

# GROUP PROJECT

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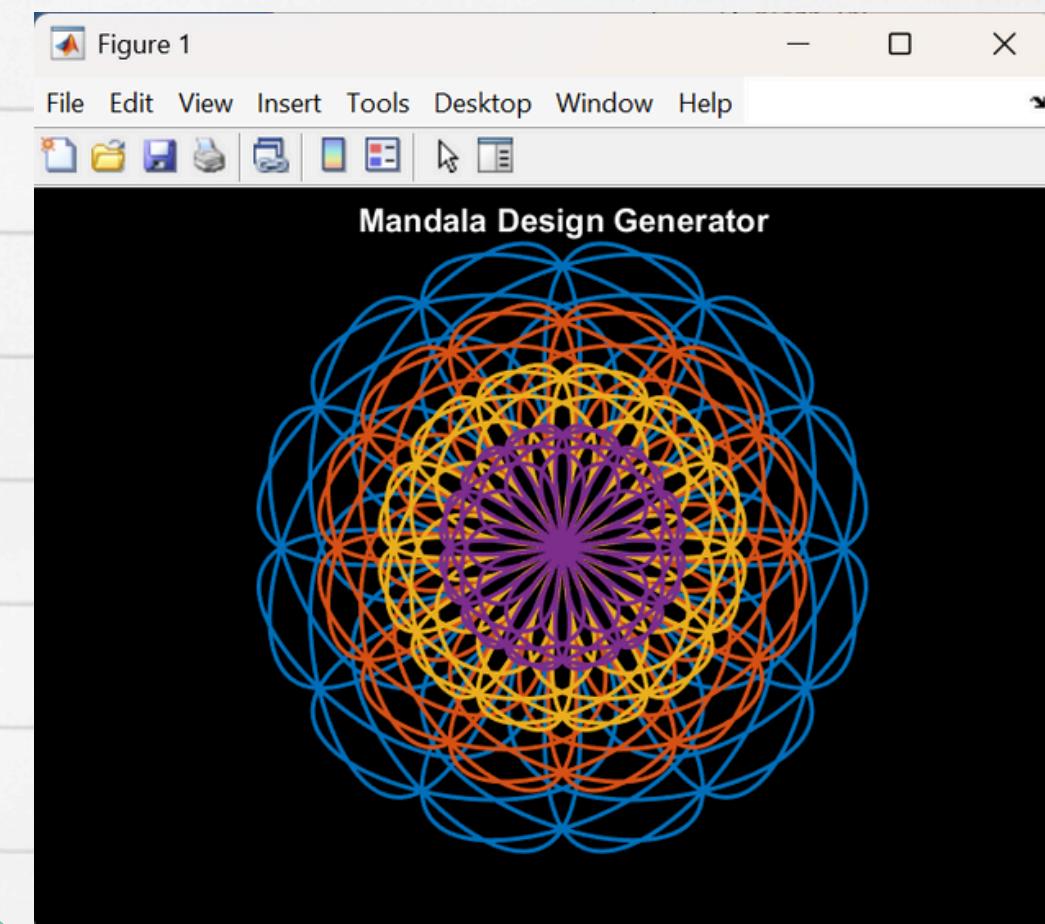
## PROBLEM STATEMENT

To develop an application in MATLAB to generate Mandala designs as per user inputs while using the concepts of Linear Algebra.

# MID-SEM PROGRESS

A MATLAB code had been written which generates a single petal as the base shape and uses the concept of linear algebra like rotation and reflection matrix and shear transformation to generate beautiful designs. It takes user input about number of sectors, layers of mandala design and background color from the Command Line Interface.

```
Command Window
>> mandala
--- Mandala Design Generator ---
Number of Sectors: 12
Number of Layers: 4
Background Color Options:
1: Black (k)
2: Red (r)
3: Green (g)
4: Blue (b)
5: Yellow (y)
6: Cyan (c)
7: Magenta (m)
8: White (w)
Choose background color by number (e.g., 1 for Black): 1
Apply Shear Transformation? (1 for Yes, 0 for No): 1
Shear in X (kx): 0.3
Shear in Y (ky): 0
Base Scaling Factor (0.1 to 1.0): 0.8
fx>>
```



### Added base shapes

- Petal
- Polygon (connected diagonals)
- Rose curve

### MATLAB programming

- Developed a robust MATLAB codebase and an interactive GUI

# NEW FEATURES

### Shear Matrix Eigenvectors

- Option to display shear matrix eigenvectors in a separate figure for checking symmetry axes in future

### Advanced Features

- Added a "Save Image" button in the GUI, allowing users to export their generated mandala design as a PNG file with a single click.

# GUI INTERFACE

## Inputs Taken from User:

- *Base shapes*
- *Number of sectors/sides/petals*
- *Number of layers of design*
- *Background color*
- *Shear transformation toggle*
- *Shear X and Y inputs*
- *Scaling factor for the design (slider)*
- *Eigenvectors toggle*

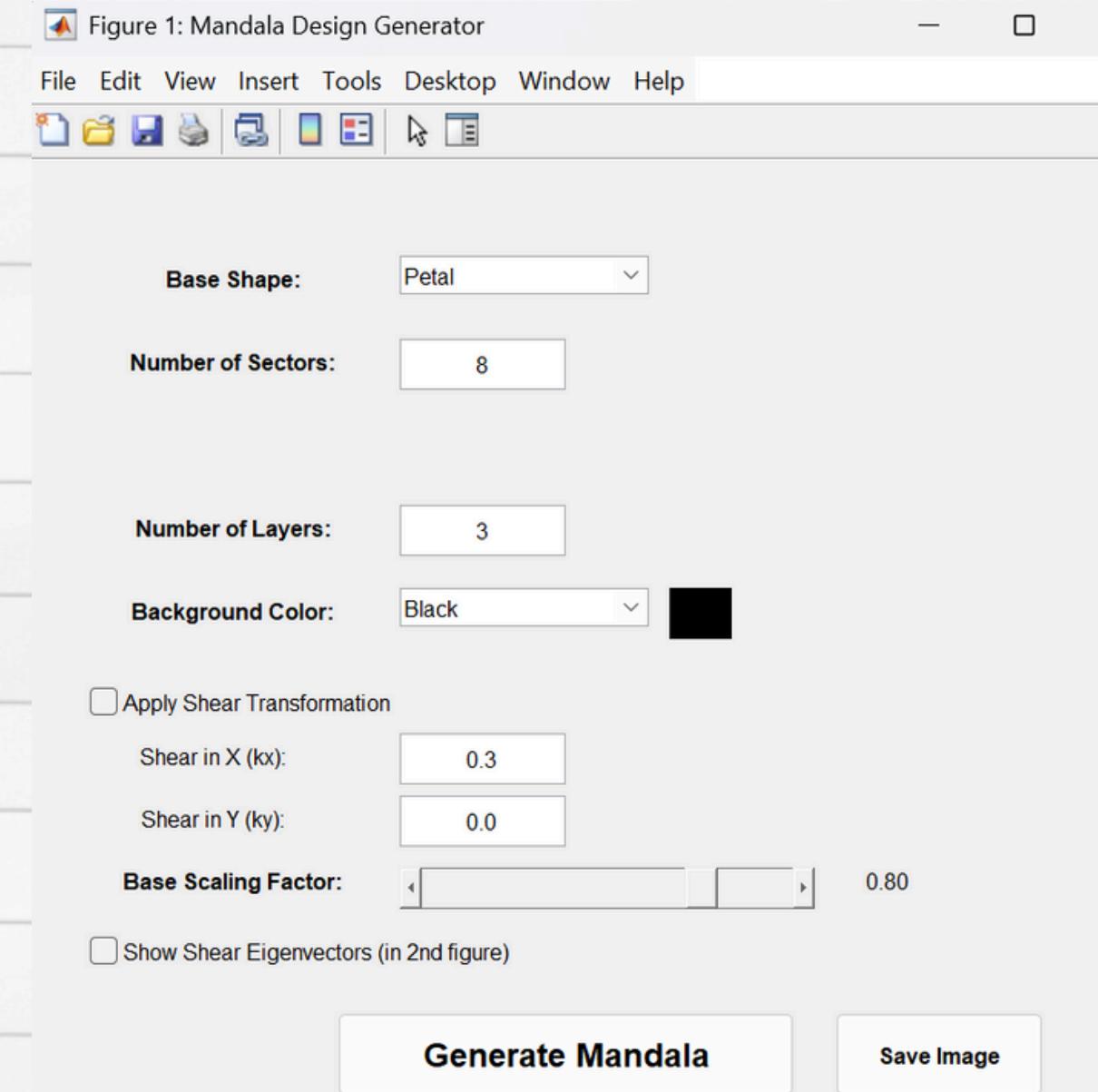


Figure 1: GUI Application after running code with default inputs

# UNIQUE OUTPUTS

## Highlights of Code Output

- Symmetrical and artistic patterns using mathematical transformations.
- Real-time visualization of changes made through the GUI.
- Unique mandalas every time based on different user inputs.
- Demonstrates the beauty of linear algebra in creative design.

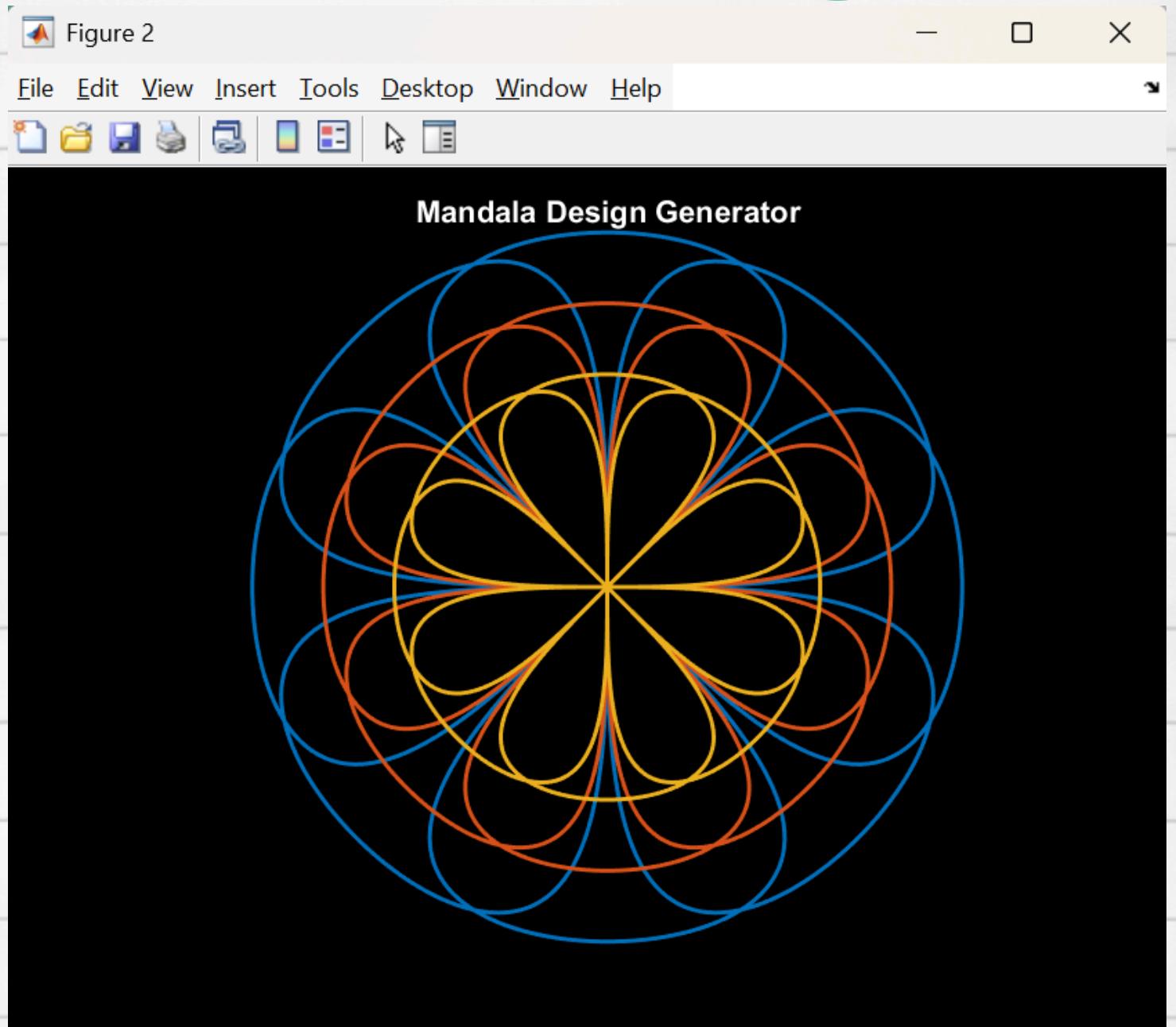


Figure 2: Generation Of Mandala Design on Default Inputs