600086 Lab Book CUDA

# Week 7 – Lab G

Date: 25th March 2025

## Q1. Drawing based on a canvas of size [-1, 1] x [-1, 1]

### Question:

Understand how to draw a disk based on pixel coordinates defined in float type variables.

### Solution:

A computer screen with text and numbers

AI-generated content may be incorrect.

A screen shot of a computer program

AI-generated content may be incorrect.

### Test data:

N/A

### Sample output:

N/A

### Reflection:

I can produce disk-based drawings that are based on pixel coordinates by using positional values acquired through simple calculations using existing values.

### Further information:

N/A

## Q2. Write a simple ray caster

### Question:

Create a simple ray caster using samples provided in CUDA.

### Solution:

A computer screen with text and numbers

AI-generated content may be incorrect.

A screen shot of a computer program

AI-generated content may be incorrect.

A screenshot of a computer

AI-generated content may be incorrect.

Code and solution at the start of the lab.

A screenshot of a computer program

AI-generated content may be incorrect.

A screenshot of a computer

AI-generated content may be incorrect.

Downloading and adding the required header files into the project.

A black screen with white text

AI-generated content may be incorrect.

Modifying the variables A and B inside the ray.h header file to be O and DIR.

A computer screen with many colorful text

AI-generated content may be incorrect.

A screen shot of a computer code

AI-generated content may be incorrect.

Adding in sample code that was provided in the lab. The methods check\_cuda, castRay, create\_world and free\_world are there to facilitate checking whether or not CUDA has had a problem, determining where the rays are going to cast and casting them, creating the world that will act as a box or container and freeing up the resources that were used by the program when they are no longer needed.

A computer screen shot of a program code

AI-generated content may be incorrect.

Modifying d\_render() using code that was provided in the lab. This changes makes it so instead of rendering a red circle, it instead red circle, it instead renders the small world that will house the sphere as well as the sphere itself and the rays that it will need.

A computer screen shot of a program code

AI-generated content may be incorrect.

Modifying the render function so it handles the initial creation of the sphere and the world before passing them on to the d\_render function.

A screenshot of a computer

AI-generated content may be incorrect.

When the code is run, this is the output.

A screen shot of a computer program

AI-generated content may be incorrect.

Modifying create\_world to create 11 spheres instead of 1.

A screenshot of a computer

AI-generated content may be incorrect.

When the code is run, the output looks like this.

### Test data:

N/A

### Sample output:

N/A

### Reflection:

After completing this lab, I have started to get grasp on how CUDA can be used to render shapes and colours into a 3d world using a simple ray caster. The raycaster also helps determine how the colours of the sphere will be rendered with it simulating a position of a light shining on the sphere and the colours representing where the light will fall on the sphere.

### Further information:

N/A