INTRODUCTION

The following project is implemented in C using OpenGL, GLU and GLUT libraries. It consists of an animation of specific time duration controlled by the Keyboards Click Event Handling.

People have been folding paper into shapes for centuries, perhaps ever since paper was invented in China in the first century. The earliest paper folding techniques were brought to Japan in the sixth century, where they were absorbed enthusiastically by a culture that was already deeply involved with paper. The word *origami* is the Japanese name for the art of paper folding, where the root *kami* is interestingly a homonym for both paper and god. Indeed, traditional origami still plays an important role in both Shinto religious ceremony and much of Japanese architecture. Many of the original folding forms have survived to this day. In its purest form, origami involves folding a figure from a single square piece of paper without cutting.

Although the mathematical approach to origami had its proper beginning in the early nineties, its roots can be traced to a number of informal heuristics known for many years, related to designing shapes based on the number of appendages. Another older technical approach involves the construction of origami molecules, or basic building blocks that can be repeated.

The field of computational origami finally exploded with the popular talk delivered by Robert Lang at the ACM Symposium on Computational Geometry. There he described his Tree Maker software for generating the solution of a crease pattern for an origami base given an arbitrary skeleton represented as a 1D tree. One can supposedly extend much of the theory to finding crease patterns from 2D meshes (polyhedrons), but this is still work in progress since there are special conditions that occur at concave vertices. The general method involves posing an optimization problem in terms of the smallest square of paper necessary, and an elegant relationship is shown with the problem of circle-packing.

The heart of the zig-zag method is using a narrow strip of paper to zig-zag across all of the triangles in a mesh in sequence. The method operates in two main stages. First the mesh to be gift-wrapped is refined into one possessing a Hamiltonian path. Next the strip is zig-zagged across the triangles. . Basic folds are used to affect the zig-zags, different turning gadgets are used reorient the strip between triangles, and any excess paper is readily tucked out of the way.

OBJECTIVES

- Origami Art is a series of workshop and program for children, adult and corporate events. The main objective is to explore the creativity fun of a single sheet or multiple sheets of 2D papers into 3D objects through the use of paper folding techniques.
- To learn the paper folding for functional, decorative or fun application. To develop creative thinking and creative problem solving with program. To build the interconnectivity between logic and creative mind development.
- To provide a hands-on and minds-on exercise and activities. To experience, appreciate and explore the arts of paper folding in a creative environment. To develop the ability to be independent in following instructions.
- To empower and enhance left brain thinking through systematic teaching. To balance both left and right brain in the process. To develop logic thinking, creative mind and problem solving skills. To understand how a problem can be solved through many solution.

SYSTEM REQURIMENTS

Software Requirements:

- Operating System: Windows 10 64 bit / 32 bit, Ubuntu 18.04
- OpenGL Libraries.

Hardware Requirement:

- Processor: Intel Core Duo 2.0 Ghz or More
- RAM: 1GB or More
- Hard Disk: 80GB or More
- Monitor: 15’’CRT, or LCD Monitor
- Keyboard: Normal or Multimedia
- Mouse: Compatible Mouse.

IMPLEMENTATION

The implementation of a Origami-paper folding simulation in a prototype application written in C++ under Windows XP and used the standard Windows API for event handling. In this way, we were able to easily run the prototype on a standard PC using a mouse for input. As we planned on using advanced drawing features such as semi-transparency, stencil masking, and back-buffer drawing, we use the OpenGL API to render the workspace. The geometry is then rendered as rectangular polygons, quadric disks, and/or irregular polygons to the stencil buffer.

CONCLUSION

In this project, we come across various methods to implement paper folding mechanism using rectangular mesh. Binding the coordinates of respective triangles when making the folds using constraint equations has been proves really helpful. Users can tap over various keys in the keyboard to perform specific actions.

REFERENCES

1. https://www.opengl.org/

2. https://www.eclipse.org/forums/index.php/t/417158/

3. Wikipedia

4. Computer Graphics with OpenGL 4th Edition by Donald D. Hearn, M. Pauline Baker, Warren Carithers.