**HANOI UNIVERSITY OF SCIENCE AND TECHNOLOGY**



**OBJECT ORIENTED PROGRAMMING**

**MINI PROJECT REPORT**

**INTERACTIVE SIMULATION OF THE COMPOSITION OF FORCES**

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**Hanoi, 7/2022**

1. **Mini-project description**

* Project create a simple interactive simulation for demonstrating Newton’s laws of motion.
* The system includes three components: one main object, the surface, forces which apply to object.
* The user can control all the components as:

+ Select the shape of the object by dragging and dropping it in the center of the screen

+ Click right mouse to open, close menu to change the parameters of object

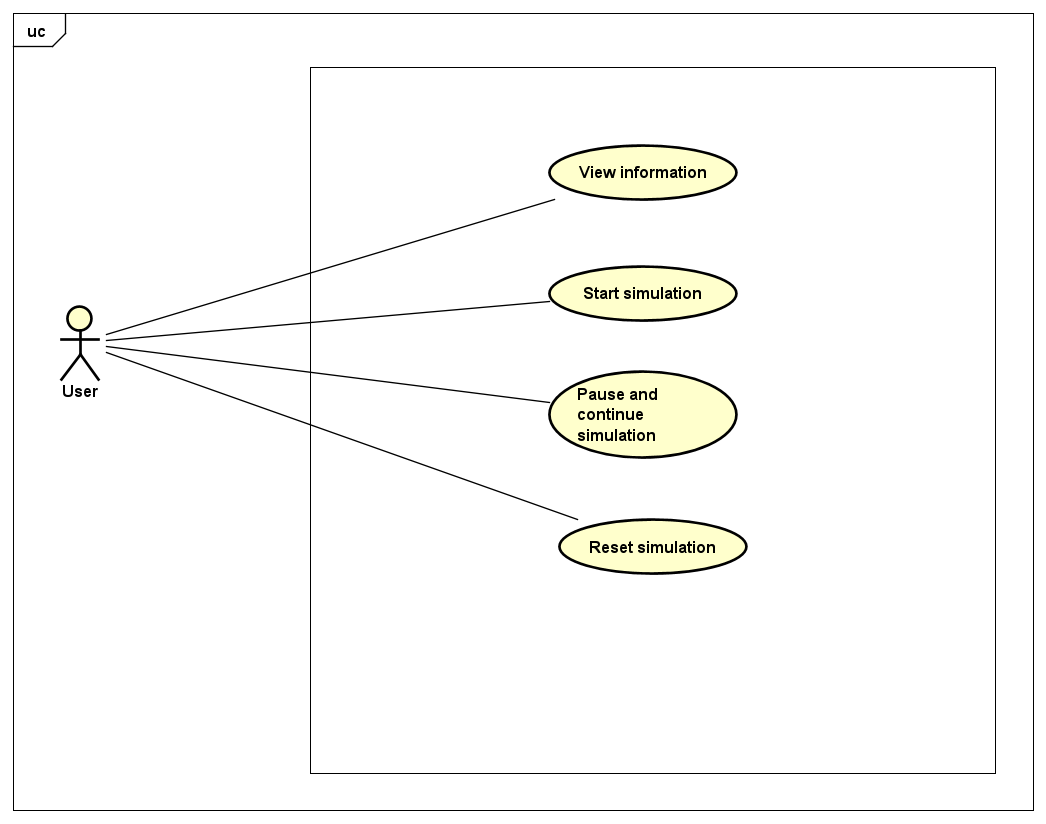
+ Change the external force parameter

+ Change coefficient of friction

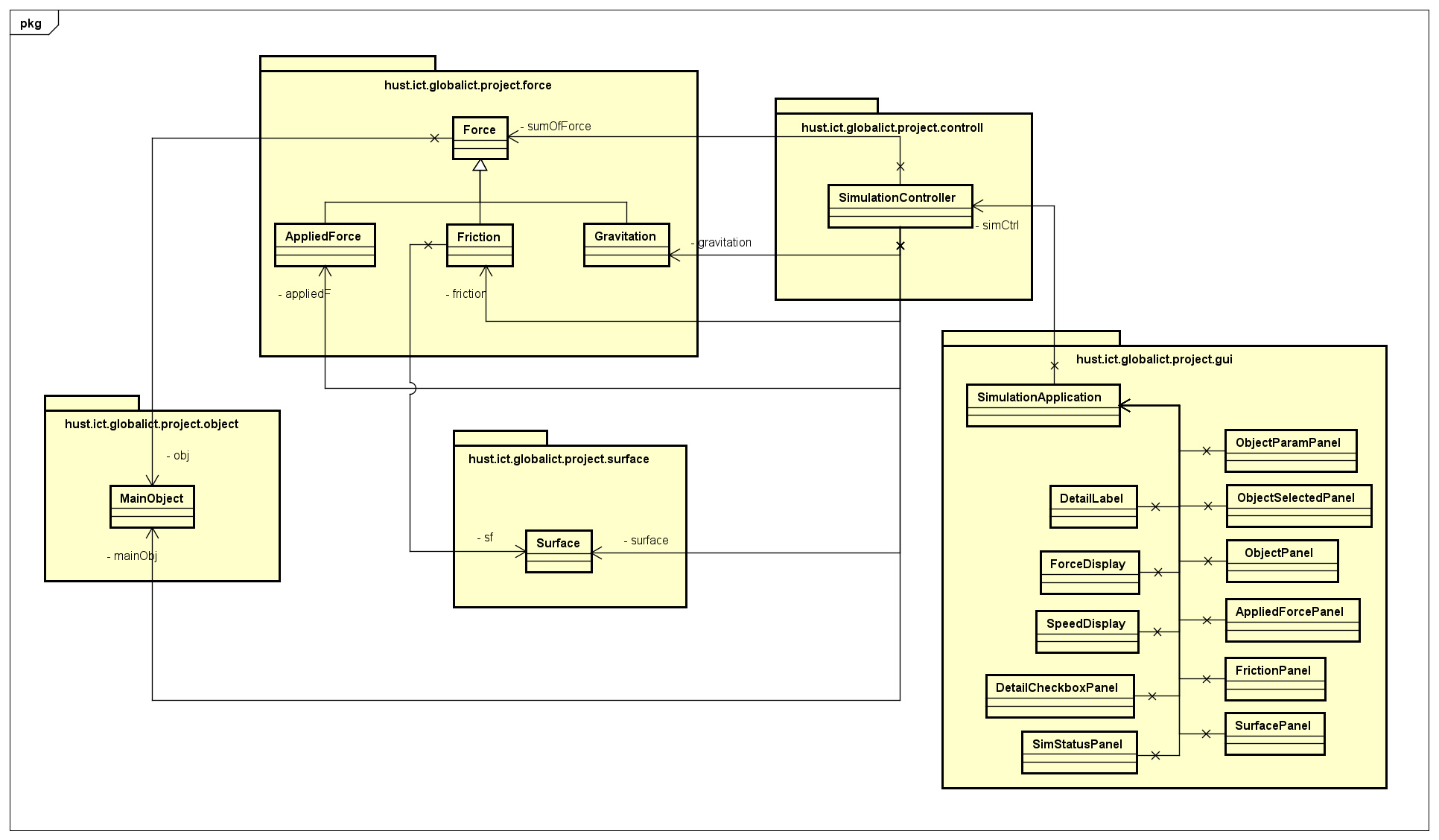
+ Checkbox in the upper corner to select the parameters you want to see details

+ pause: pause the program, continue: continue, reset: reset: run the program again.

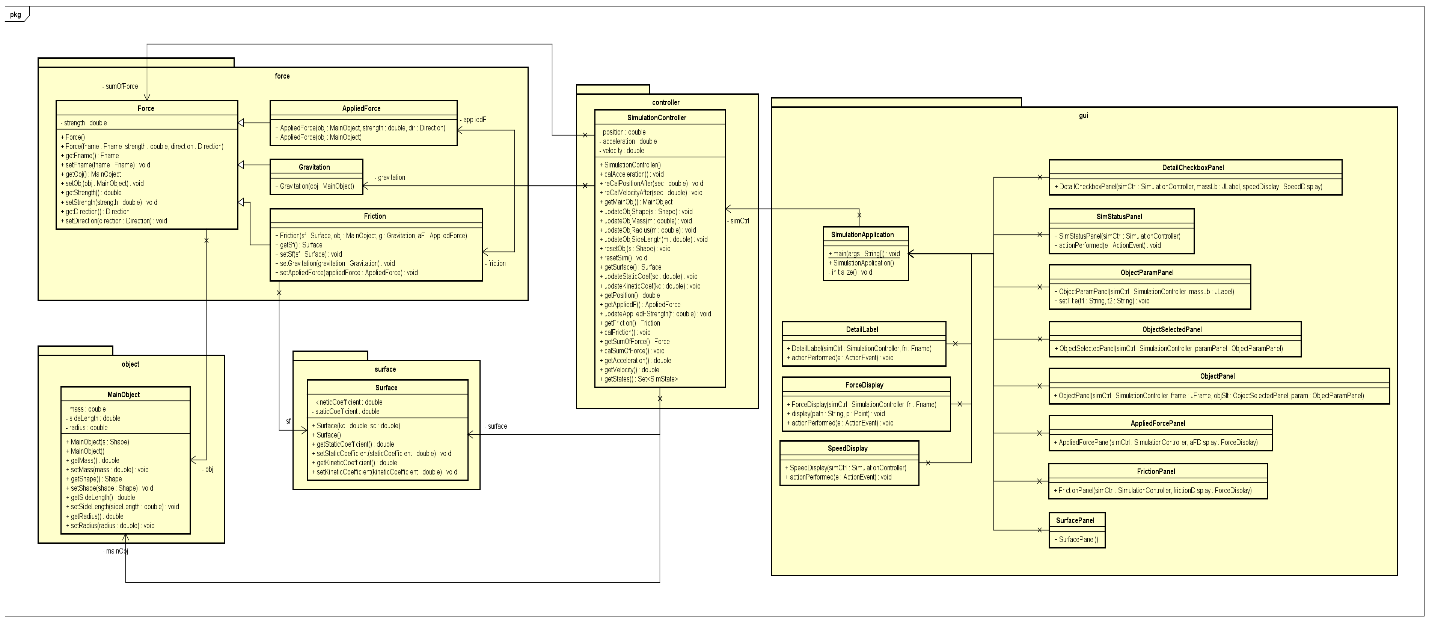
* Program will calculate forces, sum of force, acceleration, current velocity, current position every 1 second.
* Use case diagram :

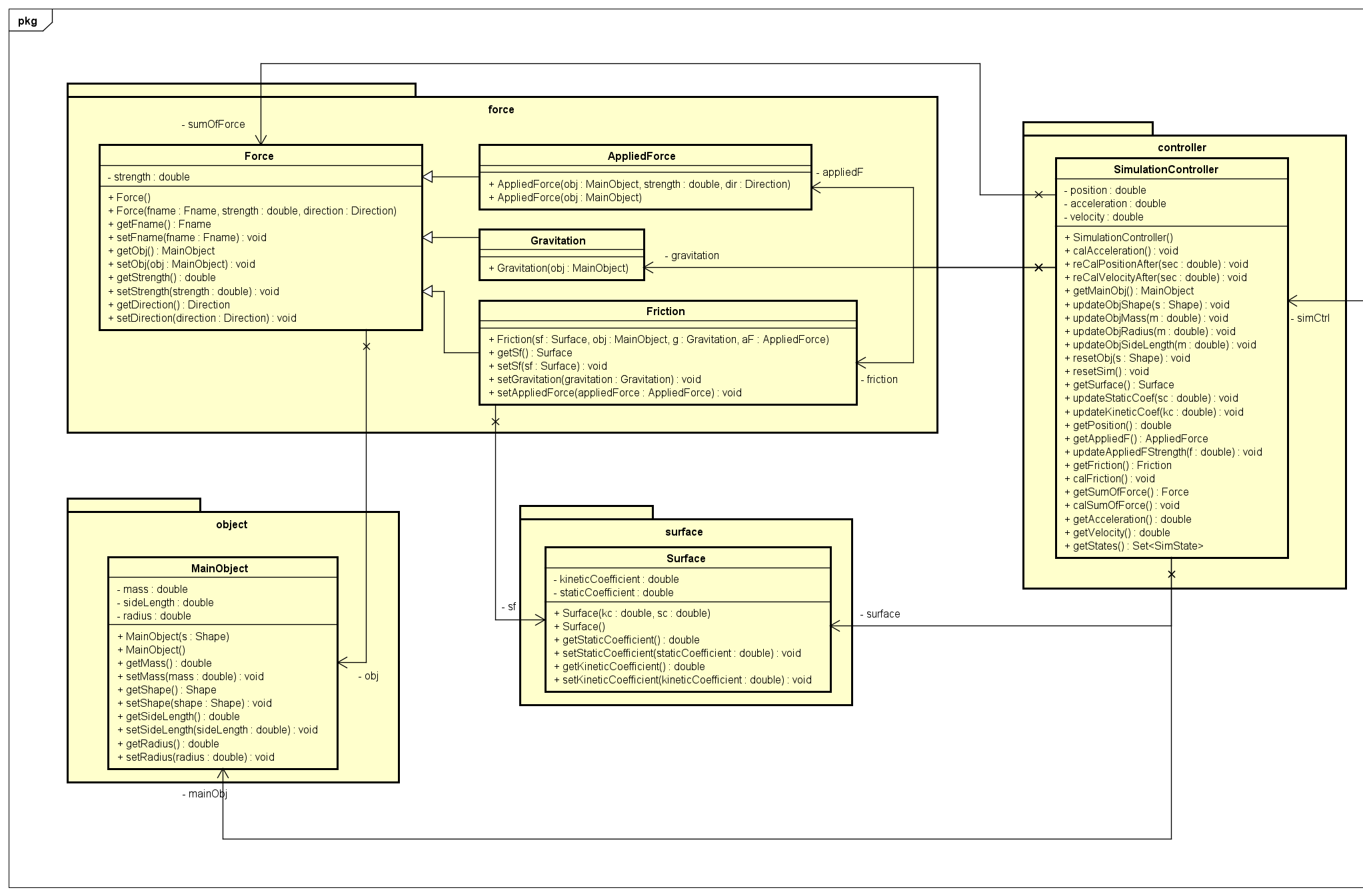


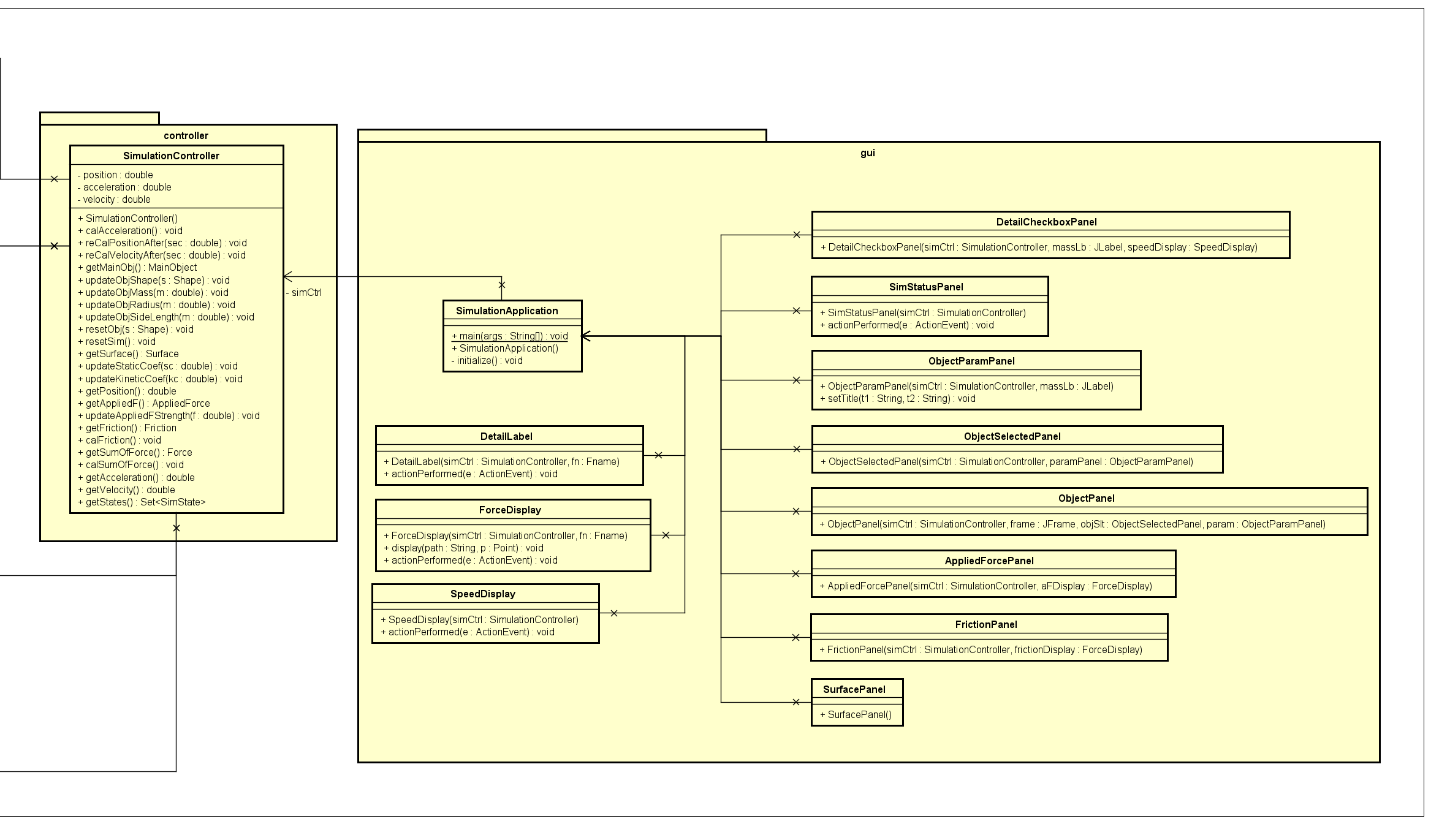
1. **Classes and Packages**
2. **Class Diagram**
   1. **General class diagram**

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**1.2. Detail class diagram**

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* Explanation of the design: Describe the relationships between classses:

+ Class relationship:

* Class AppliedForce, Gravitation, and Friction inherit class Force
* In package “hust.ict.globalict.project.gui”: class SurfacePanel, AppliedForcePanel, DetailCheckboxPanel, FrictionPanel, ObjectPanel, ObjectParamPanel, SimStatusPanel, SpeedDisplay inherit Jpanel
* Class ForceDisplay, DetailLabel, ObjectSelectedPanel inherit Jlabel
* Class SimulationApllication inherits Jframe
* Class MainObject and Force have one-to-many relationship
* Class SimulationController and MainObject have one-to-one relationship
* Class SimulationController and Surface have one-to-one relationship