



INDIAN INSTITUTE OF TECHNOLOGY GUWAHATI
SHORT ABSTRACT OF THESIS

Name of the Student : Shiv Kumar Verma

Roll Number : 156105010

Programme of Study : Ph.D.

Thesis Title: **Designing Product Forms Inspired by Nature – A Design Science Approach**

Name of Thesis Supervisor(s) : Prof. Ravi Mokashi Punekar

Thesis Submitted to the Department/ Center : Department of Design, IIT Guwahati

Date of completion of Thesis Viva-Voce Exam : 31 May 2021

Key words for description of Thesis Work : Nature-Inspired Design, Design methods, Design science, Design research, Generative tool, Form generation, Form giving, Styling

SHORT ABSTRACT

Taking inspiration from nature is a very innovative, creative, and novel approach to design products. Over time, one can cite several innovations inspired by nature - from the weapons made by cavemen to the modern day high-speed trains inspired by a kingfisher. Professional from different knowledge domains have developed various methods and tools for drawing inspiration from nature in their line of work and practice. In this research, we examined the literature on methods and processes focusing upon two professional groups for our primary research: the Systematic methods developed by Researchers/Scientists/Engineers that study principles and phenomenon in nature; and the Intuitive methods more often pursued by Designers/Architects/Painters/Artists. The former group often criticizes the latter groups' intuitive methods as being 'non-scientific'. Motivated by such criticisms, the current research set out to explore if a systematic design research and systematic design practice can be developed for generating nature-inspired product forms. This exploratory research work undertook the study drawing from Nigel Cross taxonomy that suggests that designers can understand underlying creative design processes from a study of Processes, Product and People. Following this framework four studies were undertaken.

These were:

Study 1: A review study on existing processes and methods currently followed for nature-inspired design

Study 2: An analysis of 30 nature-inspired products that were designed by professional design studios from India and abroad.

Study 3: A study of the approaches followed by selected 5 international professional designers known for their products that are inspired from nature.

Study 4: This was a live experimental class room study conducted with design students to understand the underlying process they have followed when tasked to design a perfume bottle that is inspired by nature.

The research followed a mixed method. Insights related to underlying design thinking process were drawn from the four studies. These insights were combined to formulate a framework identifying the key parameters and elements under consideration in the design process. A proposal for a generative tool for nature-inspired product form generation was formulated. It justified our hypotheses that a systematic approach to Product form generation can indeed be formulated.