



Department of Computer Science

University of Sri Jayewardenepura

CSC 317 1.5 Human Computer Interaction

Group Project – Project Proposal

Project Title: Kaleidoscope Snowflake Generator

Snow KaleidoCraft Studio

Head of the Course Unit

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DECLARATION

We, the undersigned members of our group, hereby declare that the group project titled "Kaleidoscope Snowflake Generator " is our collective work. We have prepared this project in accordance with the guidelines and requirements provided by the Department of Computer Science, University of Sri Jayewardenepura for the submission of group projects.

We jointly confirm that:

1. The information presented in this project is accurate to the best of our collective knowledge.
2. The content of this project is original, and any external sources or references used have been duly acknowledged.
3. We have not submitted this project, or a similar version of it, for any other purpose or assessment.

We understand that any misrepresentation of information or plagiarism in this project may result in the rejection of our group project and could lead to further disciplinary actions.

Date: 04th November 2023

Signatures:

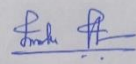

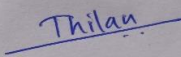
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Project Proposal

1. Project Title

Kaleidoscope Snowflake Generator: **"Snow KaleidoCraft Studio"**

2. Abstract

The " Snow KaleidoCraft Studio " is a captivating project implemented using p5.js, a JavaScript library for creative coding. This interactive program combines the mesmerizing beauty of kaleidoscopic patterns with the intricate delicacy of snowflakes. The primary objective of this project is to dynamically generate unique and symmetrical snowflake designs within a kaleidoscopic framework. Users are invited to engage with the generator, manipulating parameters to influence the shape, size, and complexity of the snowflakes. The kaleidoscopic effect ensures that every adjustment results in a visually stunning and harmonious arrangement. The interactive nature of the project provides an immersive experience, allowing users to explore the infinite possibilities of snowflake formations.

Underlying the visual allure is the p5.js library, which facilitates the seamless integration of creative coding elements. The combination of mathematical precision and artistic expression empowers users to appreciate the beauty of symmetry in nature while fostering a sense of playfulness and exploration. The "Snow KaleidoCraft Studio" transcends the traditional boundaries of static art, offering a dynamic and engaging experience that brings the delicate intricacies of snowflakes to life through the lens of kaleidoscopic symmetry.

3. Objectives

- Generate symmetrical and intricate snowflake patterns on a canvas.
- Allow users to adjust stroke size for customizing the appearance.
- Implement functionality to save the generated snowflake as a PNG file.
- Provide a feature to clear the canvas for a fresh start.

4. Scope

1. Symmetrical Snowflake Drawing:
 - Develop a function to draw a symmetrical snowflake on the canvas using p5.js.
 - Implement parameters for the snowflake's length, angle, and symmetry.
2. Canvas Manipulation:
 - Create functions to clear the canvas and reset it to draw new snowflakes.
 - Allow users to save the generated snowflake as a PNG file.
3. Adjustable Stroke Size:
 - Implement a feature to adjust the stroke size of the snowflake dynamically.
 - Allow users to control the thickness of the lines in the snowflake.
4. Rotating, Colorful and Different Designs of Snowflakes consisting front web page:
 - Introduce animation to make the snowflakes rotate slowly.

- Implement a color palette for the snowflakes.
 - Create variations of snowflake designs with different branch patterns.
5. User Interface (UI):
 - Design a user-friendly interface with sliders, buttons, or other UI elements to control parameters.
 6. Performance Optimization:
 - Optimize the code for efficient rendering and smooth user experience, especially when dealing with complex designs.
 7. Accessibility:
 - Consider accessibility features to make the generator usable for individuals with different abilities.

5. Proposed Methodology

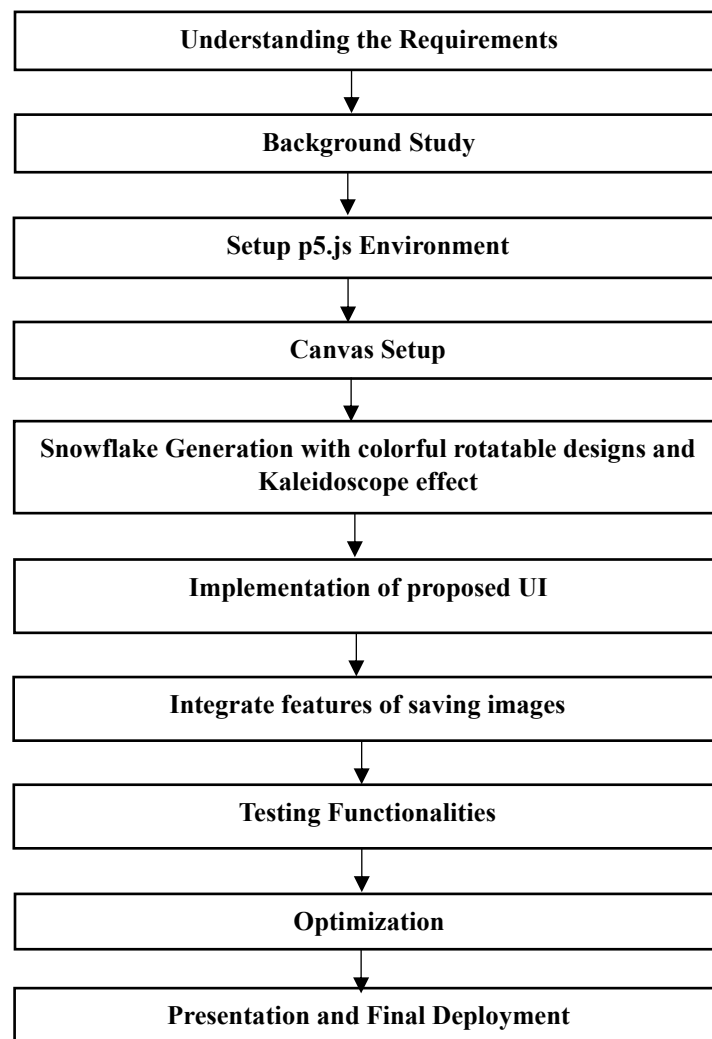


Figure 1. Proposed Methodology

1. Step 01: Understanding the requirements.
 - Define the features and functionalities of the Kaleidoscope Snowflake Generator.
 - Identify key Human Computer Interactions, such as adjusting stroke size, rotating designs, saving images, and clearing canvas.
2. Step 02: Background Study
 - Explore existing snowflake generation algorithms and p5.js capabilities.
 - Study symmetry and kaleidoscope patterns for inspiration.
3. Step 03: Setup p5.js Environment
 - Create the project structure with HTML, CSS, and JavaScript files.
 - Include the p5.js library in the HTML file.
4. Step 04: Canvas Setup
 - Configure the canvas size and position.
 - Implement a mechanism for clearing the canvas.
5. Step 05: Snowflake Generation with colorful rotatable designs and Kaleidoscope effect
 - Develop algorithms for generating symmetrical snowflake patterns.
 - Implement stroke size adjustment functionality.
 - Integrate color schemes and gradients for vibrant snowflakes.
 - Implement rotations for dynamic snowflake designs.
 - Create a kaleidoscope effect by reflecting and repeating patterns.
6. Step 06: Implementation of proposed UI.
 - Implementing an intuitive UI for adjusting parameters.
 - Include sliders or input fields for stroke size and buttons.
7. Step 07: Integrate features of saving images
 - Integrate a feature to save the generated snowflake as a PNG file.
 - Implement error handling for save operations.
8. Step 08: Testing Functionalities
 - Testing the functionalities behave properly.
9. Step 09: Optimization
 - Optimize the code for performance.
 - Consider asynchronous operations for image saving.
10. Step 10: Presentation and Final Deployment
 - Presenting and showcasing the project's features and design choices.
 - Demonstrate the different functionalities and use cases.
 - Prepare the project for final deployment.

6. Proposed Solution

6.1.Features of Prototype

The " Snow KaleidoCraft Studio " is an interactive web application built with p5.js, a powerful JavaScript library for creative coding. The primary goal of this project is to generate intricate and

symmetrical snowflake patterns, allowing users to unleash their creativity and explore the beauty of algorithmic art.

Key Features:

1.Snowflake Creation:

Harness the power of p5.js to dynamically draw symmetrical snowflakes on the canvas and allow for a wide range of designs and detailing by adjusting the stroke size.

2.Interactive Controls:

Immerse ourselves in a user-friendly interface that lets us manipulate the stroke size, providing control over the intricacy of the snowflake design.

3.Colorful Rotating Designs:

Experience a burst of color as the snowflakes come to life with vibrant and customizable palettes. Each rotation of snowflake reveals a new combination of colors, adding a touch of whimsy to the wintry scene. And it allows us to explore the magic of rotating snowflakes, creating a dynamic and ever-changing visual spectacle.

4.Kaleidoscopic Symmetry:

Marvel at the kaleidoscopic effect, where the snowflake's symmetrical patterns create a visually stunning display. More than that, bring the canvas to unveil diverse and captivating designs, reminiscent of a kaleidoscope.

5.Save and Reset:

Capture your favorite snowflake designs as PNG files with the click of a button, preserving the artistic creations and clearing the canvas effortlessly, providing a blank slate for your next burst of creativity.

6.2.Proposed User Interfaces

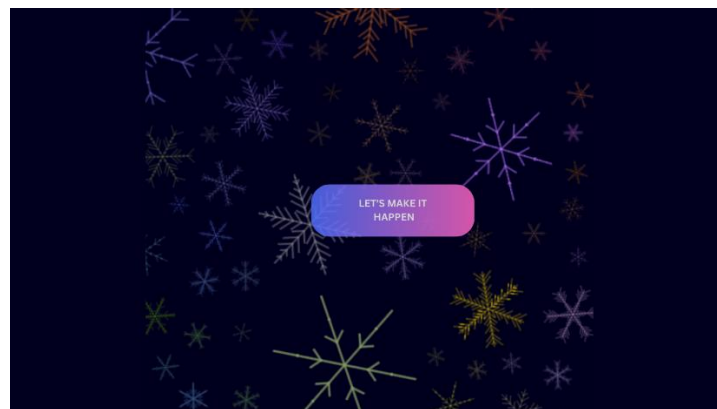


Figure 2. Proposed User Interfaces-1

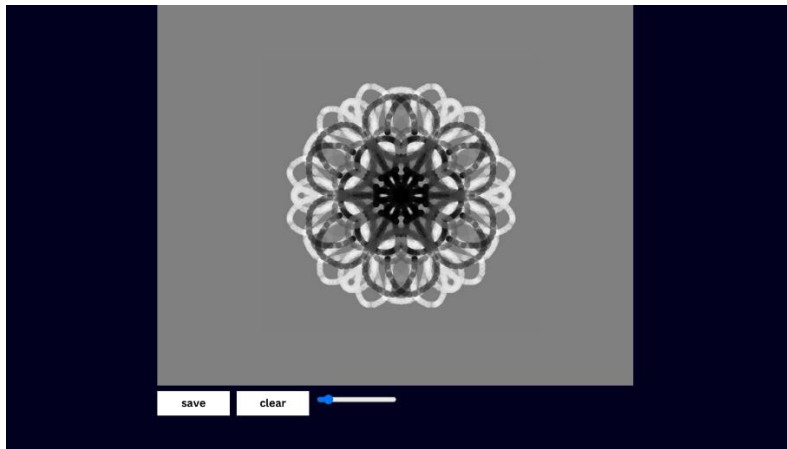


Figure 3. Proposed User Interfaces-2

Figure Number	Figure Name	Description
2	Proposed User Interface -1	This is the proposed front web page of this application. It's proposed to have a button using HTML and CSS to line up next webpage. And, it is supposed to have a background full of different designs and different colored rotating snowflakes on a canvas using p5.js and js.
3	Proposed User Interface -2	This is the interface that consists with the main functionality. There is a canvas on it and the user can move the cursor and in one position and system draws it in symmetrical pathways using kaleidoscope symmetry. Using the 'save' and 'clear' buttons, user enables save the art in png file format and clear the canvas respectively. Using the slider, it is supposed to implement the changing the stroke size as user's preference.

Table 1. Proposed User Interface Description

7. Technology Overview and Development Environment

Technology	Description	Role
P5.js	p5.js is a JavaScript library that simplifies the creation of visual and interactive elements in the browser. It is well-suited for creative coding and graphics.	Used as the primary framework for canvas drawing, snowflake generation, and user interactions.
HTML5	The latest version of the HTML standard, providing structure for web content.	Used for creating the project's main structure, including canvas setup and UI elements.

CSS 3	Cascading Style Sheets for styling and layout of web pages.	Used for styling the HTML elements, ensuring an aesthetically pleasing user interface.
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Table 2. Technological overview of the proposed application

Development Environment	Platforms	Description
Code Editor	Sublime Text	https://www.sublimetext.com/
	p5.js Web Editor	https://editor.p5js.org/
Version Control	Git	https://git-scm.com/
Hosting	GitHub	https://github.com/

Table 3. Development environment of the proposed application

8. Hardware and Software Requirements

This is about hardware and software specifications that will be used for this project.

8.1.Hardware Requirements

Hardware	Requirements that proposed to use
Processor	Intel(R) Core (TM) i5-10210U CPU @ 1.60GHz, 2112 Mhz, 4 Core(s), 8 Logical Processor(s)
Memory	8GB RAM
System Type	x64-based PC
System Name	LAPTOP-MCDR9VBI
System Manufacturer	Acer
System Model	Aspire A315-55G

Table 4. Hardware specifications which will be used for proposed system

8.2.Software Requirements

Software	Requirements that proposed to use
Operating System	Windows 11
Microsoft office access	2016 pro
User Interface Design	https://www.canva.com/
p5.js	Web Editor: v2.9.2 p5.js: v1.8.0
Sublime Text	Unregistered Desktop Application

Table 5. Software specifications which will be used for proposed system

9. Functional and Non- Functional Requirements

9.1 Functional Requirements

1. Canvas Drawing: The system should provide a canvas using p5.js to draw symmetrical snowflakes.
2. Snowflake Generation: Users should be able to generate symmetrical snowflakes on the canvas using the kaleidoscope effect.
3. Adjustable Stroke Size: Users should have the ability to adjust the size of the stroke (line thickness) for drawing snowflakes.
4. Save as PNG: The system should have functionality to save the generated snowflake designs as PNG files.
5. Clear Canvas: Users should be able to clear the canvas to start a new design.
6. Colorful rotating snowflake generation : random colored and shaped snowflake design in front web page of the application.

9.2 Non- Functional Requirements

1. Performance: The system should provide a smooth and responsive user experience, even when generating complex and colorful designs.
2. Compatibility: The application should be compatible with various web browsers to ensure accessibility for a wider audience.
3. Scalability: The system should be scalable to accommodate potential future updates, features, and improvements.
4. User Interface (UI) Design: The UI should be intuitive and user-friendly, making it easy for users to navigate and understand the functionalities.
5. Accessibility: The application should adhere to accessibility standards, ensuring that it is usable by people with different abilities and disabilities as a easily accessible web application.
6. Cross-browser Compatibility: Verify and ensure that the application works consistently across different web browsers to enhance its accessibility.
7. Responsive Design: Ensure that the application's UI is responsive, adapting to different screen sizes and devices for a consistent user experience.

10. Project Beneficiaries

1. Art Enthusiasts:
 - Individuals who appreciate digital art and enjoy creating visually appealing designs.
 - Art students or professionals looking for creative tools for inspiration.
2. Educators:

- Teachers and educators who can use the Kaleidoscope Snowflake Generator as an engaging tool for art and geometry lessons.
 - Students learning about symmetry, patterns, and digital art.
3. Casual Users:
 - Anyone interested in a fun and interactive tool for creating unique snowflake designs.
 - Individuals looking for a relaxing and creative digital experience.
 4. Graphic Designers:
 - Design professionals seeking a tool for generating abstract and unique patterns for various projects.
 - Graphic designers looking to experiment with different color schemes and shapes.
 5. Digital Artists:
 - Artists working in the digital medium who want to incorporate intricate snowflake patterns into their artwork.
 - Those who enjoy exploring the creative possibilities offered by generative art.
 6. Winter and Holiday Content Creators:
 - Bloggers, social media influencers, or content creators looking for winter-themed visual content.
 - Individuals creating seasonal graphics, backgrounds, or decorations.
 7. Programming and Coding Enthusiasts:
 - Developers and coders interested in exploring p5.js and generative art.
 - Those looking to learn about algorithms for creating symmetrical designs.
 8. Community Events and Workshops:
 - Organizers of community events or workshops focused on art, technology, or creative expression.
 - Participants in hands-on sessions or hackathons centered around generative art.
 9. Open-Source Community:
 - Contributors to the open-source community interested in enhancing and extending the functionality of the Kaleidoscope Snowflake Generator.
 - Those looking for a creative project to collaborate on.
 10. Innovative Learning Platforms:
 - Online platforms offering creative coding courses or projects.
 - Learners looking for unique and engaging coding exercises.

11. Project Plan and Timeline

Phase 01	Understanding the Requirements
Phase 02	Background Study
Phase 03	Proposal Submission
Phase 04	Setup p5.js Environment
Phase 05	Canvas Setup

Phase 06	Snowflake Generation with colorful rotatable designs and Kaleidoscope effect
Phase 07	Mid Evaluation
Phase 08	Implementation of proposed UI
Phase 09	Integrate features of saving images
Phase 10	Optimization
Phase 11	Presentation and Final Deployment

Table 6. Project Plan with Phases

Phase Number	Month 1				Month 2				Month 3				Month 4			
	November 2023				December 2023				January 2024				February 2024			
	Week 01	Week 02	Week 03	Week 04	Week 01	Week 02	Week 03	Week 04	Week 01	Week 02	Week 03	Week 04	Week 01	Week 02	Week 03	Week 04
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Table 7. Timeline Chart

12.Certification of Approval

This is to certify that the project proposal titled: "Kaleidoscope Snowflake Generator" submitted by our team has been reviewed and approved by the undersigned. The project has met the specified criteria and requirements outlined in the proposal. The proposed functionalities, features, and deliverables have been deemed acceptable and aligned with the goals and objectives set forth.

Project Details:

Project Title: Kaleidoscope Snowflake Generator

Approval Date:

[Include any specific comments or notes regarding the approval, if applicable.]

This certification signifies that the project is officially approved for execution, and the project team is authorized to proceed with the implementation phase.

Authorized by:

Signature:

Date: