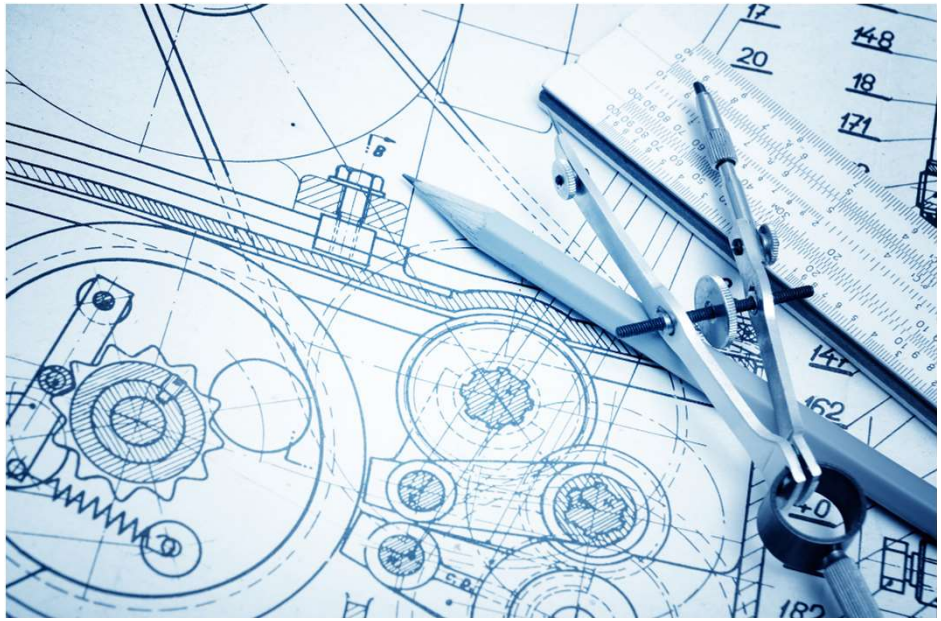
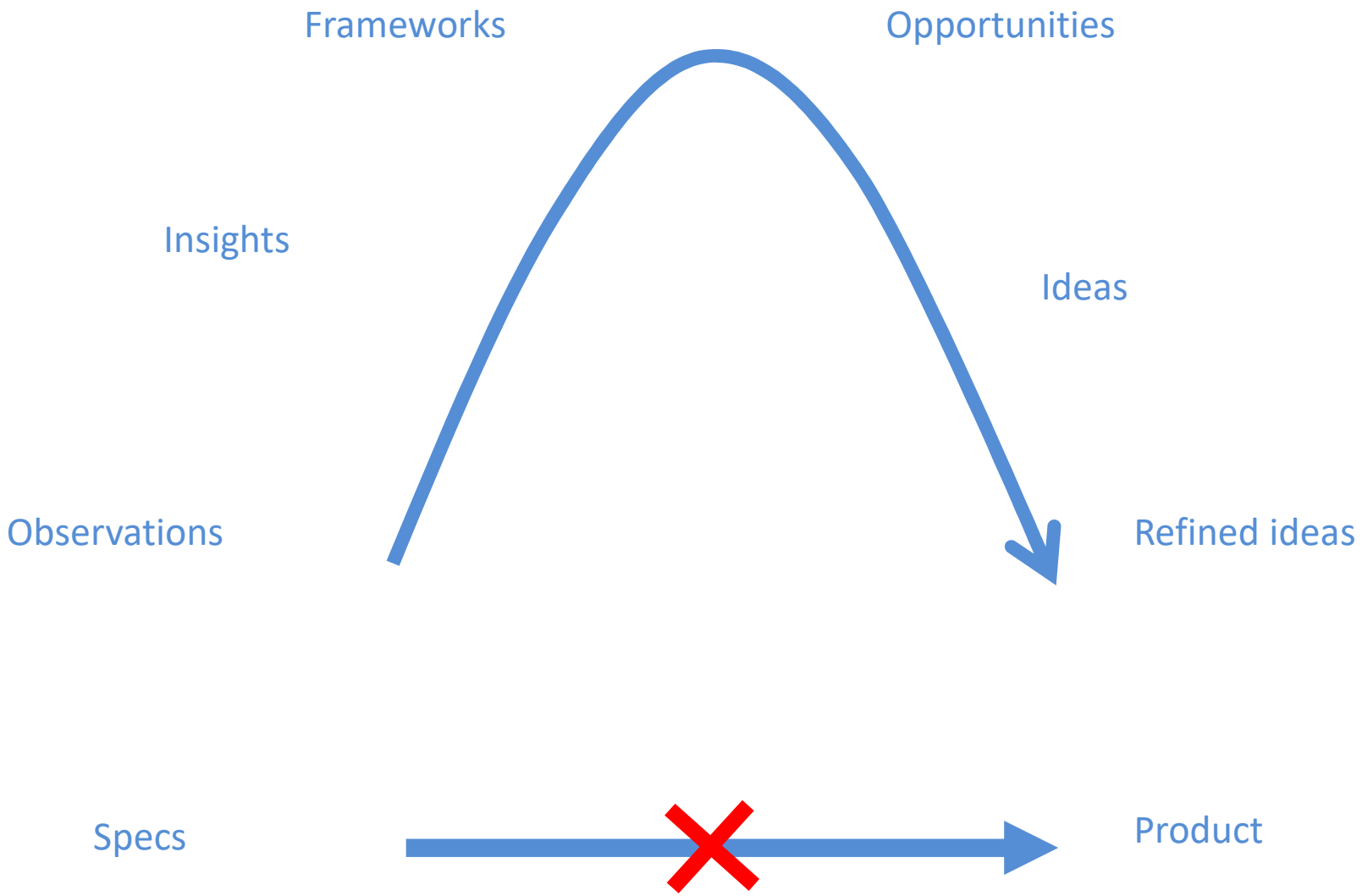
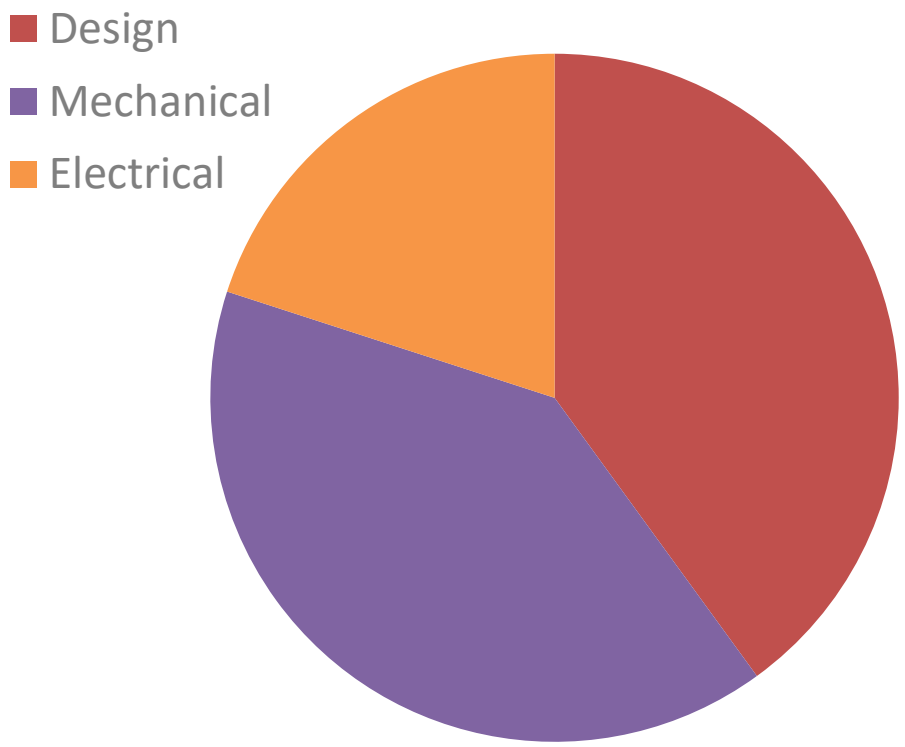
Introduction

- An integrated hands-on module for students to put engineering theory into practice by working in teams
- Students design and build engineering artefacts
- Primary objective of the module is to develop student autonomy, integration, hands on skills, team work and communication skills.

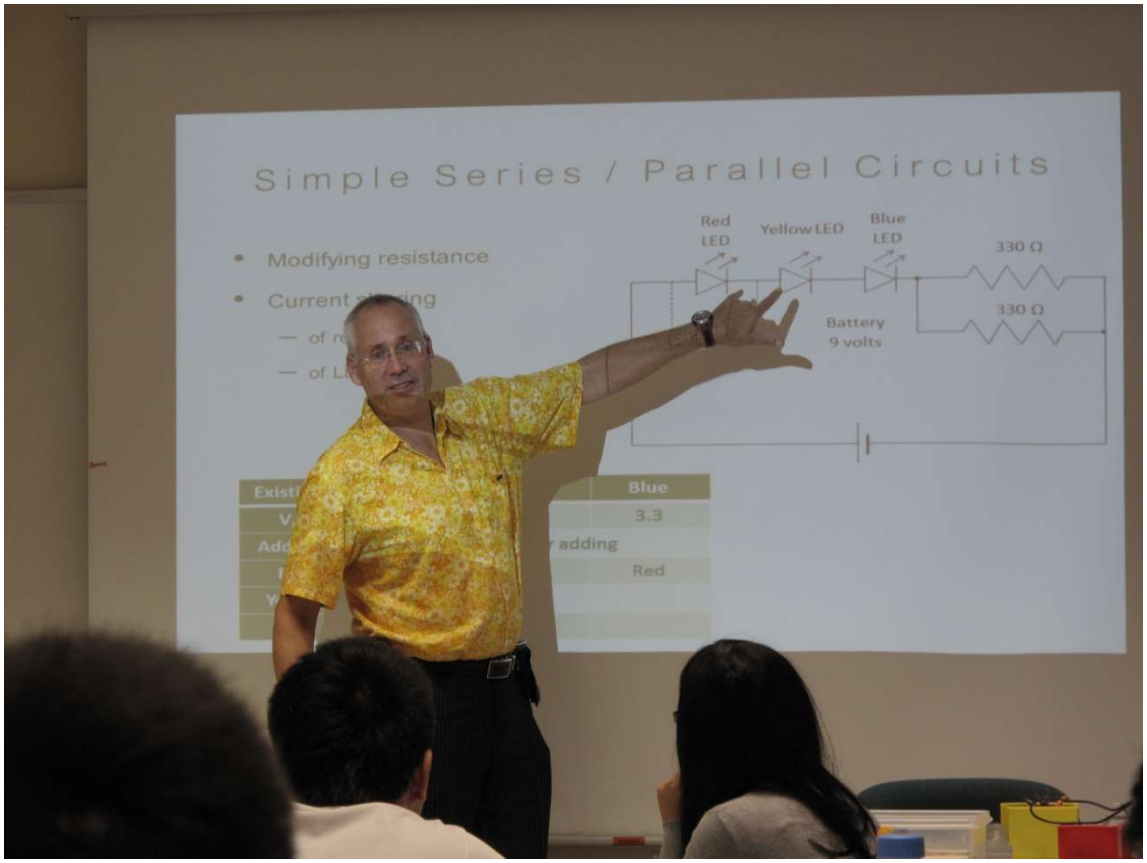


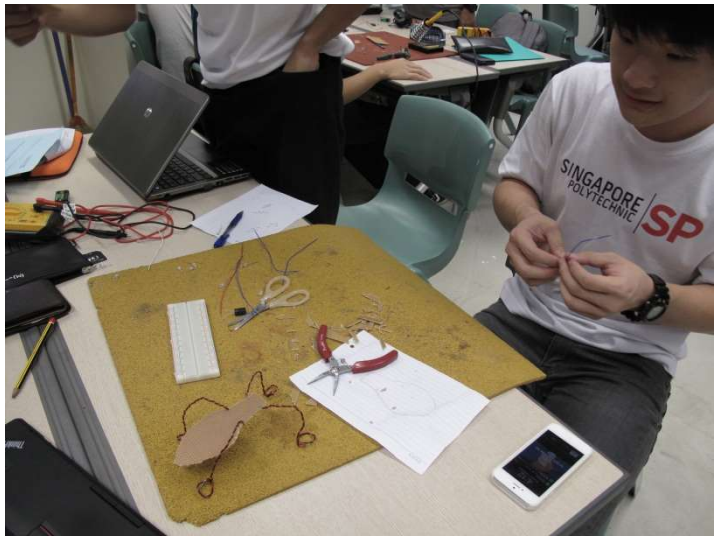

Frameworks
Opportunities
Insights
Ideas
Observations
Refined ideas
Specs
Product

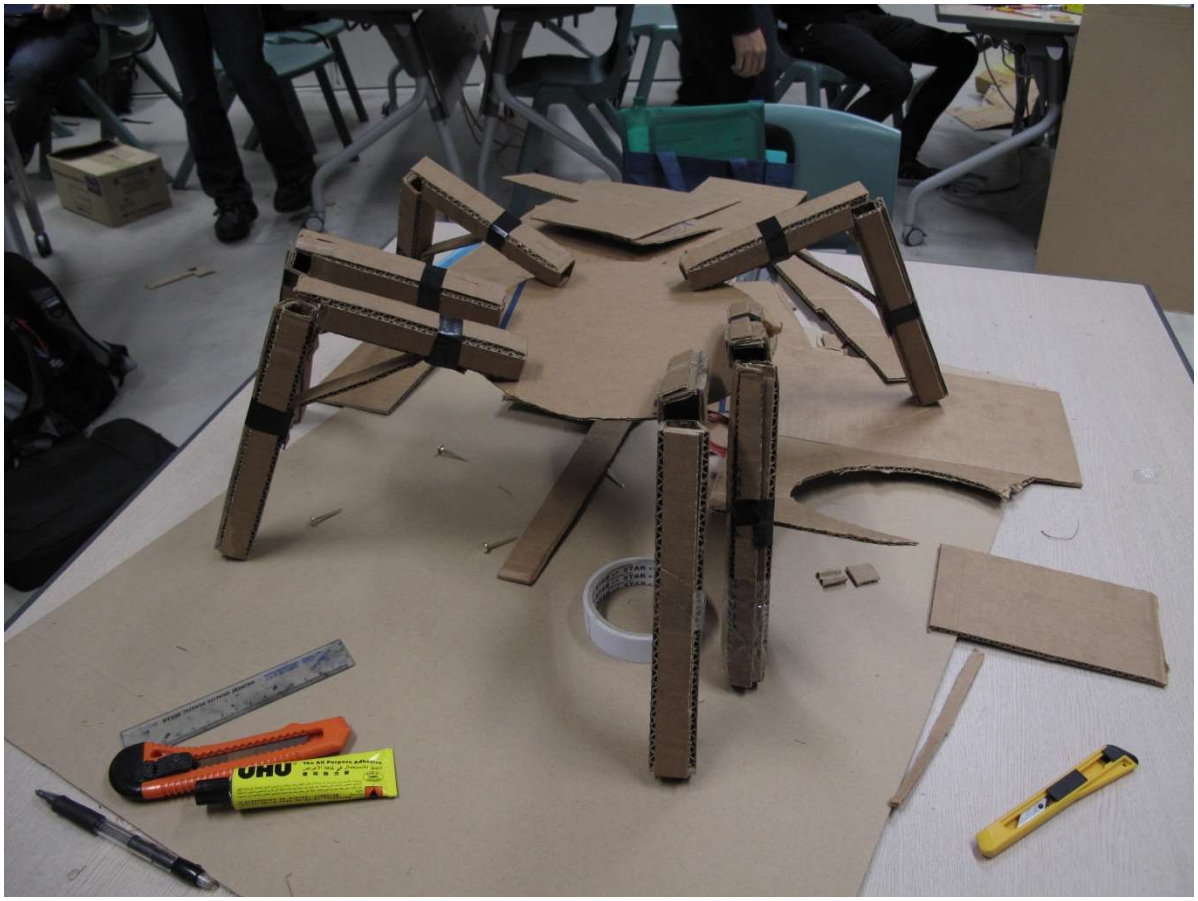
A distribution of concepts in EM524



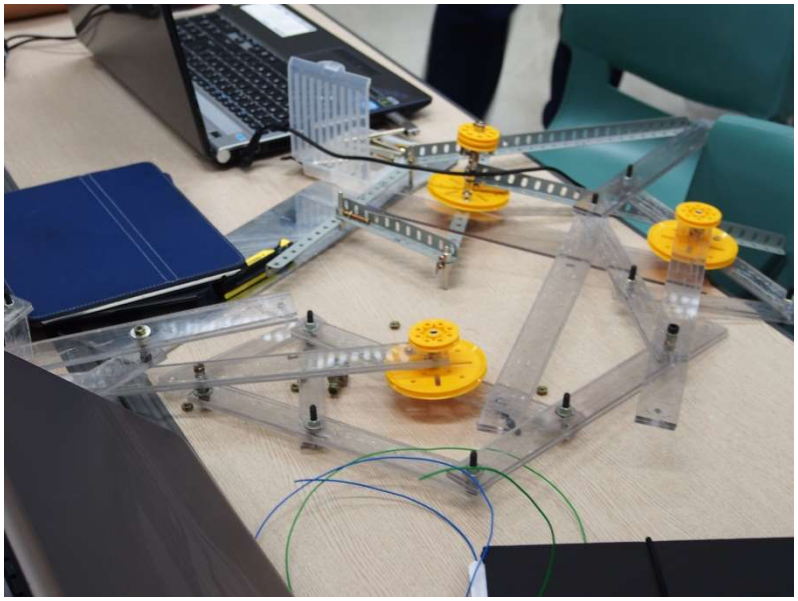
Learning engineering concepts

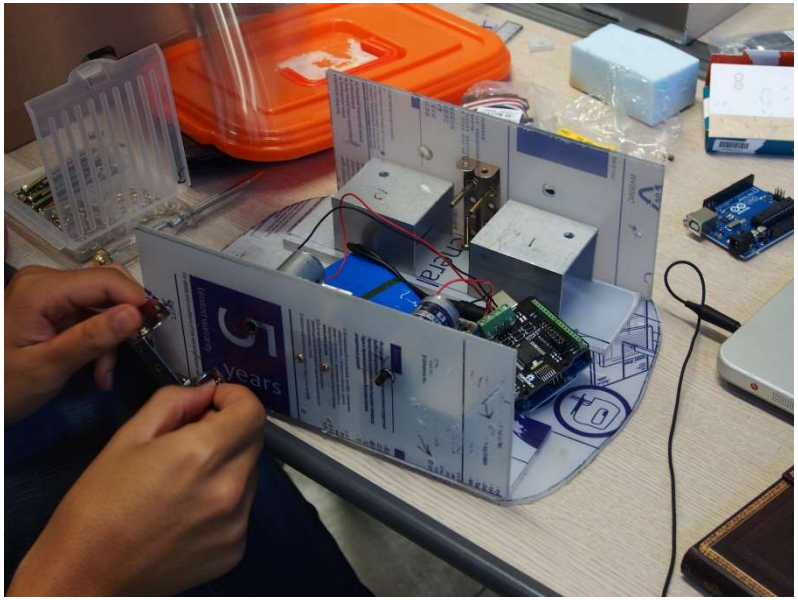






Prototyping ideas



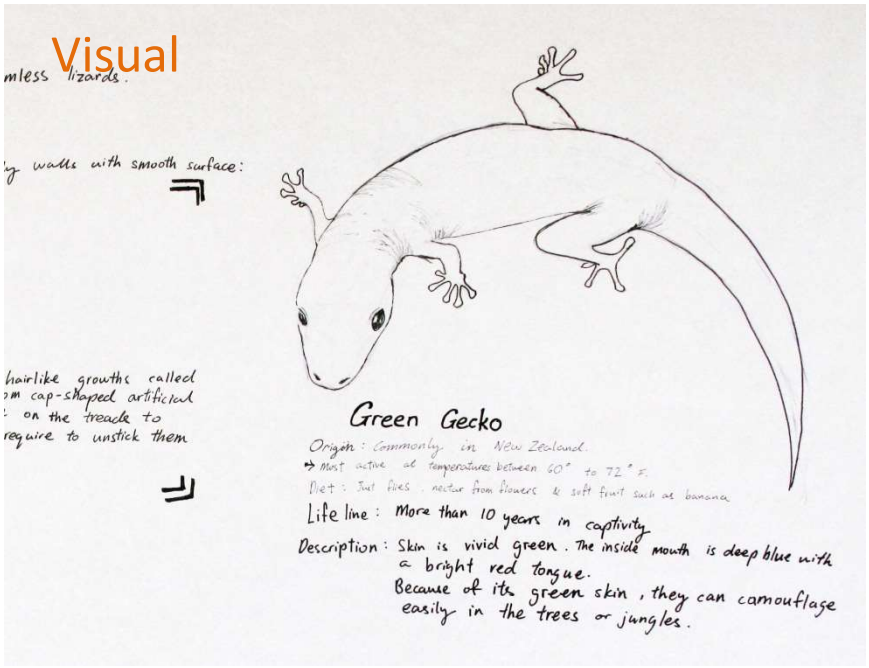


Realization

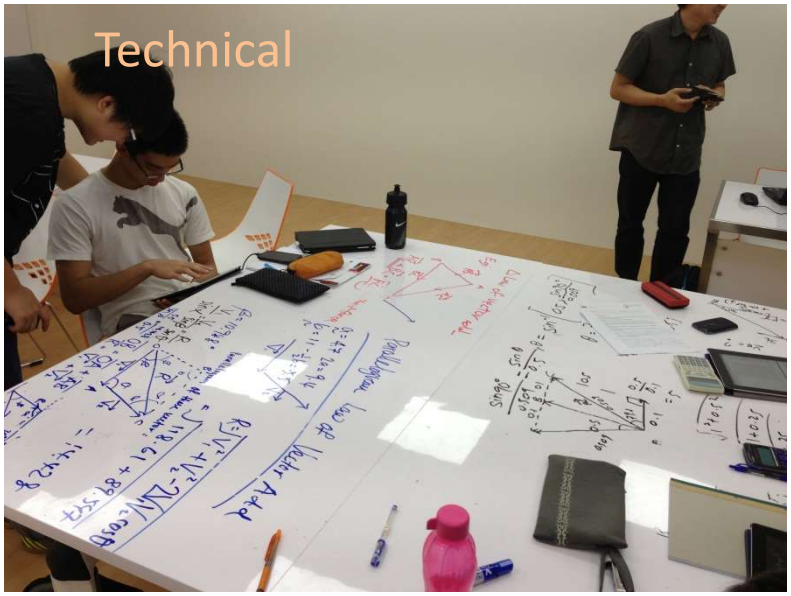
Communication

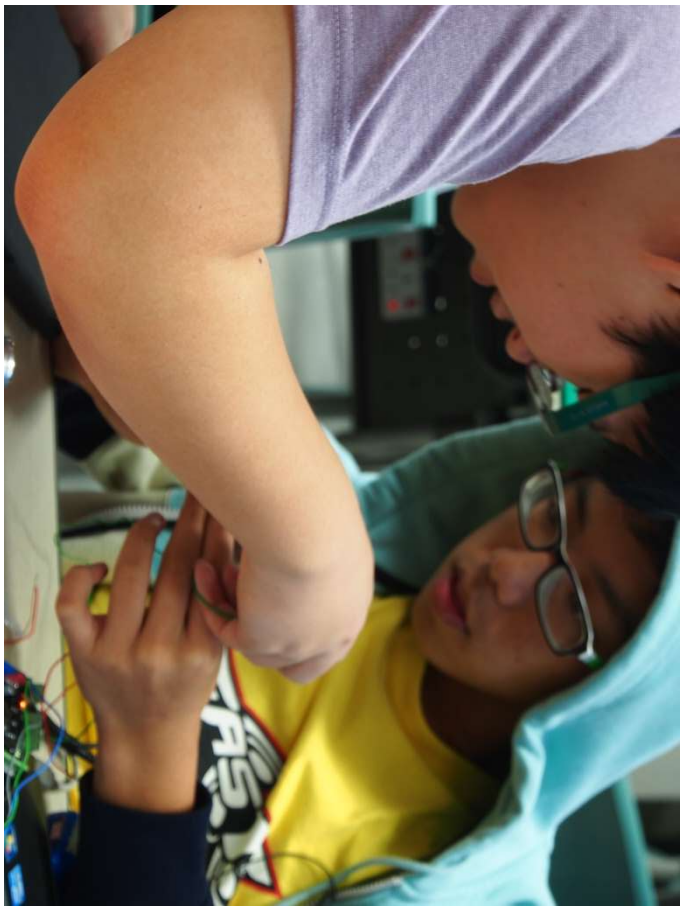
Oral

Visual

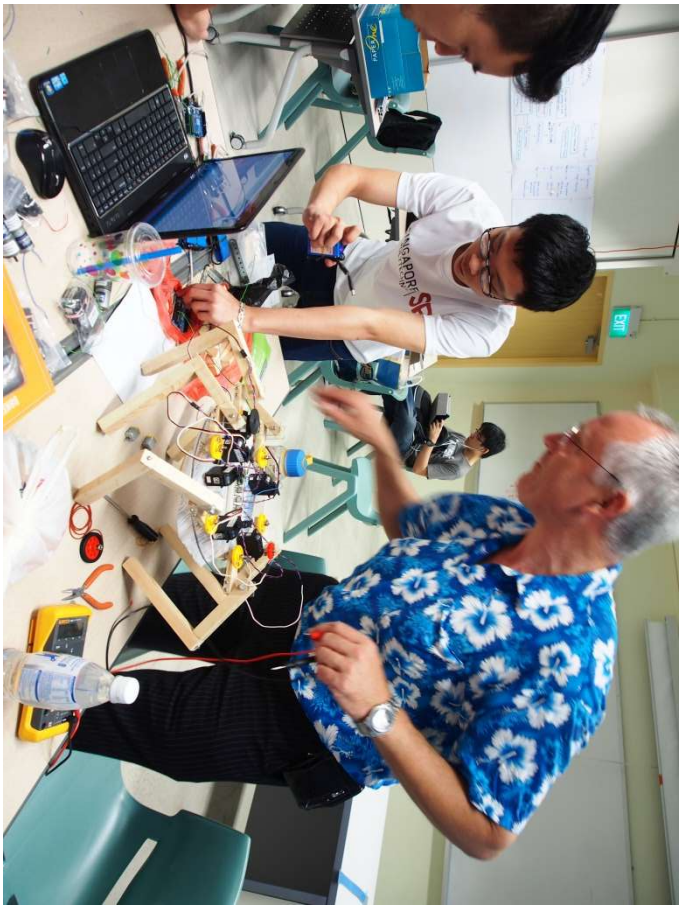


Technical





Teamwork



Design inspired by nature-Biomimicry

- Learning from and mimicking the strategies found in nature to solve human design challenges.

https://biomimicry.org

design inspired by nature

from the industrial revolution to the beginning of the XXI century

form from nature

focus :
aesthetics

examples:
industrial design,
furniture design,
product design

1883 - Chair - Mackmurdo

1900 - Pendant - Lalique

1900 - Carver Chair - Gaudí

1900 - Lamps - Tiffany

1902 - Lamp - Behrens

1904 - Orion Teapot - Adler

1920 - Chair - Rohlfmann

1938 - Savoy Vase - Aalto

1948 - La Chaise - Eames

1950 - Arabesque - Wolfins

1951 - Vespa - D'ascanio

1938, 1940 - Beetle - Volkswagen

1966 - Butterfly Stool - Yanagi

1969 - Donna - Pesce

1982 - Ciao for Canon - Colani

1990 - Juicy Salif - Starck

1996 - Vespa ET2 - PDT Piaggio

1998 - New Beetle - Volkswagen

1998 - I Mac for Apple - Ive

2001 - Tyrrant Bottle - Lovegrove

2003 - Candleleo - Vessel

2003 - Flaria for Arita - Kita

2006 - A La Iata Bowl - Montana

Arts & Crafts | Art Nouveau | Art Deco | Organic Design & Organicism | Biobjects

function from nature

focus :
technology

examples:
industrial design,
inventions,
robotics

1849 - Artificial Leg - Palmer

1853 - Glider - Cayley

1868, 1873 - Barbed Wire - Kelly, Gliddan

1903 - Wright Glider - Wright Brothers

1907 - Helicopter - Cornu

1921 - Robot - Kapek

1934 - Patent Car #9 - Bel Geddes

1934 - Cat Eye Reflector - Shaw

1948 - Velcro - De Mestral

1960 - Walking Truck - General Electric

1969 - Artificial Heart - Liotta & Cooley

1982 - Lotus Effect - Barthlott

1992 - Back Protector - Sadler

1999 - Aibo Robot - Sony

2003 - Gecko Tape

2004 - Fastskin Swimwear Speedo

2006 - Boxfish Car - Daimler Benz

2005 - I Unit - Toyota

2007 - Bone Chair - Laarman

2003 - Vertebra - Montana

process and system from nature

focus :
large scale projects

examples:
bio-inspired theories,
urban planning,
industrial systems,
industrial design.

1858 - Central Park - Olmsted

1902 - First Garden City - Howard

1927 - Biopolis - Geddes

1949 - Metabolic & Symbiotic Arch. - Kurokawa

1963 - Urban Metabolism - Wolman

1971 - Urban Ecology & Eco City - Register

1969 - Industrial Ecology - Frosch et. al.

1969 - Design with Nature - McHarg

1997 - Biomimicry - Benyus

2007 - SimbioCity - Sweden

2008 - Cultivation Kitchen - Hsie

2008 - Biophilic Design - Kellert et. al.

historic events & inventions

1700 | 1800 | 1900 | 1950 | 2000

Could ants help us design collaborating multi-robots?

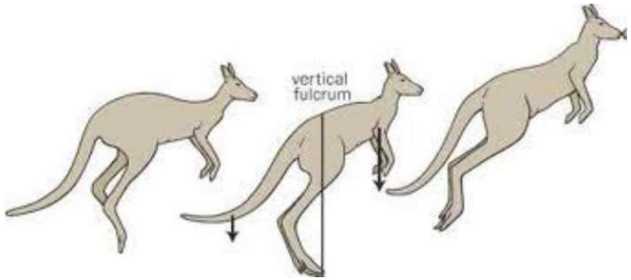
https://www.youtube.com/watch?v=IiiWRZ_vG-M

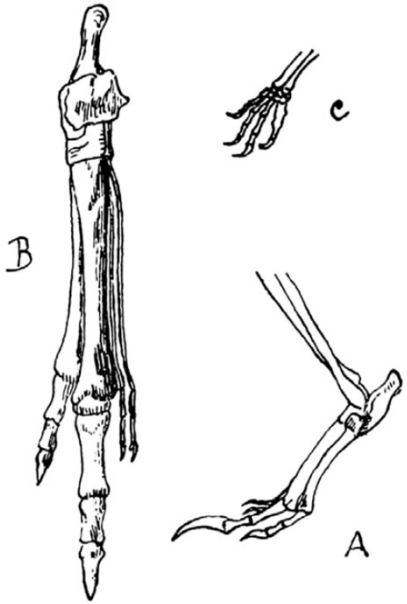
Analysing animal movement its potential application

http://www.youtube.com/watch?v=40gECrmuCaU&list=UUOIHBHRbvncMo7Bf0Vx1zEQ&index=16

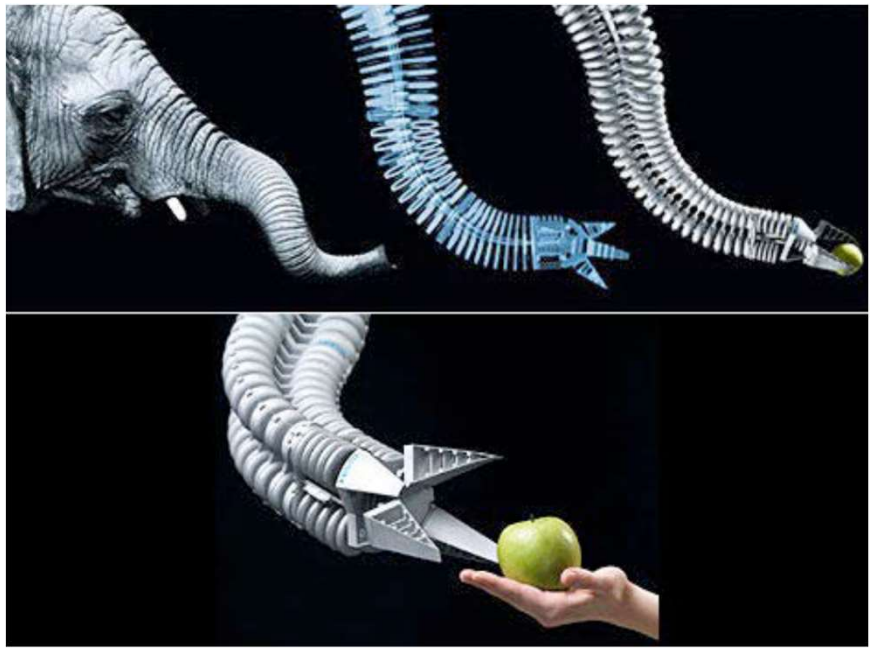
Why use animal inspired movements?

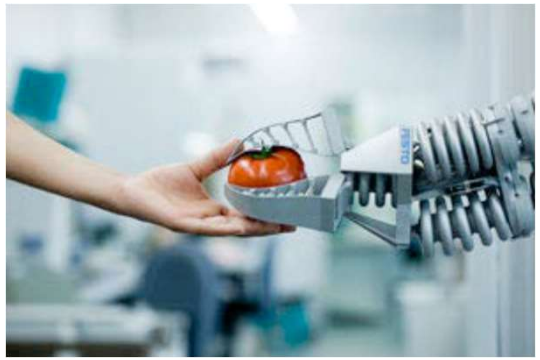
Animals show remarkable diversity and capability. From the ease at which a gibbon can swing through the trees, to the profound efficiency of the hops of a kangaroo





Why use animal inspired movements?





Biomimicry at Home

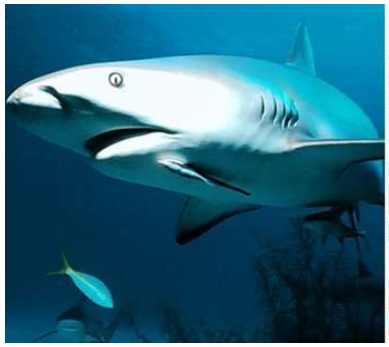
Designed to behave like natural trees.

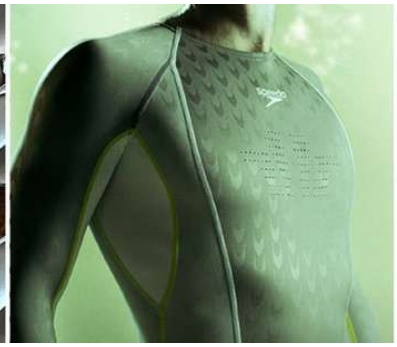
The trees dispers heat trapped at the top of the structure to various temperature controlled areas.

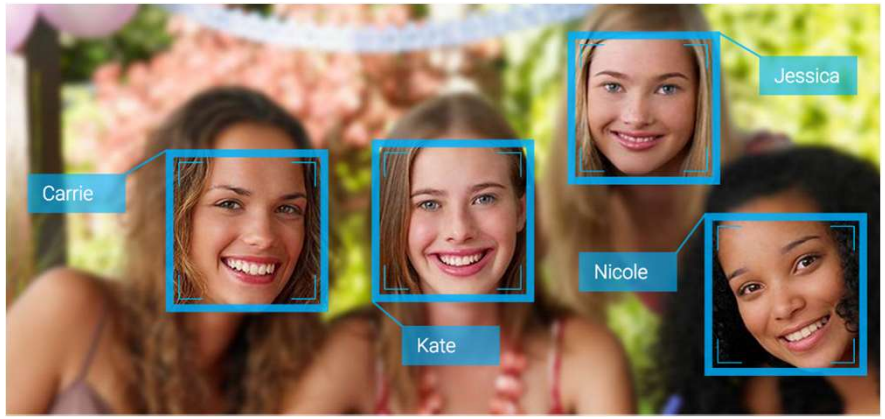
Photovoltaic solar cells at branches collect massive amounts of energy, to sustain the rest of the supertree systems. The branches are spread out to expand surface area for the solar cells.

https://www.biomimicrysingapore.net/

Biomimicry at your daily life



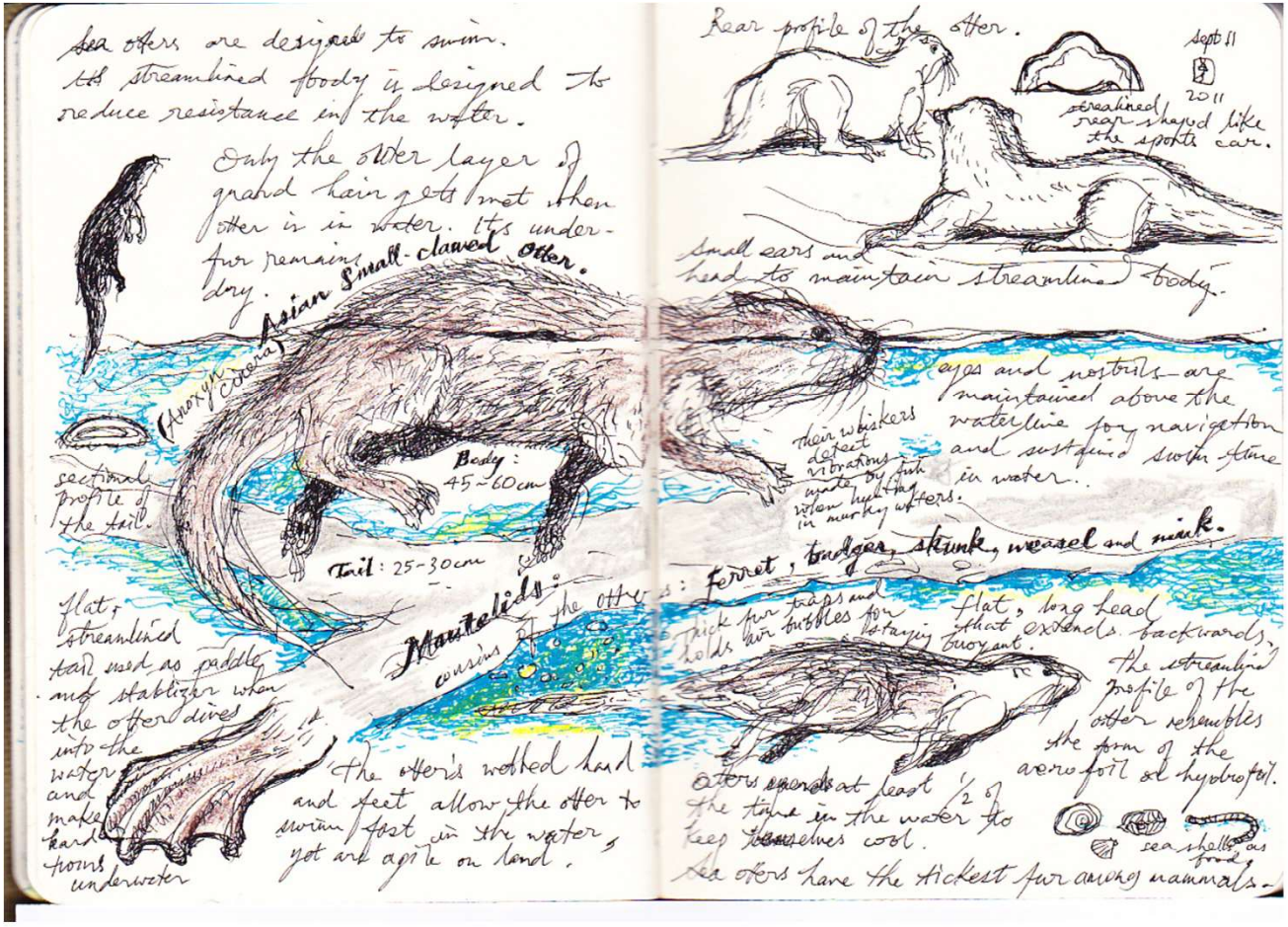




Project theme

Design and build engineering artefacts taking inspiration from nature

A sample of research documentation



STUDY THE MOVEMENT OF THE **CREATURES**
OBSERVE AT LEAST **3 DIFFERENT** UNIQUE CREATURES AS **INDIVIDUALS** WITHIN THE **GROUP**

WEEK 4 ASSIGNMENT

COMPILE THE TEAM'S DISCUSSION INTO A POWERPOINT REPORT AND SUBMIT AS A TEAM:
KEY THINGS TO NOTE ARE REASONS FOR YOUR TEAM'S DECISIONS. PLEASE DO NOT START DESIGNING YET BUT TO THINK WHAT ARE THE POSSIBLE ANIMAL MOVEMENTS THAT MIGHT INSPIRE YOUR FUNCTIONS. INCLUDE MORE PICTURES AND LESS WORDS