Geometric Arts Through Botanical Patterns

Ah-Choo, KOO[a*], Forest Yan-Peng LIM[a], Lydia Weng-Ping, CHIN[a], Yi-Fei, TAN[b] & Wooi-Nee, TAN[b]
[a]*Faculty of Creative Multimedia*
[b]*Faculty of Engineering*
Multimedia University, Cyberjaya, Malaysia
*ackoo@mmu.edu.my

Abstract: In this paper, we describe a creative work on how digital documentation of plant and flowers in daily life can be used for exploration of geometric arts and pattern generations. Garden with plants and other inhabitants is a place of thousand secrets, which we explored and discovered through a documentation of an interactive art work entitled, Garden of Pattern (Koo, Lim, & Chin, 2009). It is a flash-based pedagogic and instructive interactive program. This paper/workshop intends to explain the processes and the tools used for creating the artwork, from the conception of idea to the completion stage. The workshop will provide a communication platform with the audience on how this digital documentation of botanical patterns can be made easier through camera, and how Adobe Flash can be used as a tool for drawing and generating patterns from plants. Future direction of the research on this project will also be shared with the audience.

Keywords: Patterns, mathematics art, geometry, interactive art, Adobe Flash

Introduction

Pattern can be defined as arrangement of shape(s), outlook(s) or behavior(s) with regularity, order, repetition, and scale. Pickover(1995) defined pattern by including visually interesting shapes and themes as patterns, where the visual can be extracted from human, nature, and mathematics. László Orlóci (2001) explained about natural pattern needs to be observed and discovered before an understanding of natural phenomena can begin. Pattern is a main concern to all fields of natural science. Natural patterns are dynamic and able to manifest the complex dynamic processes in nature. Many natural patterns share a similar process of formation called "self-organization" (Camazine, 2003). It happens in a wide range of processes in both living and nonliving systems. Those processes are characterized by simple "rules" that depend solely on local interactions among the subunits of the system (Camazine, 2003, p. 36).

2. Patterns and Geometric Arts

Botanical patterns have a strong linkage with geometry and mathematics. Although the patterns are extracted from nature, they can be interpreted mathematically. The following show an examples of our findings, which was described in a prototype of our Interactive works, namely Garden of Pattern (Koo, Lim & Chin, 2009). In the workshop, we will demonstrate the work, and present more findings:
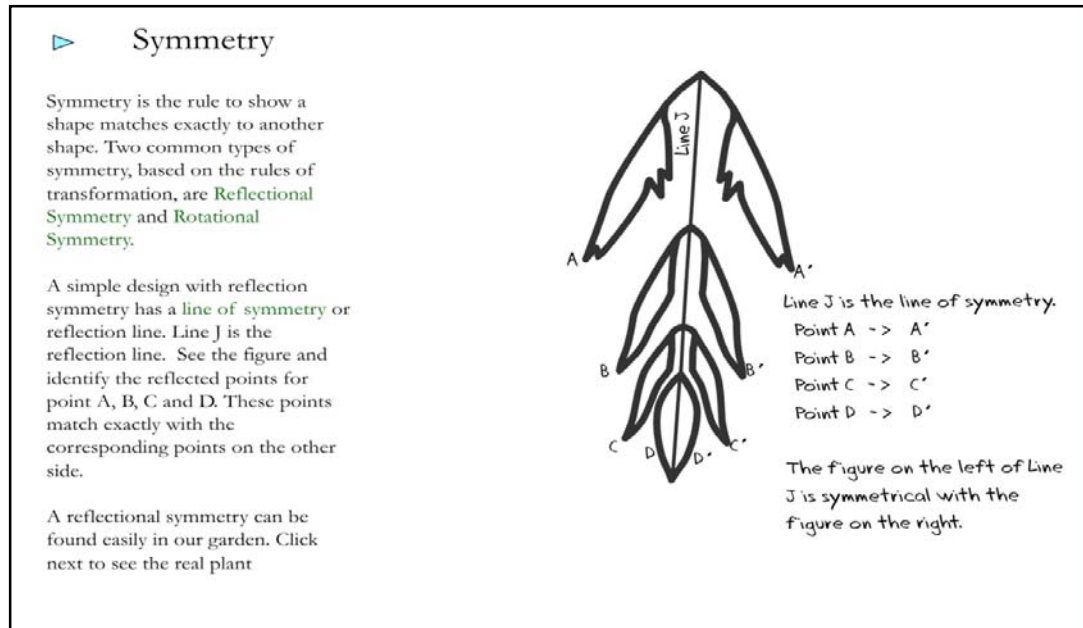
Figure 1: An example of findings of the relationship of geometry and botany nature.

## 3.	The Processes (To be described in the workshop)

The core part of this workshop will be the description and explanation of the design and development processes of this artwork. The processes are quite straight forward, which consist of the following key steps:

Step1) Conception of Idea
Step2) Data gathering, analysis, and writing of findings/scripts
Step3) Design, and alternative design process
Step4) Development and refinement cycles
Step5) Final testing and checking
Step6) Completion and Exhibit (of Prototype).
The following are some of the snapshots (captured documents) showing the steps of the above processes.
 Step1) Conception of idea, by writing a brief description of the project, and plans.
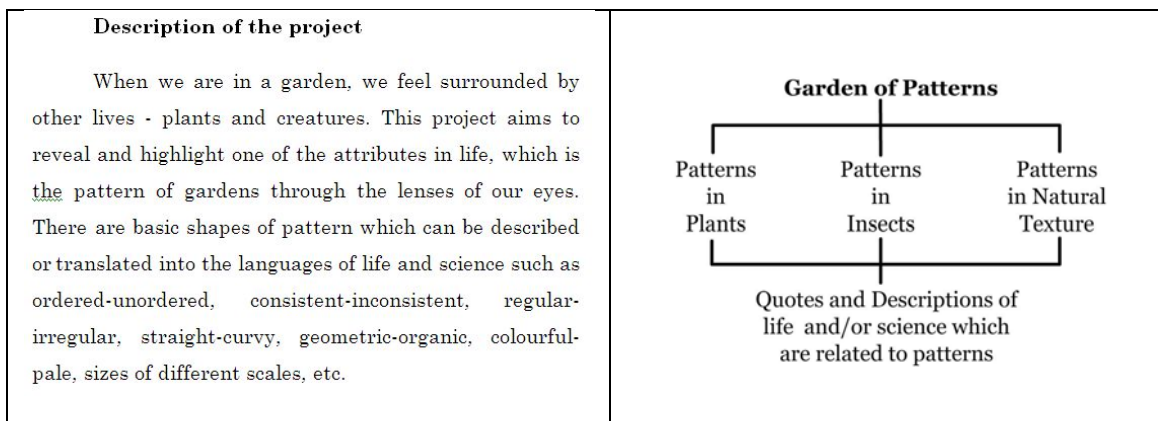

Figure 2: A brief description of the project and plan for contents.

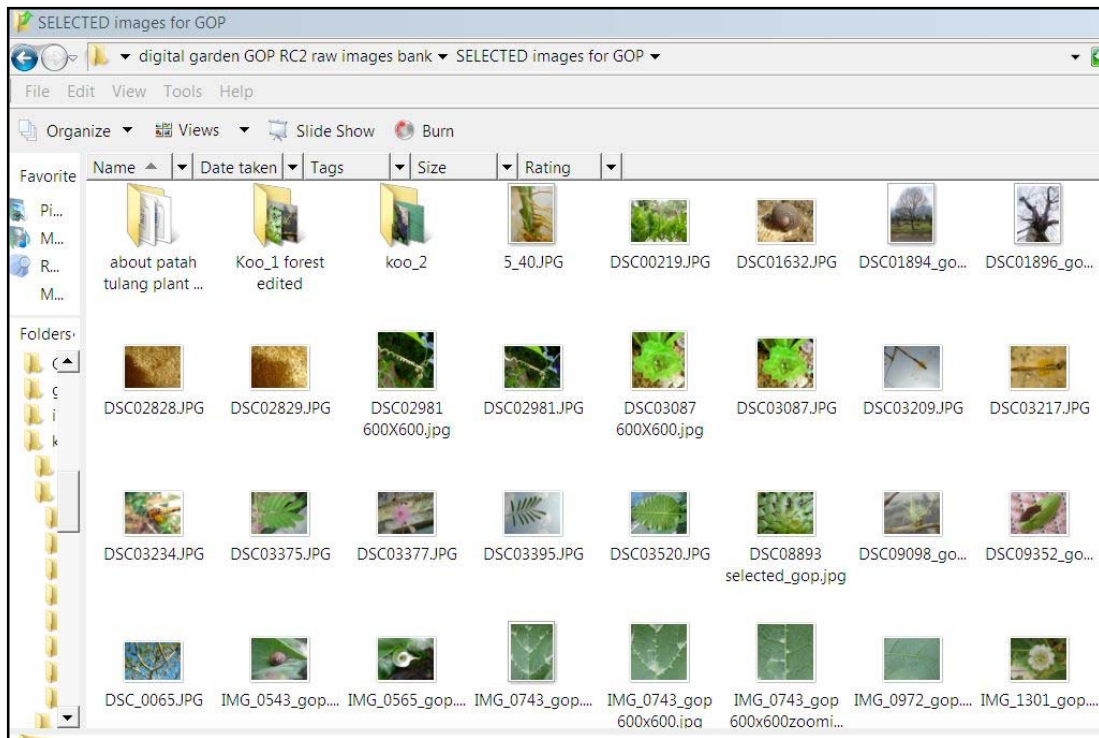Step2) Data gathering, exploration and classification/categorization.

Figure 3: Collection and categorization of visual data of nature.

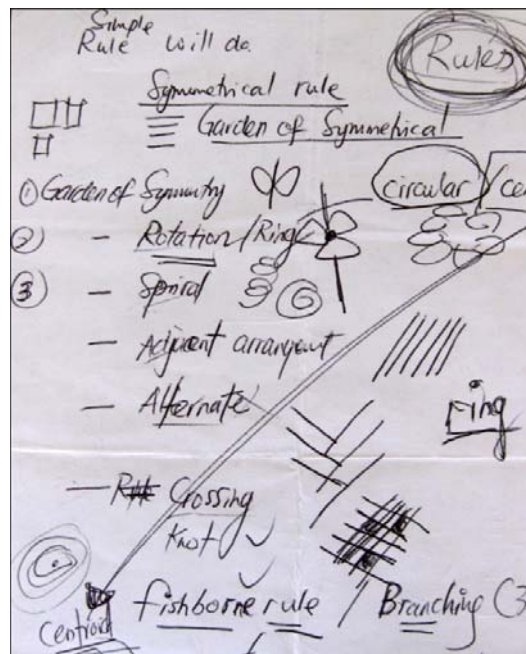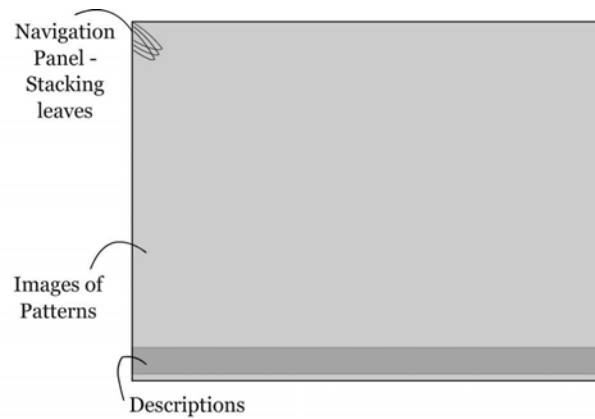Step2) Writing of findings and scripts

Figure 4: A sketch of how the findings should be outlined and written.
Library research was also conducted.

Step3) Design and alternative design, from initial to final stage.

Figure 5(a): An initial layout design

Figure 5(b): A stack of design documents which consist of storyboard, thumbnail view of storyboards, and sketches of graphics elements.
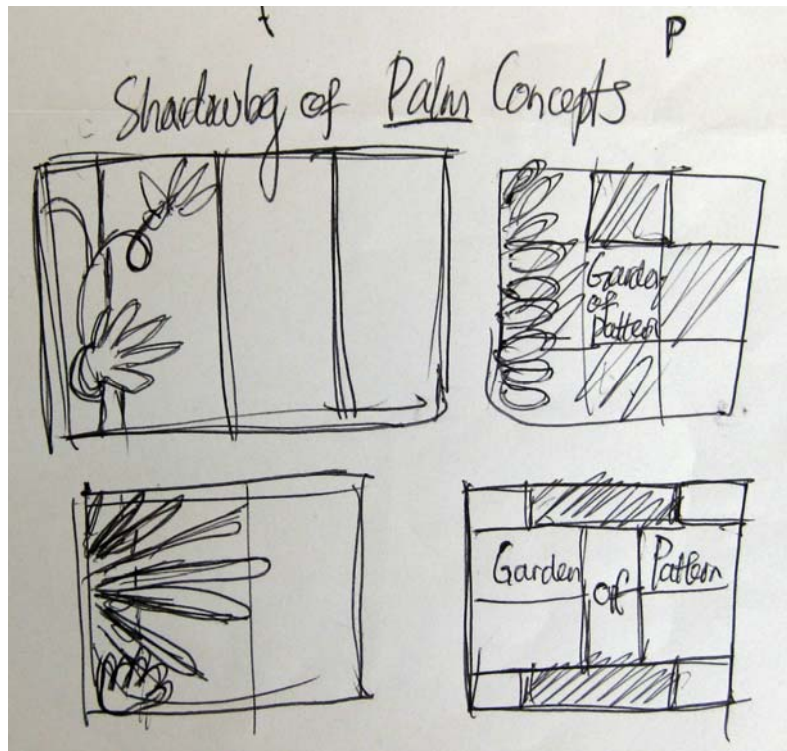
Figure 5(c): Almost finalization of design idea
which was based on Palm tree.

Step4) Final Design, development and refinement on screen/computer (authoring environment)
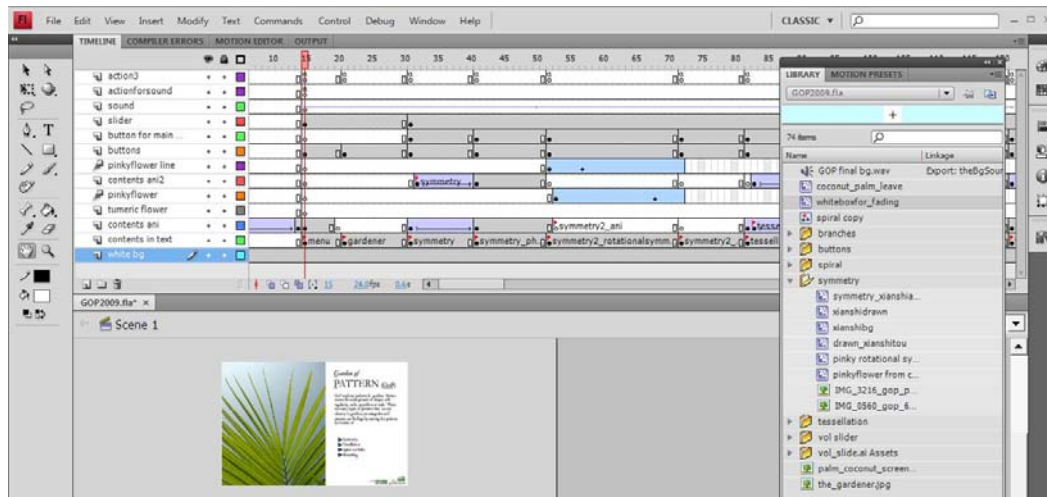

Figure 6: A screen capture of timeline structure, library assets and stage in
Adobe Flash authoring environment.

As for the Development process, Adobe Flash was used for creating the interactive program. This workshop will also describe an overview of Flash, especially its Drawing tools, and how Flash can be used to create an Interactive Program with the contents on patterns and geometric arts.
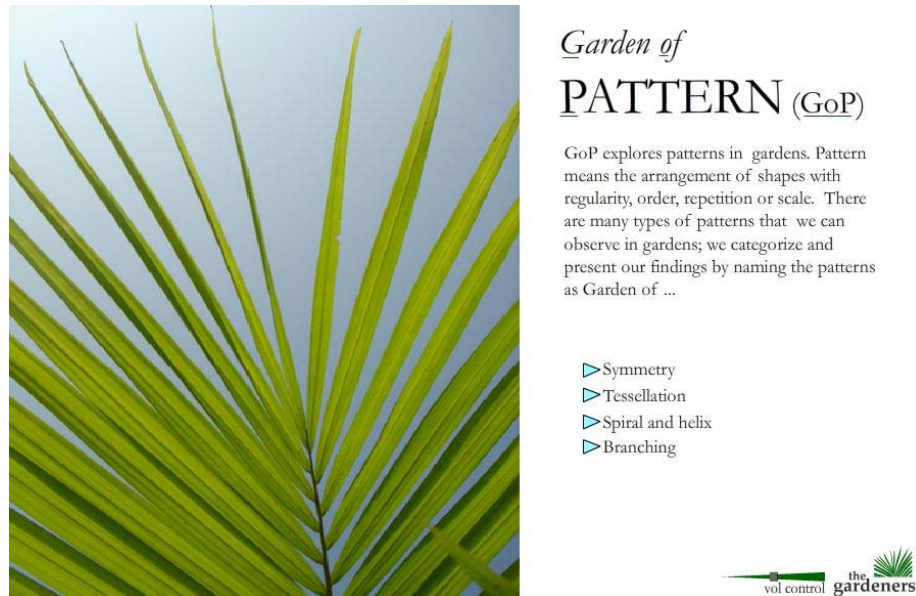
Step5 & 6) Testing and Exhibit

Figure 7: The final prototype of Garden of Pattern (GoP),
an interactive and instructive artwork based on botanical pattern.

4.   Garden of Pattern (Final description)

This work is a simple Flash-based interactive program, with some photographs captured from gardens, classified into various categories of patterns. We do not need a big garden for doing this; our small tropical gardens at the backyard are adequate. Through observation and library research, we begin our creation journey by finding certain rules which govern the patterns. In this prototype, we classify them into a few categories, such as Garden of Symmetry, Garden of Tessellation, Garden of Spiral and Helix, and Garden of Branching. We dissect and build our understanding based on these rules. For each category, there is an overview and descriptions on the rule(s) itself and followed by the example of patterns. The future work of this project is to expand the findings to other geometrical categories and also to add more visual data for each category.

5.   Conclusion

Through this workshop, audiences who are interested in content based interactive works will be able to learn how an interactive project was created, from initial to final stage. Through this project, we realize the various rules which govern the pattern in our gardens. We can then see the patterns and understand them from the science and art point of views. We also

realize that environmental factors will cause some changes on patterns, and gradually emerge into another set of nice looking pattern.

Acknowledgements

References

[1] Camazine, S. (2003). Patterns in nature. *Natural History*, Retrieved 25 August 2010, from http://www.plexusinstitute.org/ideas/show_elibrary.cfm?id=255

[2] Koo, A.C., Lim, Y.P., & Chin, W.P. (2009). Garden of Pattern. In Research Creation Exhibition 2 - Proscenium of Art, Humanities & Technology. Faculty of Creative Multimedia, Cyberjaya: Multimedia University.

[3] Orlóci, L. (2001). Pattern dynamics: an essay concerning principles, techniques, and applications. *Community Ecology*, 2(1), 1-15.

[4] Pickover, C. A. (1995). *The pattern book: Fractals, art, and nature*. (C. A. Pickover, Ed.). Singapore: World Scientific Publishing Co.

[5] Tanaka, H. & Kuribayashi, S. (2007). Botanical interface design - creative kits, tools, and methods. *Proceeding of the 3rd IET International Conference on Intelligent Environments (IE 07) held on 24 – 25 September 2007 at Ulm* (pp. 577-584). Ulm, Germany: