

A hand is shown holding a Rubik's Cube against a vibrant red background. The hand is positioned on the left side of the frame, with the fingers spread out. The Rubik's Cube is a standard 3x3 cube with various colored faces (red, blue, yellow, green, orange, white) visible. The background is a solid, bright red, creating a strong contrast with the hand and the cube. The overall composition is simple and focused on the cube and the hand.

HOW COMPLEX IS A RUBICK'S CUBE

A standard 3x3 Rubik's Cube has

43,252,003,274,489,856,000

(43 quintillion) possible configurations.

A close-up photograph of a person's hand holding a Rubik's cube. The hand is positioned on the left side of the frame, with fingers spread, holding the cube. The background is a vibrant red, possibly a curtain, which is slightly out of focus. The lighting is dramatic, highlighting the hand and the cube. The Rubik's cube is a standard 3x3x3 cube with various colored faces (red, blue, yellow, green, orange, white) visible. The overall composition is artistic and visually striking.

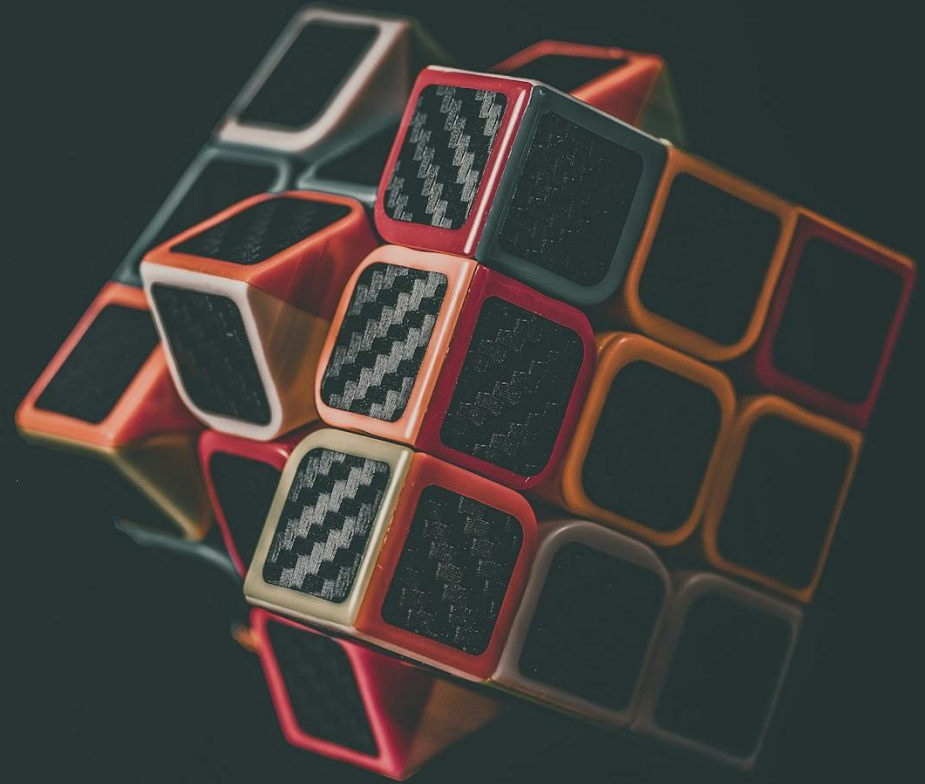
HOW COMPLEX IS A RUBICK'S CUBE

That's more than:

- The number of stars in the Milky Way
- The number of grains of sand on Earth
- Or even the number of atoms in your body

3D Rubick's Cube Simulation

Presented by Speedcubing club



THIS PROJECT IS ALL ABOUT

Taking any one of those 43 quintillion states and bringing it to life with 3D animation.

OVERVIEW

This project involves building a fully interactive and visually appealing 3D simulation of a Rubik's Cube. The cube should support real-time rotation, cube-face turns, scrambling, solving algorithms, and user input via keyboard/mouse. The project will focus on using graphics programming and 3D transformations while also incorporating puzzle logic.



OBJECTIVES

- To simulate a functional 3D Rubik's Cube using computer graphics.
- To provide hands—on experience in graphics libraries like OpenGL or Three.js.
- To model the cube's internal logic to handle rotations, face turns, and color mapping.
- To develop visualization and interaction techniques for an intuitive user experience.



TIMELINE



Week 1

Introduction to Rubik's
Cube logic, project
setup, tool/library
selection.



Week 2

Implement cube data
structure and face
rotation logic.



Week 3

Introduction to 3D
rendering basics
(OpenGL/Three.js); render
static cube.



TIMELINE



Week 4

Add user interaction for face rotation and cube manipulation.



Week 5

Implement cube scrambling and basic solving algorithms (e.g., layer-by-layer).



Week 6

UI polishing, add optional animations, and debug.



TIMELINE

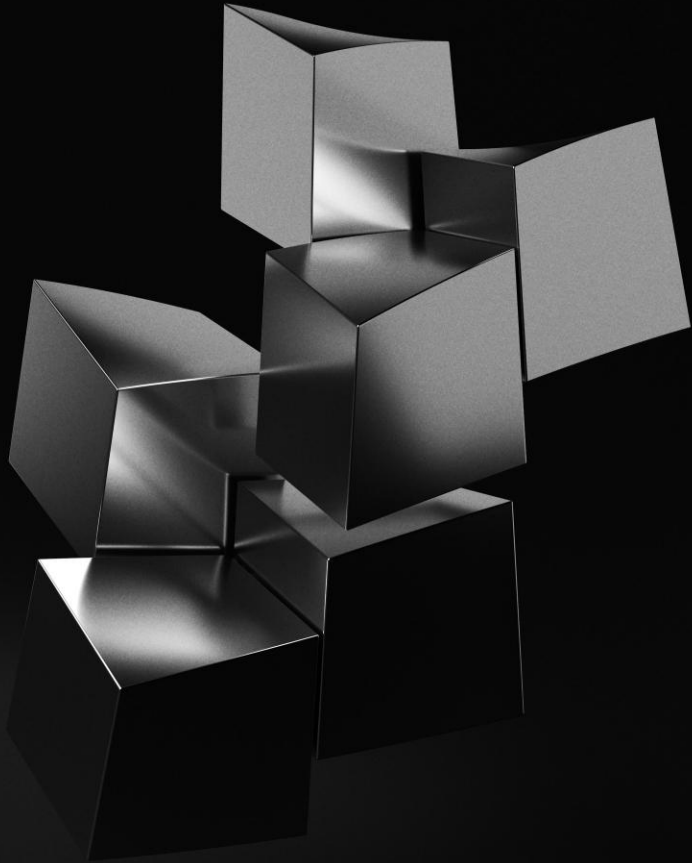
... and finally



Week 7–8

Final review,
documentation, and
presentation.



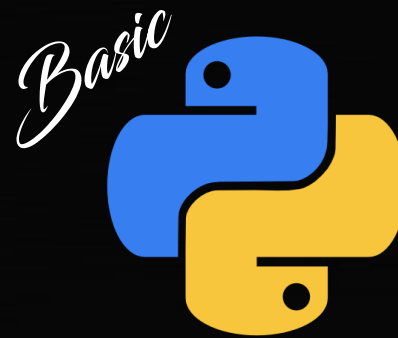
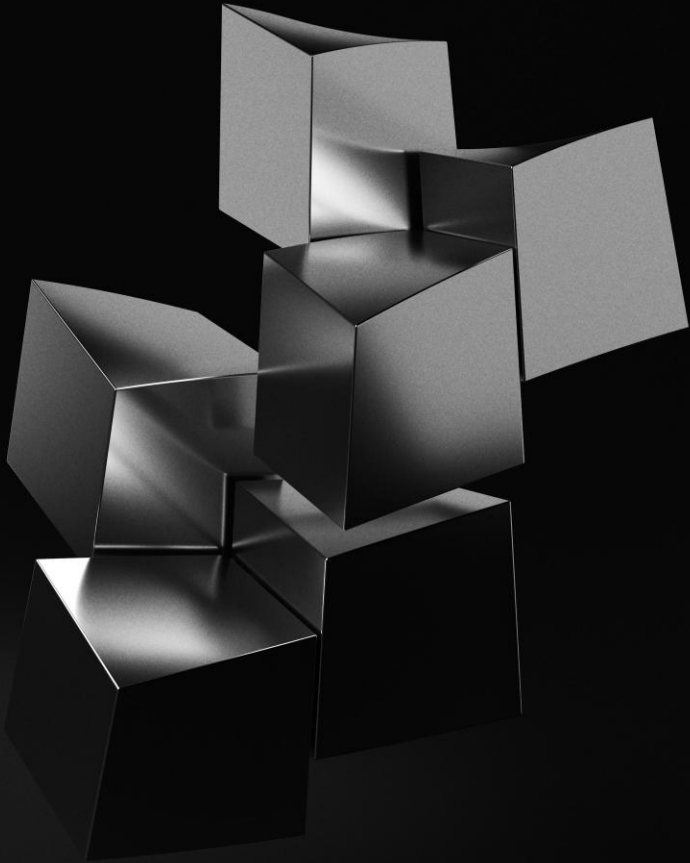


DIFFICULTY

Beginner to Intermediate

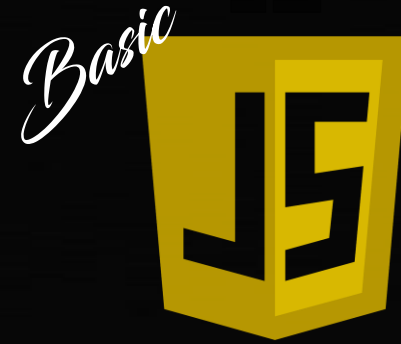
It involves 3D transformations, understanding Rubik's Cube algorithms, and implementing visual interaction, which makes it ideal for those with basic coding and a desire to dive deeper into graphics or puzzle logic.

PRE- REQUISITE



Python

or



JavaScript

- Familiarity with a graphics library (e.g., OpenGL, Three.js, or Unity) is a plus.
- Logical thinking and an interest in puzzles (Rubik's Cube knowledge is a bonus!).

MENTORS



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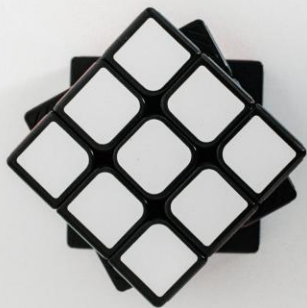
Expected number of mentees : 10–12

Work Load : 6–8 hr/week

OUTCOME

By the end of this project, mentees will:

- Have a deeper knowledge in how a Rubik's cube works and its hardware details
- Improve problem—solving skills through algorithmic thinking.
- Understand and implement 3D transformations and rendering.
- Gain hands—on experience with a graphics library (OpenGL/Three.js).
- Learn how to model real—world objects and their internal state transitions.
- Gain experience in collaborative development and version control (Git/GitHub).



THANK YOU

If you are curious, you'll find the puzzles around you. If you are determined, you will solve them.

-ERNO RUBIK