10.014
Computational Thinking for Design
Fall 2020

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Course Description

Computational Thinking for Design is an introductory programming course that combines programming both in the design and computing contexts targeted at novice programmers. It introduces students to programming and design computing skills essential for their studies at SUTD regardless of pillar preference.

Learning Objectives
- Acquire conceptual knowledge and skills for visual and python programming.
- Acquire basic knowledge of computational geometry concepts.
- Develop hands-on experience with applying computational thinking approaches to explore solutions to design and engineering problems.
- Gain skills in programming the Raspberry pi micro-controller.
- Learn and practice effective technical communication skills for formal written reports.

Measurable Outcomes
- Implement a working visual/textual program to generate variations of a 3-dimensional model in accordance to a given geometric problem.
- Develop python programs that meet a set of specifications to solve computational problems.
- Produce a physical artefact as the final outcome of a computational process for a design project.
- Develop and deliver a written report on time that describes the results of the design project.

Generative Design assignment-Beyond Human Aptitude
Students apply generative design techniques with the aim of producing drawings that cannot be recreated using conventional media. Cyclic drawings below by Lee Tze Wei, Alex Joel.

Term 1
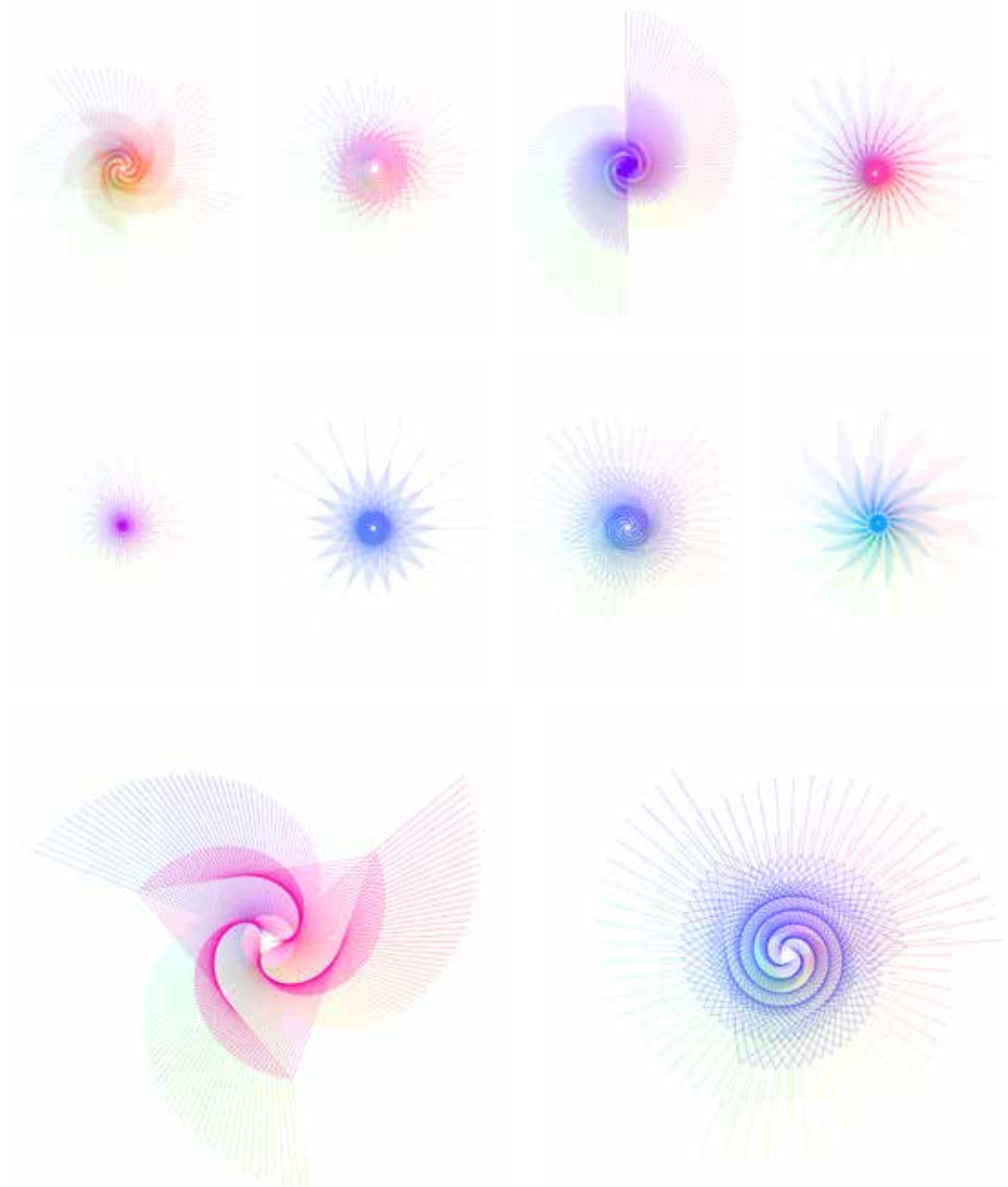
Parametric Design assignment- Mapping Variations
Students produce a scalar field family of surfaces and present variation matrices mapping interactions between parameters.
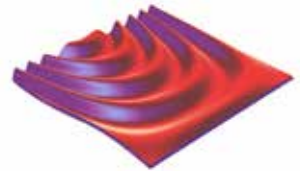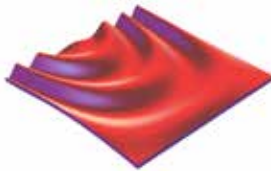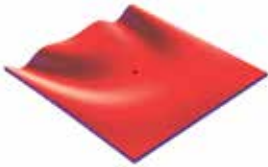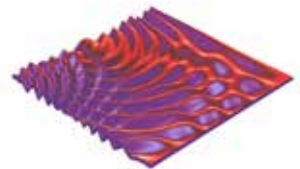Top set by Fan Xiangwei, bottom set by Jarrod Lim
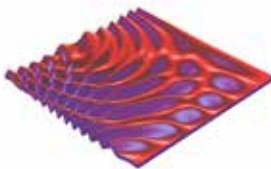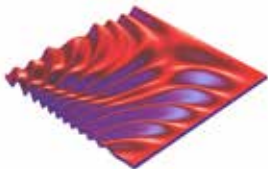
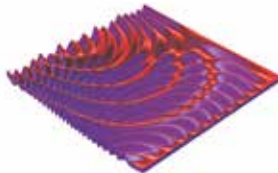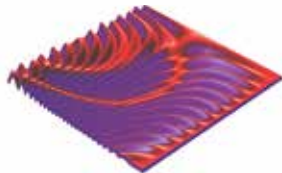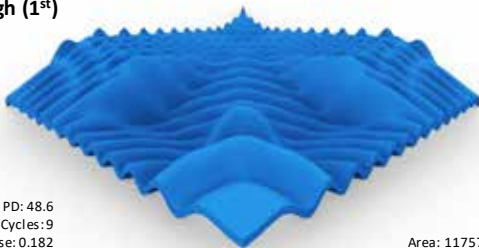| a\b	1	2	3
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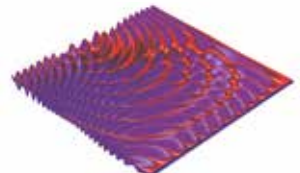
constant h = 5

High (1st)

PD: 48.6
Cycles: 9
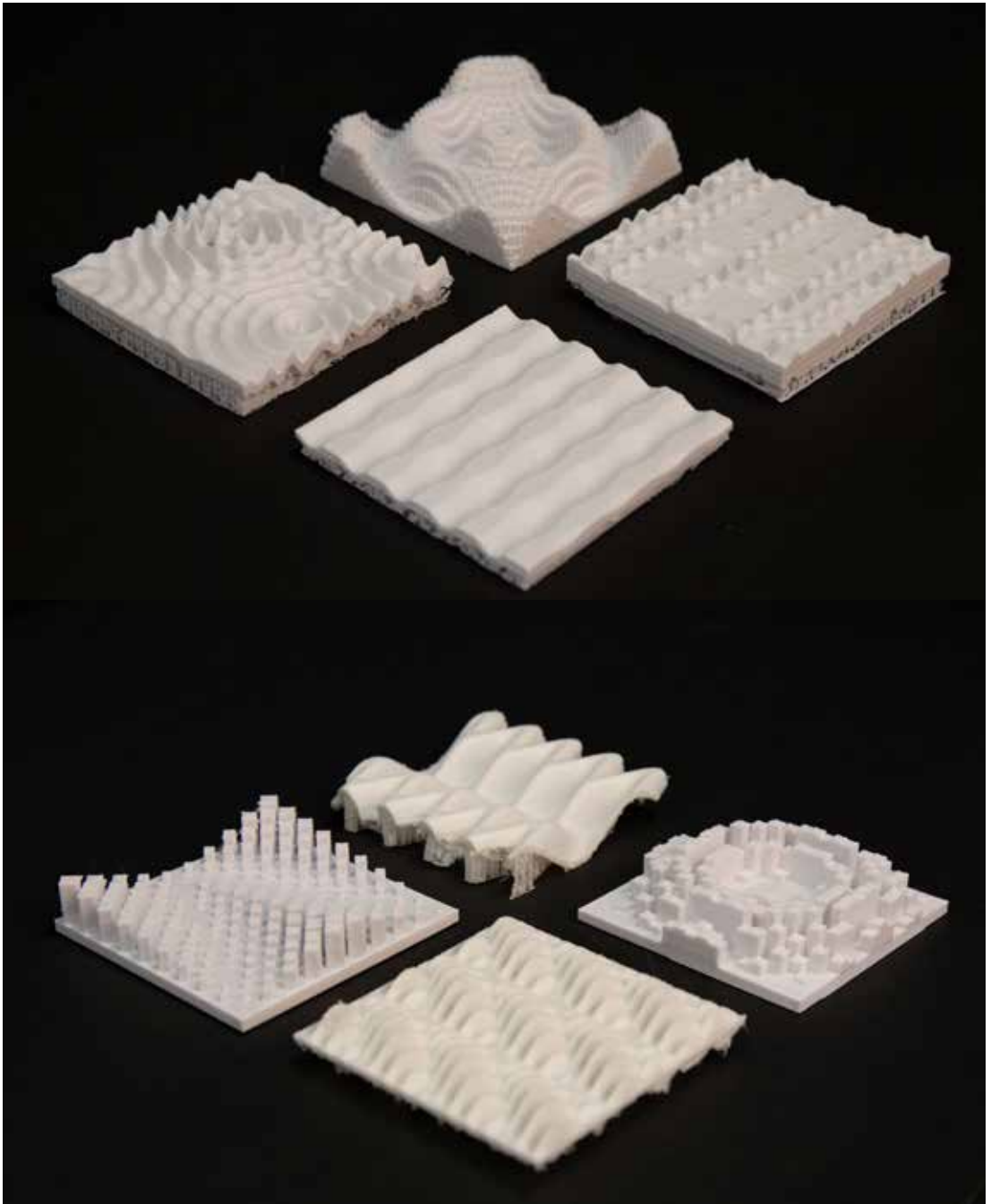Phase: 0.182
Scale: 3.25

Area: 11757.87
Height: 19.61

High (2nd)

PD: 77.7
Cycles: 19
Phase: 0.246
Scale: 4.5

Area: 12932.92
Height: 15.85

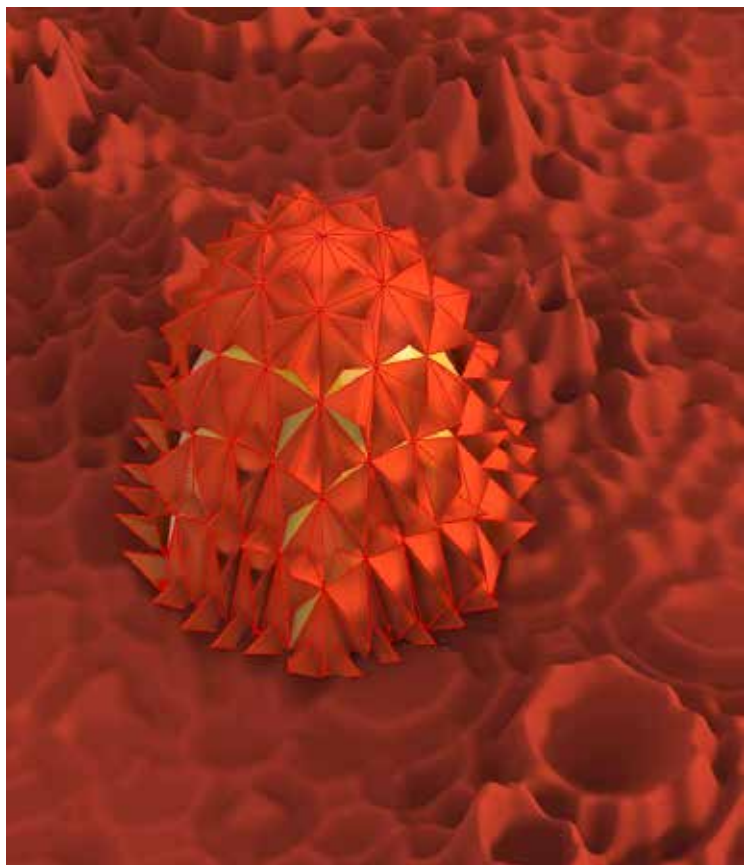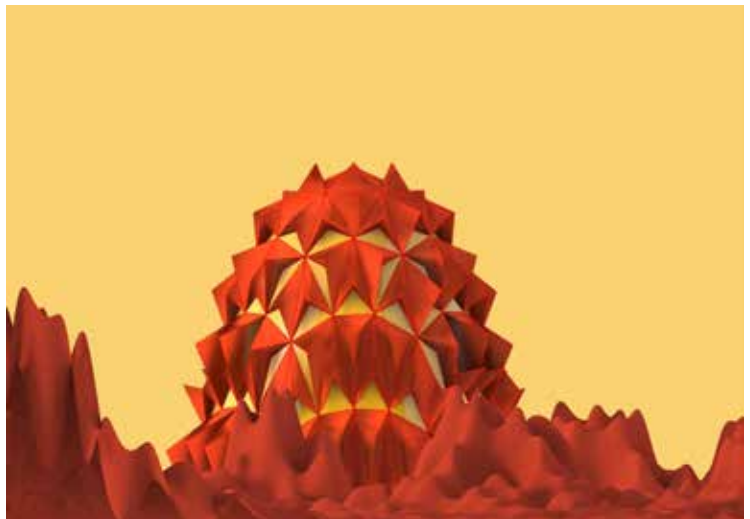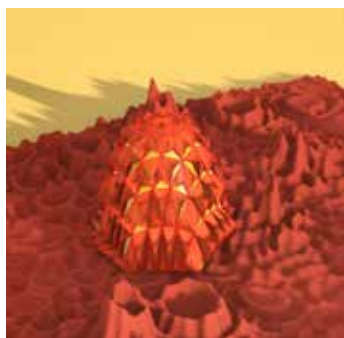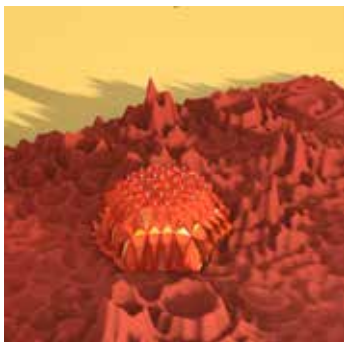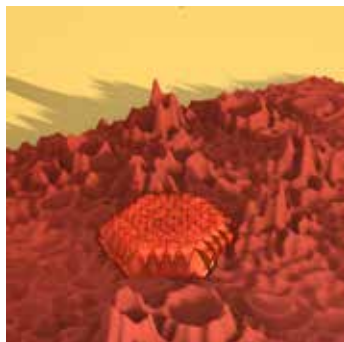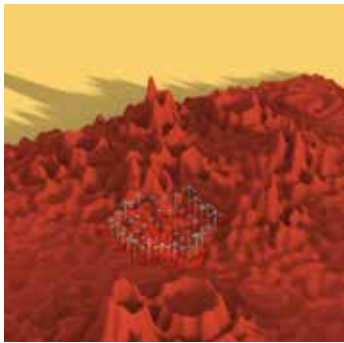Parametric Design assignment-Mapping Variations
Students select a favourite design instance based on specified qualitative and quantitative criteria before using 3D printing to produce a physical prototype.

Simulated Design assignment - Form-finding
Students develop a visual prototype for a Martian Settlement using form-finding techniques

Simulated Design assignment - Form-finding
Design of settlement (left page) by Lim Thian Yew. Design of 'Blue Marble' settlement (below) by Leon Puah