SPECIAL PROJECT

AN INSPIRATIONAL APPROACH TO RETAIN NATURAL AESTHETICS IN OUR LIVES

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Indian Institute of Technology,
Powai, Mumbai

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ACKNOWLEDGE-

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He not only helped me open my mind to the various avenues possible but also promoted me to explore areas that I once believed to be beyond my scope. His support in all forms (from ideas to books to moral) is invaluable to this project.

A big thank you to Shailendra, Manisha & Abhishek for their suggestions, help and company.

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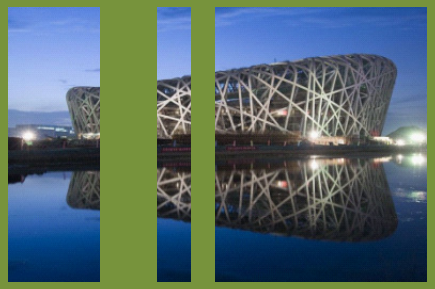
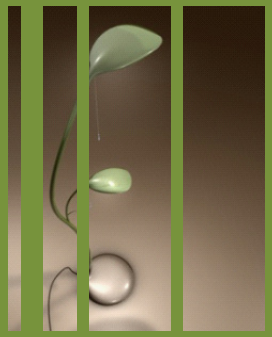




Nature & Design

An inspirational approach to retain natural aesthetics in our lives

Preface

Flying birds gave inspiration to the design of air planes. Observation of a falling apple led to the theory of gravity. Throughout history, many leading thinkers in mathematics, engineering and other areas have been inspired by the parallels between nature and human design. Now and then nature is the origin for new inventions, theories & design.

In the field of industrial design, there are so many challenges in making things aesthetic
Physically
Functional
Operational

Designers always have to achieve certain levels of aesthetics which are
I) Function
II) Form follows function and
III) Less is more, clarity, minimalism, no ornaments, repetition, geometrical forms.

Nature is aesthetically designed in every aspect. One can find any level and any type of aesthetics in nature. It is the ultimate source of inspiration to make things of our surrounding aesthetic.

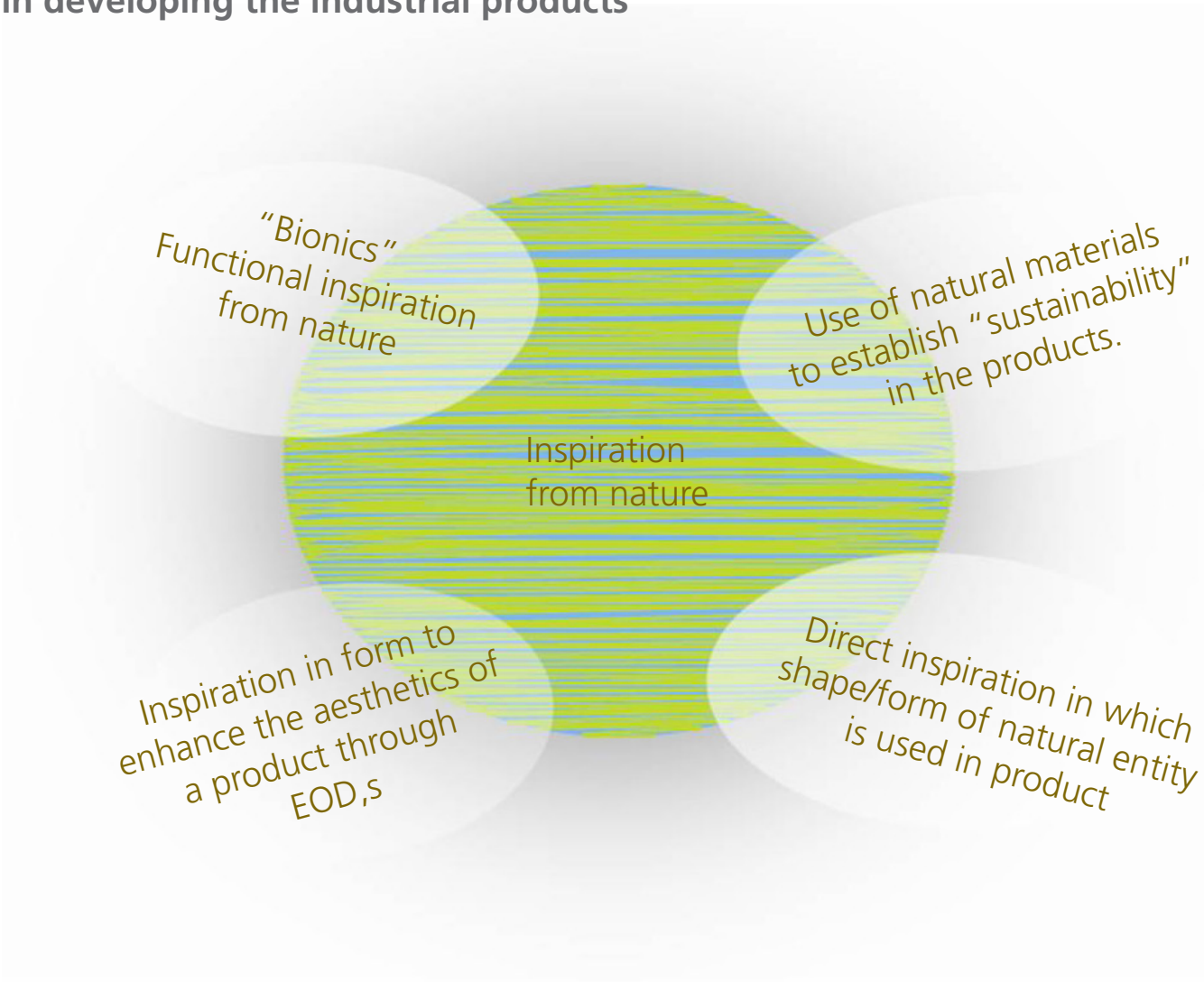
Introduction

Human has always been taking inspiration & learning from Nature. This project is the study about an inspirational approach to retain natural aesthetics in our life.

It talks about various perspectives of taking inspiration from nature in industrial design to retain natural aesthetics in products. Some time biological methods become the solution of our daily life requirements, some time natural material help us to maintain sustainable environment. Best existing examples have been collected & studied to show some of areas & ways by which we can achieve natural aesthetics in designing the products.

Study involves taking a natural entity, finding the ways in which elements can be extracted from it, which depends on the particular properties of the entity. Different properties of it create multiple view points to see its form in different ways.

Classification of ways, how we inspire from nature in developing the industrial products



Functional inspiration from nature

Bionics

(also known as biomimetics, biognosis, biomimicry, or bionical creativity engineering)

"Bionics is the application of biological methods and systems found in nature to the study and design of engineering systems and modern technology."

Let's have some examples of bionics.

Hulls of boats imitating the thick skin of dolphins.

Sonar, radar, and medical ultrasound imaging imitating the echolocation of bats.

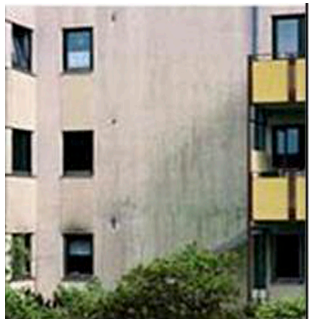
And so many things are around us which are the good examples of this revolutionary term.

Let us consider a few examples.

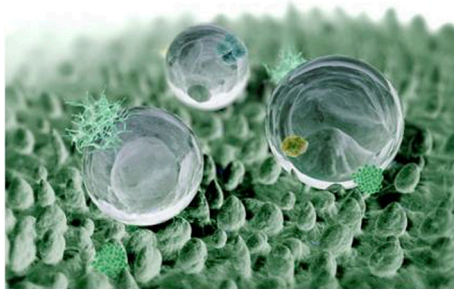
Functional inspiration from nature

1. Dirt- And Water-repellent Paint (Coating)

Inspired by: Surface of the lotus flower plant is practically unsticky for anything (the lotus effect)



Lotus leaf, due to the presence of wax, does not retain any water or wax on its upper layer. This is called lotus effect. Based on lotus effect a paint named Lotusan is developed by a German Professor Wilhem Barthlott, from the University of Bonn, which is dirt and water repellent. It has self cleaning properties and excellent resistance to weather, chalk and UV rays. It remains clean even for decades.



Reference: http://scienceray.com/technology/information/10-product-designs-that-are-inspired-by-nature/

Functional inspiration from nature

2. Shark Suit (Speedo Fast Skin)

Inspired by:
Scales of shark

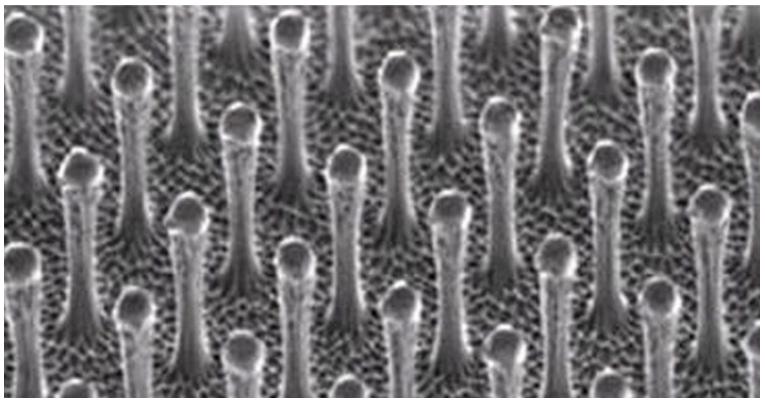
It has been observed that the reason for the ability of shark to swim fast is nothing but the design of its scales. The shark suit is designed this way to help the swimmers. It helps them to swim fast by reducing water friction.

Reference: http://scienceray.com/technology/information/10-product-designs-that-are-inspired-by-nature/

Functional inspiration from nature

3. Gecko Tape

Inspired by:
Gecko lizard's ability to climb up walls and walk along ceilings



Gecko tape is a gum less tape designed by the Manchester University Scientists. This is designed by the inspiration of the Gecko lizard's ability to climb up walls and walk along ceilings. The Gecko foot has tiny hair-like structures called setae that exhibit van der waals forces which help them in climbing.

Reference: http://scienceray.com/technology/information/10-product-designs-that-are-inspired-by-nature/

Functional inspiration from nature

4. Velcro

Inspired by: How the hooks of the plant burrs stuck in the fur of his dog and his pants

Velcro is the famous brand of the hook-and-loop fasteners that was designed by Swiss Engineer George de Mestral in 1940. He designed it after the observation of how the hooks of the plant burrs stuck in the fur of his dog and his pants. Observation of this under microscope showed him numerous tiny “hooks” that belonged to the plant.

Reference: http://scienceray.com/technology/information/10-product-designs-that-are-inspired-by-nature/

Functional inspiration from nature

5. Cat's Eye Reflectors

Inspired by: The Tapetum Lucidum, the reflector cells in cat's eyes that reflect even small amounts of light

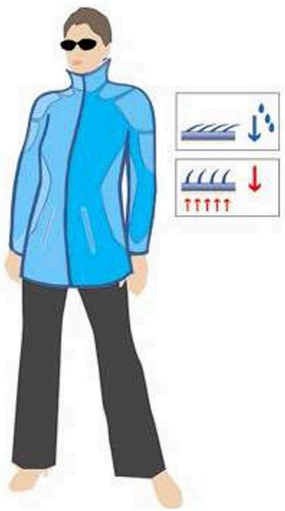
After studying the tapetum lucidum, the reflector cells in cat's eyes that reflect even small amounts of light, Percy Shaw in 1935 designed reflectors that are now being used on roads to mark road margins and lane dividers. The reflectors usually consist two reflector glasses fit into a white rubber dome. This dome is fortified by mounting onto a cast iron holding.

Reference: http://scienceray.com/technology/information/10-product-designs-that-are-inspired-by-nature/

Functional inspiration from nature

6. Smart Fabric

Inspired by:
The mechanism used by the pine cones to shed their seeds.



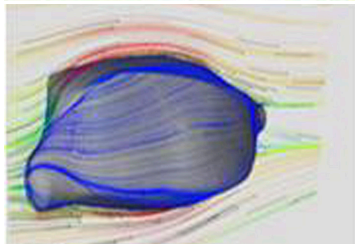
Smart fabric is developed by Britain Researches at the University of Bath's Centre. This new fabric is developed based on the mechanism used by the pine cones to shed their seeds. The smart fabric does the same thing, opening up when it is warm, and shutting tight when cold.

Reference: http://scienceray.com/technology/information/10-product-designs-that-are-inspired-by-nature/

Functional inspiration from nature

7. Mercedes Bionic Concept Car

Inspired by: Aerodynamic shape of box fish



Mercedes bionic concept car is designed based on the body shape of a box fish. Box fish is found in tropical marine habitats. The car has hexagonal shaped body which has less weight and all its parts are also lighter in weight. This car can travel 60 km within eight seconds only. It emits 80% lesser nitrogen oxide and consumes 20% less fuel.

Reference: http://news.mongabay.com/2005/0710-DaimlerChrysler.html

Use of natural materials to establish sustainability

Various Products made up of natural material helps us in maintaining sustainable environment. Every aspect of the world of tomorrow depends on our present decision and sustainability is the word in focus.

Various types of Lifestyle Products, daily and even electronics are made sustainable to make the things economical, social and ecological.

Let’s have some good examples of it.

Use of natural materials to establish sustainability

1. Ceiling fan

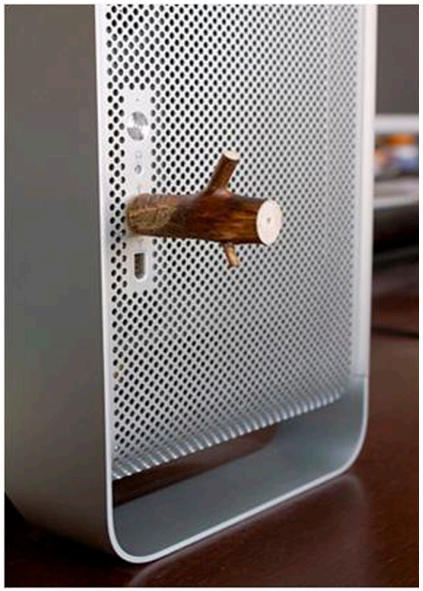
Material used:
Cane, bamboo

Reference: http://www.farreys.com/ceiling_fans/modern/index.html

Use of natural materials to establish sustainability

2. USB memory sticks

Material used:
Wood



These sticks from studio OOOMS are made to stand out from their natural environment of computers and offices. The sticks are picked from the woods and are individually selected for their natural beauty, and then professionally handmade into unique and personal USB memory sticks.

Reference: http://www.shift.jp.org/en/archives/2006/12/oooms_usb_memory_stick.html

Use of natural materials to establish sustainability

3. The Honeycomb Vase "Made by Bees"

Material used:
This vase was build in one week and by approximately forty thousand bees

Prototype 2006, Directed by Studio Libertíny (The Netherlands)
The work takes from two to ten days, depending on the weather, the season, the size of the colony, and the colony's need to expand. The process, which the designer calls "slow prototyping" in an ironic counterpoint to today's rapid manufacturing technologies, poetically brings a natural phenomenon full circle, starting with flowers, which nourish bees and enabled them to produce the vase, and ending with a vessel that is meant to contain flowers.

Reference: http://www.flickr.com/photos/looktouch/2458665078/
http://3rings.designerpages.com/2009/03/16/slow-prototyping-and-the-secret-life-of-bees/

Use of natural materials to establish sustainability

4. Plyboo Pendant Lamp

Material used:
Plywood

Propeller's gorgeous new pendant lamps demonstrate the potential of combining CNC milling with sustainable materials like Plyboo. What particularly attracts us to the Furrow Parkade pendant light is the simple linear design, with cuts that reveal the inner core of the material, making it equally beautiful when showcased in natural light or when used to light-up a dark night.

Reference: http://www.dezeen.com/2007/04/19/studio-libertiny-at-droog/

Direct inspiration from shape/form of natural entity

Shape/Form are directly taken from nature and product directly resembles the entity from which the inspiration has been taken.

Direct inspiration from shape/form of natural entity

1. SWING

Inspired by:
The falling of the leaves in autumn

Swing should be placed in outdoor spaces where the sunset glints through its leaf holes, creating sweet shadows. This slow rocking movement will remind of the peace and tranquillity of a child hearing a lullaby.

Reference: http://www.yatzer.com/1411_alberto_sanchez__the_leaf_swing

Direct inspiration from shape/form of natural entity

2. Moth design lamps

Inspired by:
Trunks of plants

Shannon Shapiro is a designer from Los Angeles who creates lighting, furniture and interiors that are inspired from nature.
As the founder and principal designer for Moth Design, Shannon has been able to further spread her creative wings into new areas and products, focusing initially on lighting and expanding into furniture and furnishings.
Famous for her coral lighting Shannon admits she is an avid athlete who loves the outdoors and strives to find ways to bring the "outside" in, "… wind is inspiring to me…particularly its effect on water, trees, coral, grass…all elements of nature.

Reference: http://cubeme.com/blog/2007/12/21/moth-design-lamps-by-shannon-shapiro/

Direct inspiration from shape/form of natural entity

3. HUSKY Tent

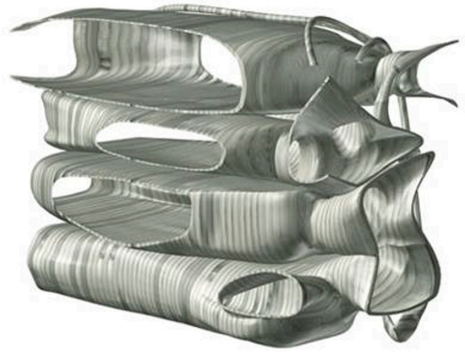
Inspired by:
Dry twig of tree which create space under the bent branches

Reference: http://www.designboom.com/weblog cat/8/ view/2527/biomimetic-tent-design.html

Direct inspiration from shape/form of natural entity

4. Waterflux

Inspired by:
Nature and the way nature and its processes function like "ice cavity"



The new art museum scheduled to be finished in 2009.

On the first look, seems like an ice cavity but in fact it is carved out of wood and other eco friendly materials.

Even the construction of this museum has been carefully planned so that the end result gives out an amorphous mix of structure which though looks disorderly but does have an identity of its own.

Reference: http://www.tuvie.com/waterflux-by-rsien

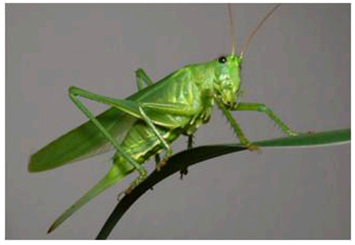
Inspiration in form to enhance the aesthetics

Elements of Design are extracted from natural entity and are used to enhance the aesthetic of the product.

Inspiration in form to enhance the aesthetics

1. Insecta Concept

Inspired by: Insects, such as Grasshoppers



Personal vehicle for the future, with unique construction and design language.

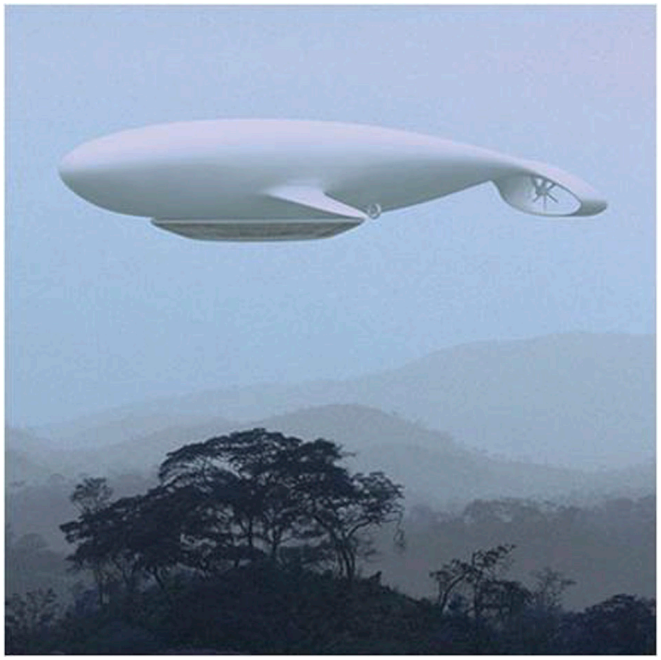
The exterior expresses the characteristics of friendly insects, such as Grasshoppers- Agile, Lightweight and Green.

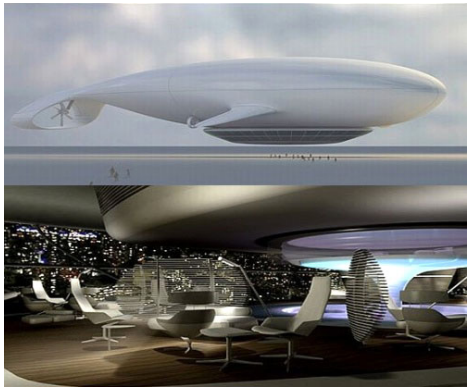
Reference: http://www.devicedaily.com/misc/insecta-concept-because-future-cars-belong-to-insects.html
http://motortips.blogspot.com/2008_10_19_archive.html

Inspiration in form to enhance the aesthetics

2. Whale-shaped aircraft

Inspired by:
Whale fish





"Manned Cloud" a flying Hotel by the French designer Jean-Marie Massaud.

A beautiful piece of art and technology developed with French national aerospace research body ONERA can host 40 guests and has a range of 5,000 km.

Reference: http://www.acceleratingfuture.com/michael/blog
http://www.dezeen.com/2008/01/10/manned
-cloud-by-jean-marie-massaud/

Inspiration in form to enhance the aesthetics

3. Fungus sitting

Inspired by: the growth of fungus clusters

Public chair modules called Fungus.

Designed by the Chinese artist Ma Yansong of MAD for the Zhangjiang business park in Pudong, Shanghai.

It represents the basic organic form that could create infinite combinations.

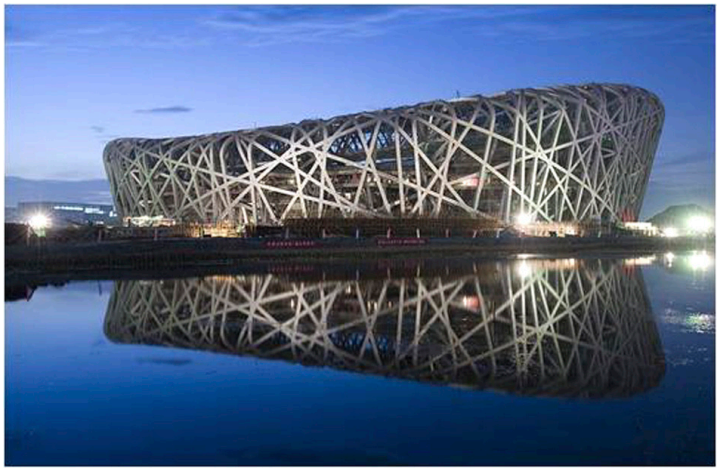
They scatter in the urban public space as mushroom made of modern materials.

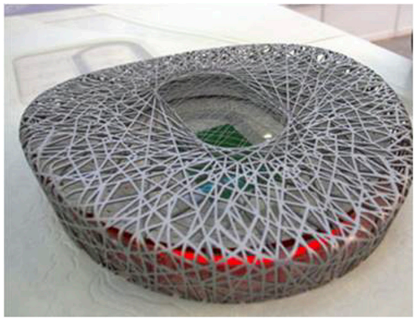
Reference: http://www.dezeen.com/2008/03/23/fungus-chairs-by-mad/

Inspiration in form to enhance the aesthetics

4. Bird's Nest National Stadium

Inspired by:
Structure of bird's nest





The bird nest from the swiss architects duo Herzog and DeMeuron for the 2008 Beijiing Olympics.

The structure itself is composed of a grid-like formation that serves as both structure and facade, integrating the stairs, walls, and roof into one cohesive system.

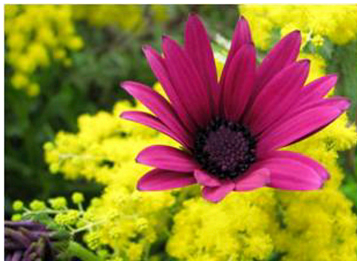
Instead of form being dictated by function, Herzog and DeMeuron's design effectively removes the distinction, making function and form one in the same.

Reference: http://photobucket.com/guestlogin?albumUrl=http://s7.photobucket.com/albums/y281/gherkin007/WC2018/
http://en.wikipedia.org/wiki/Beijing_Olympic_Stadium

Inspiration in form to enhance the aesthetics

5. Grower De Jorge Valls En Nude´08

Inspired by:
Shape of the legs resemble roots, and the upper part adopts the form of a flower in blossom



The exclusive design is brought to light from a growing concept; the shape of the legs resemble roots, and the upper part adopts the form of a flower in blossom.
A clearly organic geometry made out of aluminium, that develops itself from a single module allowing to create Grower.

Reference: http://www.guiadkn.com/index.php/page/75/

Inspiration in form to enhance the aesthetics

6. Frog-Inspired Bike

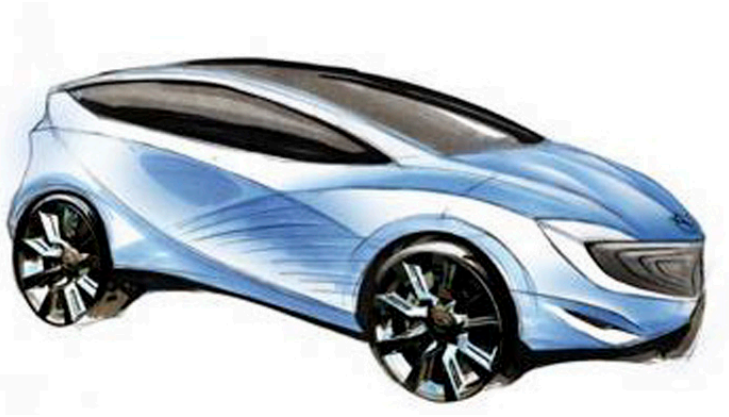
Inspired by:
Frog's motion and structure

Alex Suvajec's concept bike. It's unconventional frame expresses the characteristics of frog. Dynamism of the bike resembles the movement of frog body.

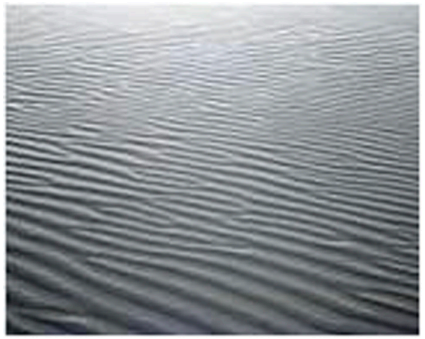
Reference: http://picocool.com/story/title/frog-inspired-bike-design

Inspiration in form to enhance the aesthetics

7. Mazda Hakaze

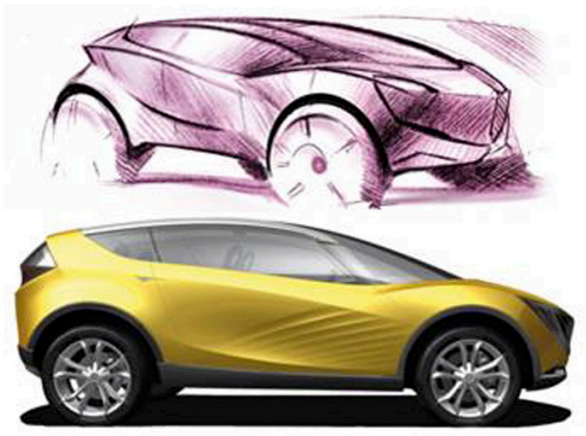


Inspired by:
How natural forces like wind and water move in nature



In Japanese, the word Hakaze comes from “ha” for “leaf” and “kaze” which means “wind,” a fitting combination for a vehicle that looks like it is effortlessly cutting through the air while standing still.

Capturing images of natural forces allowed the team to visualize something that isn’t normally visible, and this envisioning helped the designers create and develop the form. “Invisible air flows by the visible form, and this aesthetic form was the language for future vahicles.



Reference: http://www.carbodydesign.com/archive/2007/02/05-mazda-hakaze-concept/

Inspiration in form to enhance the aesthetics

8. Mazda Nagare Concept

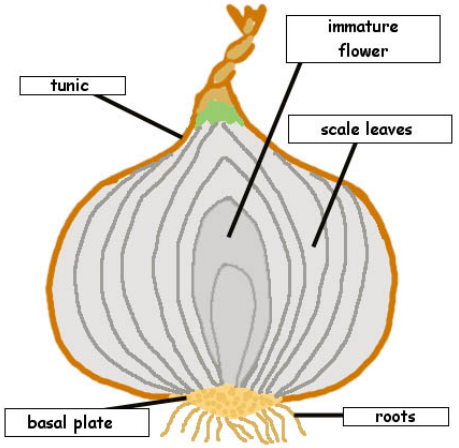
Inspired by:
How natural forces like wind and water move in nature

"Nagare" is a Japanese word that stands for 'flow' and the embodiment of motion and takes its inspiration from how wind shapes sand in the desert, how water moves across the ocean floor. Embodied by a unique surface language, and combined with form and proportion, it communicates movement in a new way.

Reference: http://www.carbodydesign.com/archive/2007/02/05-mazda-nagare-concept/

Onion:
A natural entity

In the second phase of study, onion is taken as a natural entity. The study focusses on how the particular properties of the entity make the path of exploring the form.



As a natural entity, onion has interesting elements. The study was initially done based on its biology. It has a particular shape of bulb which is made up of many scales. When scales are peeled off one by one, forms, colors, pattern/texture of lines on the surfaces of scale change gradually.

Onion is generally cut in latitude to make slices which have concentric circles. These circles have beautiful graphical character. When it is cut longitudinally, all scales of onion appear in layers. The centre has beautifully shaped immature flower which has an expression of innocence.

In process of exploring form, different forms are evolved by taking onion itself and peeling off its layers and cutting it in many ways.

Shape of bulb

The bulge of the bulb is due to the layers inside the onion. These layers forms a covering around each concentric layers. The surface of the bulb has longitudinal line textures on it. Every natural entity is different, but entities of the same family have a characteristic that is common to each entity within the family. The lines on the bulb on the onion appear as if they are starting from the root and converging towards its tail. This directs the

Cross sectional cut

When the layers of the onion are peeled off, the shape of the bulb gets changed. The decrement of the bulge causes change in the form. To see these forms, it is cut in cross sectional ways. Sometimes angular cut of its inner layers gives beautiful and different forms.

Form from cross sectional cut

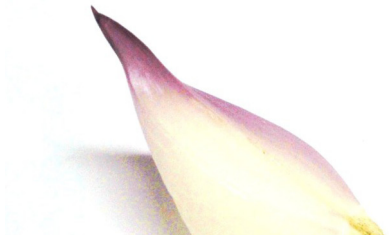
Form of a individual layered scale

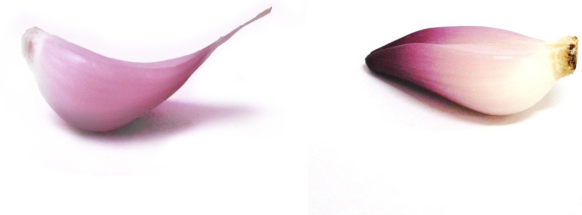
Scales

Scales are the main characteristic of the onion. To see the contribution of scales in its different forms, it is cut intentionally in layers. During this process different stages of forms are achieved. On pressing the root joint, the leaves separate and this shows the layers inside onion which are joined at the root. Every step in this leads to giving different forms.

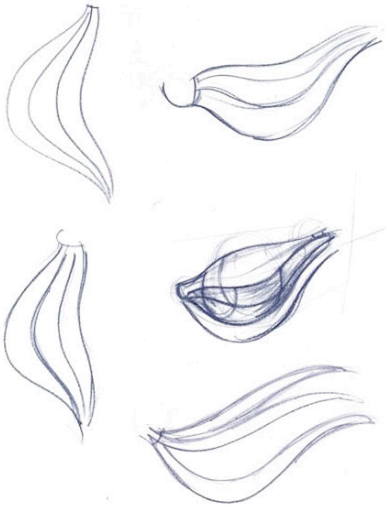
Immature flower

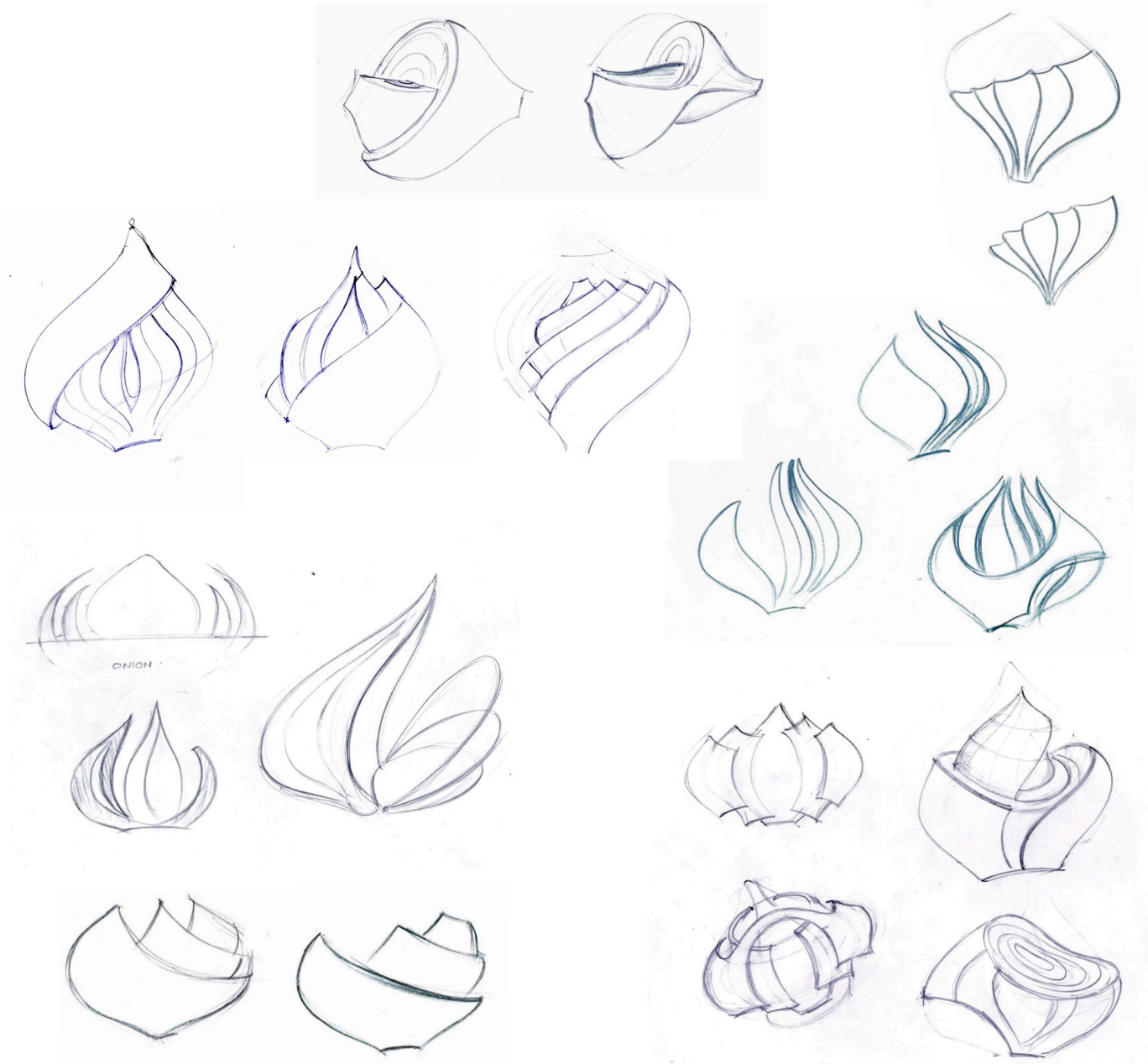
The immature flower of the onion is like a bud. The form has the expression of innocence and a beautiful curve. It goes from light to the dark. This enhances the beauty of its form.





Sketches: Exploration of forms





Forms
and its variations

Forms
and its variations

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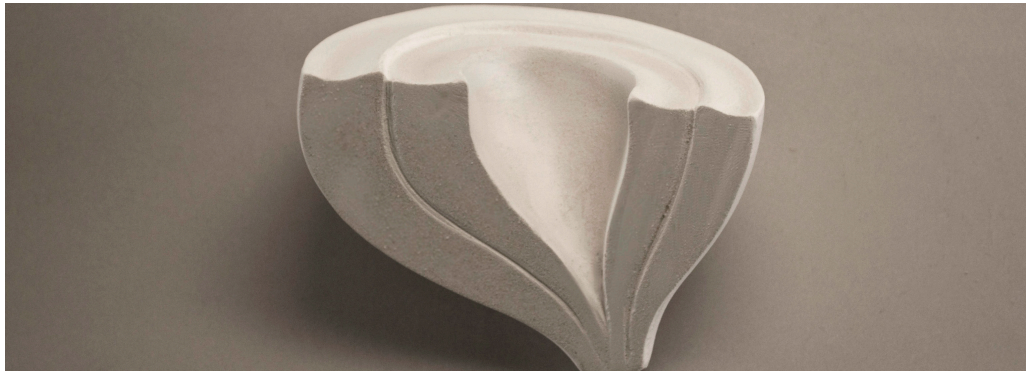

Forms and its variations

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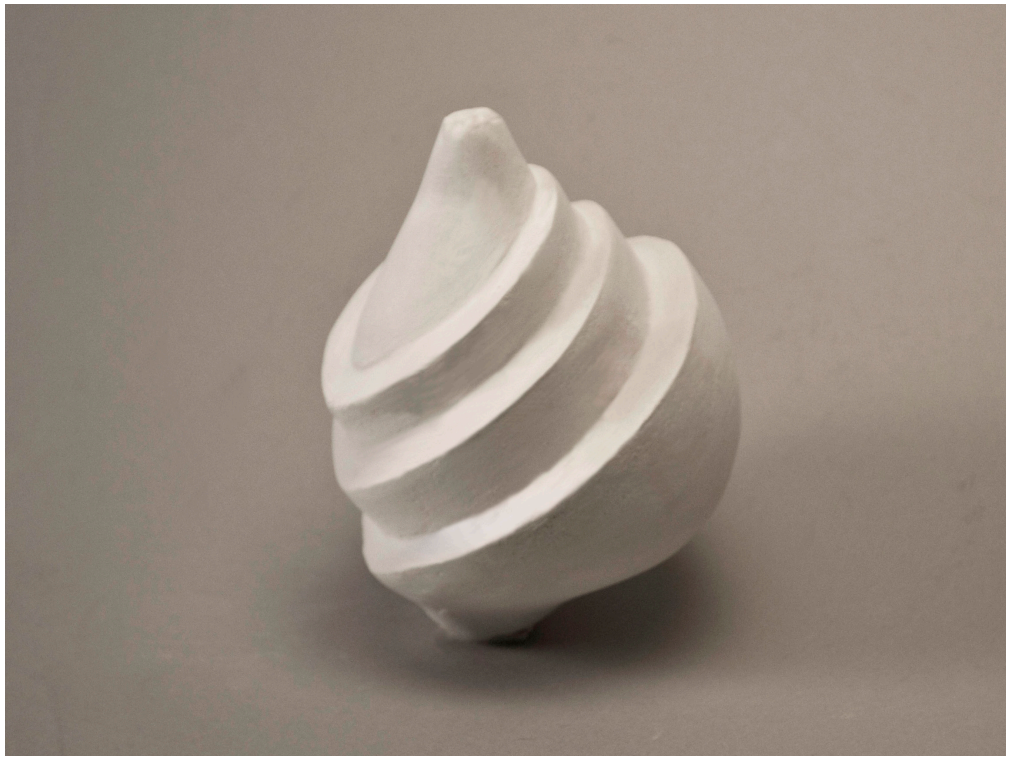

Conclusion

The creator of this world made it very beautiful. We always obey it, may be because we also are the part of it. Complex processes in the Nature are designed very well to be happened nicely & without fail. Mystery of nature is beyond understanding of human. For them it's very difficult to understand & use the intricate nature of organic curves of Nature (in compare to geometric forms) but Nature is ornamented by these organic forms. So, it comes out as very helpful in design process when organic forms are incorporated to retain a sense of aesthetic.

Study reveals such correlation between nature and design. Moreover it is concluded that any natural entity will have new ways of seeing it and using it to find its different forms having the property of the entity. Although basic properties of product influence our approach to retain natural aesthetics but with this entity's own particular properties makes the path of exploring the form.

References

WEB LINKS:

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