html (“Acceleration” module)

Description: In the simulation, the user controls a physical system. The system includes three components: one main object, the surface (which is always horizontal) and an actor who can apply a horizontal force on the object. The user can control all the components of the physical system and observe the motion of the main object, specifically:

- The main object: The user has two option for the main object, either a cube-shaped object or a cylinder-shaped object. For each type of object, the user can also specify the desired parameter as follows:

Object type	User controlled parameters
Cube-shaped object	<ul style="list-style-type: none">- Side-length (cannot exceed a maximum threshold)- Mass
Cylinder-shaped object	<ul style="list-style-type: none">- Radius (cannot exceed a maximum threshold)- Mass

To set up the main object in the system, the user can drag an option from the object menu on the bottom left onto the surface, then click on the object, and provide the parameters in the context menu that pops up.

- The actor: The actor always applies force on the center of mass of the main object. Unlike the reference, you don’t need to represent the actor with an actual figure, instead, instead, the actor is represented by the force it applies. This force can be represented with a horizontal arrow. To control the strength and direction of the applied force, the user can use the bottom center panel by using the sliding bar or specify the number of Newtons in the textbox.
 - The surface: The user can control the friction coefficients of the surface in the bottom right panel. There are two friction coefficients: static friction coefficient and kinetic friction coefficient. For each coefficient, the user can control its value through a sliding bar and a text box. Note that the value of the static coefficients must be higher than the value of the kinetic coefficient.
- + To simulate motion, we recalculate the position of the main object after each time interval Δt .
- + Throughout the motion simulation process, the user can
- Change the applied force as well as the friction coefficients of the surface.
 - Pause, continue and reset the simulation.
 - Choose to show or hide detailed information such as the forces, the sum of forces, the values of forces, the mass, speed and acceleration of the main object through the corresponding tick-boxes on the panel on the upper right:
 - The forces and sum of forces are displayed as arrows like in the reference.
 - The masses are displayed as text on the main object like in the reference.
 - The speed and acceleration are displayed as text on the upper left corner.