

# Design from nature: Development of a database to support product development

S.F. Wong<sup>1</sup>, S. Maidin<sup>1,\*</sup>

<sup>1</sup> Faculty of Manufacturing Engineering, Universiti Teknikal Malaysia Melaka, Hang Tuah Jaya, 76100 Durian Tunggal, Melaka, Malaysia.

\*Corresponding e-mail: shajahan@utem.com.my

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**ABSTRACT** – Although biomimetic is a good source of ideas for design, however it is not widely used. This is due to lack of systematic process for engineers to find biological analogies related to the design problem and to transfer knowledge of biological design to engineering problem. Besides, the biological design feature information is scattered. In order to ensure there is a design aid tool to solve human challenges in terms of solving complex design problem and challenges, this research proposed a database with biomimetic design feature information. Questionnaire survey was carried out with 35 final year Department of Design students to test the functionality, usability and their satisfaction of the database. It was found that the database assist them by providing various visual design features that could be adopted from nature to solve design problem and improve creativity in product design.

## 1. INTRODUCTION

Biomimicry or Biomimetic is the study of structure and function in biological systems as models for the design, engineering of materials and machines in order to solve complex human problems. Biomimetic come from the Greek words bios meaning life and mimesis meaning imitation [1]. Sometimes a closely related term bionics which means combined from biology and technics is also used. Besides that, there are alternative terms to 'bionic' or 'biomimetic', these are 'biologically inspired' or 'bio-inspired'. Biologically inspired design is to implement the functions, mechanisms and principles which is inspired by nature. In recent years, many engineering design has been inspired by nature. Nature's design can generate a new idea and can solve engineering design problems. On the other hand, biomimetic can create opportunities to generate new materials, processes and devices. The increased need for biologically inspired design is caused by two factor, these are the need for sustainable development and the perception that nature's design can create opportunities for innovation [2].

## 2. METHODOLOGY

### 2.1 Biomimetic Database

The biomimetic examples are collected then were arranged into classified categories for every function of the organisms. Biological systems are assembled, categorized and arranged systematically before uploading into a database. The database was developed to be user friendly design interfaces. The Tables, Forms, Queries and Reports are created then the relationship between them was made by using macro tool. There are 13 functions incorporated to the database. These are adhesion, anti-reflective, energy, force, hydrophobicity, hydrophilicity, mechanical strength, self-cleaning, structural coloration, thermal insulation, lightweight, self-repair and robotics [3]. The biomimetic design features information are searched, collected and arranged by functions.

## 3. RESULTS

Figure 1 to Figure 6 shows the main form and the end form respectively.

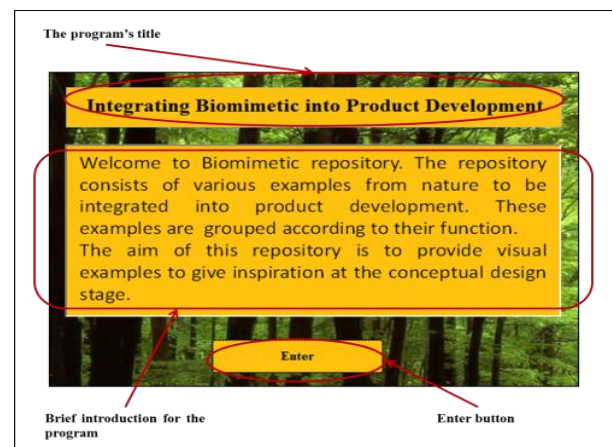


Figure 1 Main form (Before running)

Figure 2 General information form (After running)

Figure 5 Add record form for Adhesion

Figure 3 Report for Adhesion

Figure 6 The End form

Main function	Category	Picture	Product function	Application
Adhesion	Lizards		A glue-coated polymer bandage will be stretchy, stick to wet places, will dissolve in the body over time and could incorporate antibiotics or other drugs.	Surgical bandages
Adhesion	Mussels		Adhesive that works underwater or on wet surfaces and is not water soluble.	Construction, manufacturing.
Adhesion	Plants		Produce adhesive fastener in clothing and footwear.	Consumer product, packaging and apparel.
Adhesion	Spider		The spider web glue has incredible adhesive strength because of glycoproteins, the major component of the glue as microscopic nodules made of a glycoprotein.	'Green' glues, glues using glycoproteins synthesized in the lab, manufacturing.

Figure 4 Select function form (Before running)

#### 4. SUMMARY

The information of biomimetic design features was uploaded into the MS Access to ease the management of data. The scattered information was arranged by function. Result from the questionnaire survey received from 35 final year students shows they were satisfied with the database in terms of user interface design, ease of use and layout design. On the other hand, there was one respondents suggested to create more creative design interface, more information about mechanical, physical and chemical properties and more examples of biomimetic design features. However, in conclusion, the database was useful as an initial tool to provide visual information of biomimetic design features to aid design.

#### 5. REFERENCES

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