

# **PA10 Pinball**

# **Instruction Manual**

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# Overview

## Dependencies

For both of the operating systems to run this project installation of these five programs are required [GLEW](#), [GLM](#), [SDL2](#), [assimp](#), [ImageMagick++](#), and [Bullet](#)

To install assimp, the linux terminal command is

```
sudo apt-get update
sudo apt-get install libassimp-dev
```

To install ImageMagick++, the linux terminal command is

```
sudo apt-get update
sudo apt-get install libmagick++-dev
```

To install Bullet, the linux terminal command is

```
sudo apt-get update
sudo apt-get install libbullet-dev
```

This project uses OpenGL 3.3. Some computers, such as virtual machines in the ECC, can not run this version. In order to run OpenGL 2.7 follow the instructions at [Using OpenGL 2.7](#)

## Extra Credit

### Rubric Defined Extra Credit:

- This program allows the user to use varying plunger speeds based on how long the key is held

- This program has a spotlight on the ball with radius and intensity adjustments
- This program keeps track of the top 10 scores
- This program has bumpers that bounce but they do not light up.

#### **Considerations:**

- This program has the ability for the user to use a free camera
- This program has an advanced game over menu system
- This program has a leaderboard system that prompts the user for a name before playing
- This program uses a trigger system that allows the ball to go back into the launch area and be constrained to one axis while in the launch area

## **User Manual**

### **Building and Running**

To build this project we use CMake which makes including new libraries easier, and handles new files added automatically to the src and include directory. CMake is a small new learning curve but makes things easier in the future.

To install Cmake, the linux terminal command is

```
sudo apt-get update
sudo apt-get install cmake
```

Running the make in a separate directory will allow easy cleanup of the build data, and an easy way to prevent unnecessary data to be added to the git repository.

### **CMake Instructions**

The building of the project is done using CMake, installation with apt-get or brew may be necessary. Later use with CMake and Shader files will be require the copy of a directory where those files are stored (ex. shaders). To do this in the `add_custom_target` function place

```
COMMAND ${CMAKE_COMMAND} -E copy_directory ${PROJECT_SOURCE_DIR}/shaders/
${CMAKE_CURRENT_BINARY_DIR}/shaders
```

```
mkdir build
cd build
```

```
cmake ..  
make  
./Pinball
```

## Run Instructions

After building the project, the executable can be ran.

In the PA10 directory, enter the following commands into the terminal:

```
mkdir build  
cd build  
cmake ..  
make  
./Pinball
```

## Ubuntu.cse.unr.edu

---

OpenGL 3.3 will run on the [ubuntu.cse.unr.edu](http://ubuntu.cse.unr.edu) website. To do so follow the build instructions, but when running the Tutorial executable use this line to execute.

```
/usr/NX/scripts/vgl/vglrun ./Pinball
```

## Keyboard/Mouse Input Guide

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ESC - must be pressed to close the window (or right-click on the task bar and select close).

TAB - change selected light

1 - decrease specular brightness of board with selected light

2 - increase specular brightness of board with selected light

3 - decrease specular brightness of ball with selected light

4 - increase specular brightness of ball with selected light

5 - decrease specular brightness of flippers with selected light

6 - increase specular brightness of flippers with selected light

7 - decrease specular brightness of cylinder obstacle with selected light

8 - increase specular brightness of cylinder obstacle with selected light

9 - decrease specular brightness of the plunger with selected light

10 - increase specular brightness of the plunger with selected light

'-' - decrease ambient brightness of selected light

'=' - increase ambient brightness of selected light

']' - increase diffuse brightness of selected light

'[' - decrease diffuse brightness of selected light

',' - increase spotlight angle (radius) of the spotlight following the ball

',' - decrease spotlight angle (radius) of the spotlight following the ball

M - change camera mode

W - move camera forward

A - move camera to the left

S - move camera back

D - move camera to the right

Up Arrow - if in game mode, move up. If in free mode, tilt camera up

Down Arrow - if in game mode, move down. If in free mode, tilt camera down

Left Arrow - if in free mode, tilt camera left

Right Arrow - if in free mode, tilt camera right

Lshift - flip left flipper

Rshift - flip right flipper

Enter - use the plunger (hold to pull, let go to release)

SpaceBar - Toggle Lighting Mode (default is Vertex Based)

## **Tech Manual**

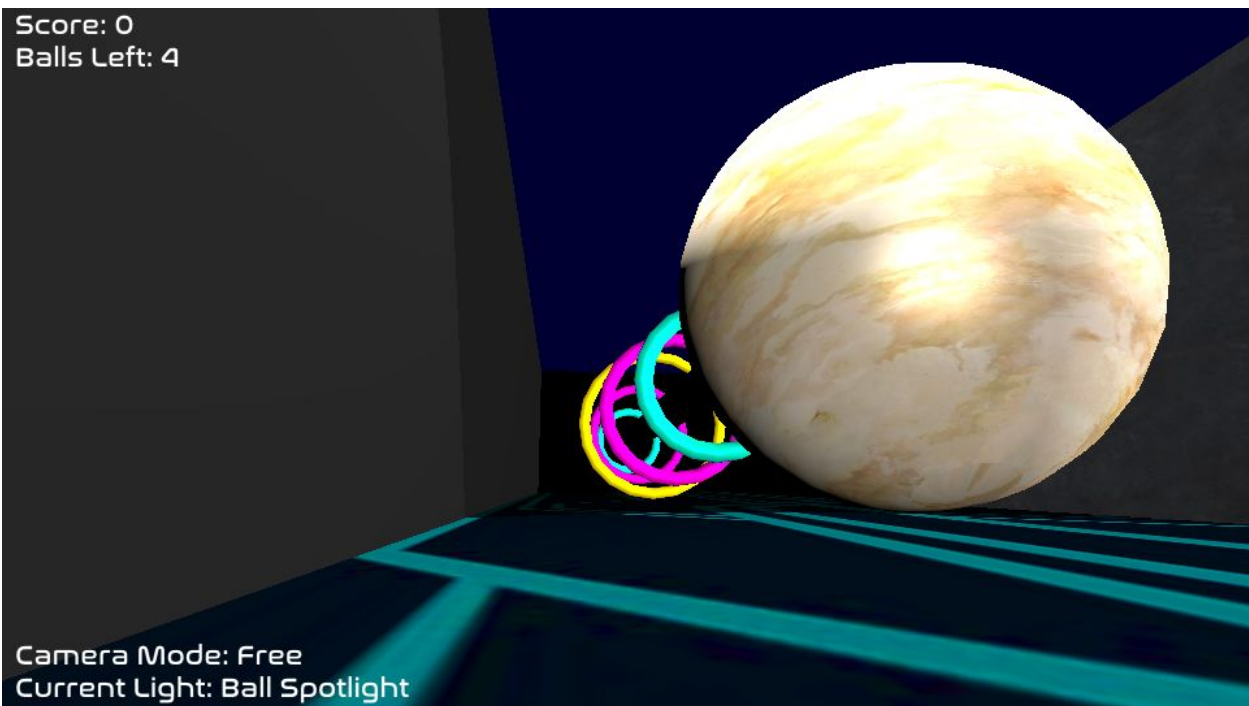
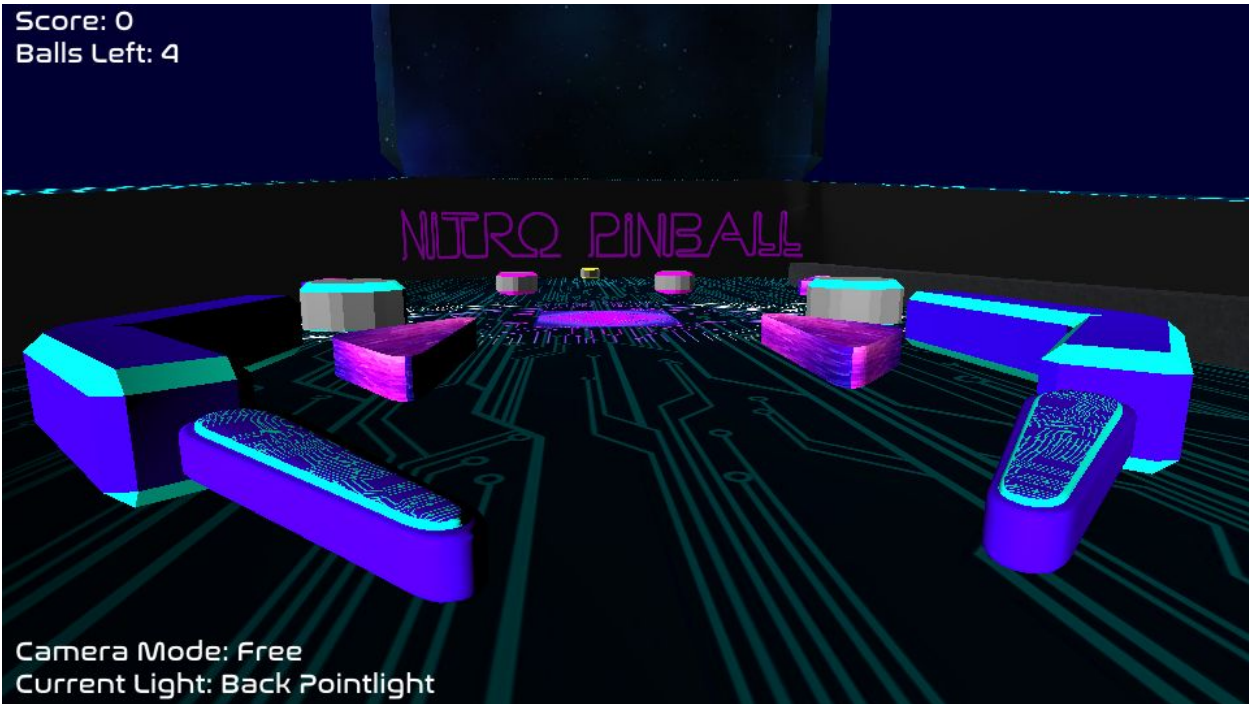
### **Issues and Bugs**

- If flipper is pressed during first frame, it slightly moves position
- Bounciness is hard to notice sometimes, though restitution is high. Other times it's very powerful
- If collision is too fast, the collision messes up
- Board texture makes light hard to notice

### **Changes made after Wednesday**

- New textures and models
- Scoring system
- GUI
- Leaderboards
- Free camera mode
- Better lighting adjustments

## **Screenshots**





Score: 0  
Balls Left: 4

Camera Mode: Free  
Current Light: Front Pointlight

Score: 0  
Balls Left: 2

Camera Mode: Free  
Current Light: Front Pointlight