

## Pinball game: ball hitting obstacles

The game description is as follows. Implementation is a matter of student's creativity. For parts not concretized, the student should make reasonable assumptions and implement the elements accordingly.

The game is partially based on the famous pinball game. The game can be played with more than one ball, and results are kept separately per each ball and shown by the game. The goal of the game is to reach a pre-defined score with a ball at a time. Once the game with a ball comes to an end, the player can enter a new ball into the playfield. The game can be played with up to 3 balls.

It contains the **plunger** (as spring-loaded rod) to fire the ball into the playfield. The force of the plunger can be regulated to direct the ball into a specific part of the playfield at the start of the game. During the gameplay, the plunger is used only if a new ball should be added to the playfield.

The **playfield** consists of the textured **basis** that is inclined towards the players so that the ball(s) are returned to them. The tilt of the basis can be controlled by the player.

Next, it contains **holes** that give points to the player. **Regular** holes take in a ball and shoot it out into the playfield, in a random direction. On the other hand, the **bonus** holes take a ball, provide bonus points, but won't give the ball back. After a ball has been taken by a bonus hole, the player has to fire the ball back into the game with the plunger.

The ball hits and bounces off the **obstacles**. The **targets** are special areas of obstacles where the player receives points when the ball hits them. The **bumpers** are represented as rounded knobs and can be either **passive** (i.e., they do nothing when hit by the ball) or **active** (i.e., jet bumpers that are activated once the ball touches them and propel it away).

**Flippers** are controllable levers used by the player to direct the ball towards a certain direction to hit targets, bumpers or holes for scoring points. There should be an empty space between the flippers when they are the closest to each other, as in a real pinball game. It is not expected that the hit ball's motion is highly accurate and realistic. However, the implementation should balance the simulation and reality so that a ball's movement does not leave an unrealistic impression during gameplay (e.g., experimenting and adjusting with the model/function that describes the motion).

The gameplay should meet the following requirements:

- The player can choose how many balls the game will use (up to 4).
- The game has a predefined target score to reach.
- The game starts with the first ball entered by the plunger, and finishes when each ball's gameplay reaches the target score or the ball falls down between the two flippers.
- The force of the plunger can be regulated by the player (e.g., duration of the key/button press).
- The tilt of the playfield's basis can be adjusted by the player (e.g., increasing/decreasing the angle).
- The game contains at least 3 bonus holes and 3 regular holes.
- The game includes at least 3 obstacles, where each has 2 targets.
- The game introduces at least 3 passive bumpers and 3 active bumpers.

- The way players provide input is a matter of choice (keyboard and/or mouse).
- There should be instructions for players on the input commands (for example, keys for specific actions).