Balloon Simulator

User Manual

# Acknowledgements

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# Introduction

Thank you for downloading and using Balloon Simulator as part of your classroom’s curriculum. We hope that you will find our software easy to use and reliable. This software was designed as part of a classroom project in CS4500 in the Fall of 2019, and released for public use by its developers.

## What is Balloon Simulator?

Balloon Simulator is an open source project with the objective of providing a product to schools that is easily accessible and supports the advancement of S.T.E.M education in primary and secondary education. The goal of Balloon Simulator is to give students an insight into the physical properties of matter and physics by simulating a balloon filled with helium, whose properties can be tweaked and recorded to look for relationships between various properties of geometric shapes and physical forces.

## How do I get started?

Getting started with balloon simulator is easy. Simply download one of our precompiled packages, extract it, and run it.

Balloon simulator comes preconfigured for various grade levels. These are as follow:

K – 2

* Color wheel that adjusts balloon color
* Radius slider that adjusts the balloon’s radius when adjusted

3 – 5

* Everything from K – 2 EXCEPT color wheel PLUS
* Data boxes which display the metrics about the balloon

6 – 8

* Everything from 3 – 5 PLUS
* Graphing functions that allow plotting points on a graph
* Wind Slider which allows an additional force to be applied to the balloon

## What if I want to customize what is available/visible?

Go to the location where you downloaded this package, go to the folder named BalloonSim\_Data, then go to the folder named Config. Inside, there is a file named config.json. Inside, you can adjust which elements will be accessible to the users. Simply adjust the values inside to your desired values.

Full path:  
%path\_to\_downloaded\_package\_folder/BalloonSim\_Data/config/config.json

# Operation Manual

In this section, there will be detailed information about each user-accessible component of this package.

## Section 1: User Interface elements

### Section 1: Color Wheel

### Section 2: Radius / Wind Slider Switch Box

### Section 3: Radius Slider and Buttons

### Section 4: Data Box

The Data Box displays properties of the balloon, such as its radius, surface area, volume, and upwards force it can exert with the current amount of helium that is present inside of it. This value does NOT include the side wind forces that are applied to the balloon.

• Radius is in METERS

• Surface Area is in METERS SQUARED

• Volume is in METERS CUBED

• Forces is in NEWTON METERS

### Section 5: Wind Slider

### Section 6: Graph