

ID5130 - Project Abstract

Ray Tracing Algorithm for Donut Rendering

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The project focuses on implementing a ray tracing algorithm in C++ to render a torus (donut) shape. Then optimize the rendering process using parallel programming. Ray tracing is a fundamental technique for generating realistic images by simulating the path of light rays as they interact with objects in a scene.

We use an analytically defined 3D model of a Donut as an object for rendering.

The rendering of the object is done by looping through each pixel on the image plane and casting a primary ray from the camera to the particular pixel in the image and extending it further into the 3D space to intersect the donut. The ray-torus intersection is checked, and a color is assigned to the pixel based on the angle between the ray and the light source.

Generating primary rays from the camera's viewpoint can be parallelized by assigning different pixels of the image to different processing units. Checking for intersections between primary rays and the torus surface can be parallelized by distributing the intersection tests for different rays across multiple threads or processing units.

Overall, this approach lays the foundation for a complete ray tracing system with a camera model, image buffer, and lighting effects to render a realistic torus shape.