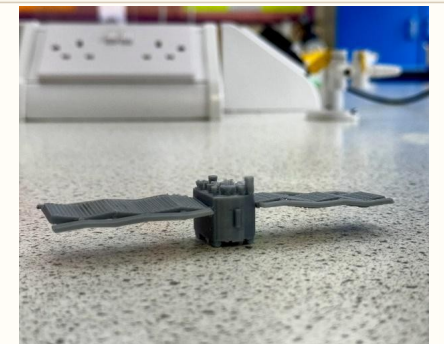


Design. Analyze. Build. Communicate.

Lok Teng Cheung

SUMMER 2027 / INTERNSHIPS + RESEARCH



Source images: ECTC team report [1]; CREST report [2].

✱

✱



Engineering, from idea to evidence.

Aerospace engineering student with experience in simulation, prototyping and materials research.

I study Aerospace Engineering at Georgia Tech, with a minor in Japanese. My work connects material selection, structural behavior and practical design—from processor-package studies to 3D-printed aerospace demonstrators.

3.94

GPA / 4.00

CSWA

SolidWorks certified

2028

Expected graduation
December

DESIGN + ANALYSIS

SolidWorks • MATLAB • Blender

METHODS + COMMUNICATION

Thermal–structural studies, 3D printing, experimental setup design, technical writing and visualization.

EXPLORE THE PORTFOLIO

- | | | |
|--|--|-------|
| 01 | Electronics thermal management | 03–05 |
| ECTC team project • simulation-led design | | |
| 02 | Additive manufacturing & testing | 06–07 |
| CREST Gold project • CAD to physical test | | |
| 03 | Aerospace materials review | 08 |
| Published independent literature synthesis | | |
| 04 | Engineering context & visual practice | 09–10 |
| Team experience • drawing & communication | | |



Thermal management for high-power processors

Thermal & Materials Researcher | Georgia Tech | December 2025–May 2026

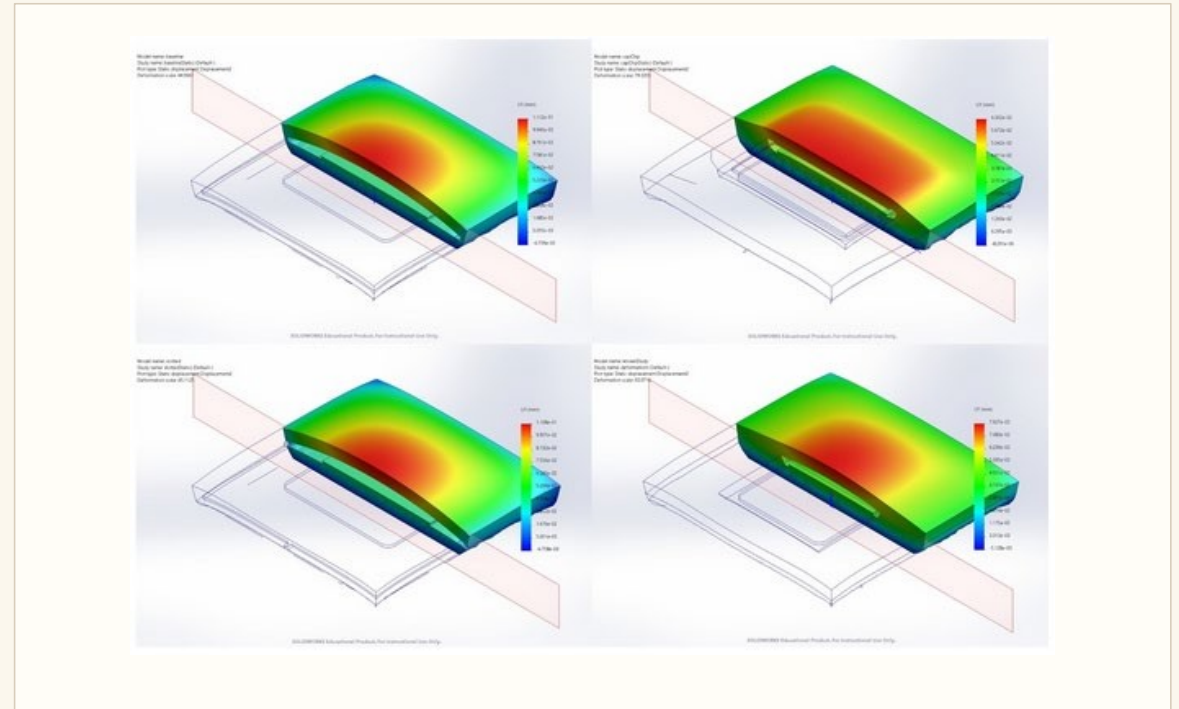
THE ENGINEERING QUESTION

How can a low-cost lid and thermal interface reduce package deformation without treating thermal performance and mechanical reliability as separate problems?

MY CONTRIBUTION AREAS

SolidWorks thermal-structural studies; materials screening; comparison of lid geometries and their design trade-offs within the three-person team.

Team: Hiroyuki Sakuma, Lok Teng Cheung and Dennis Gao.



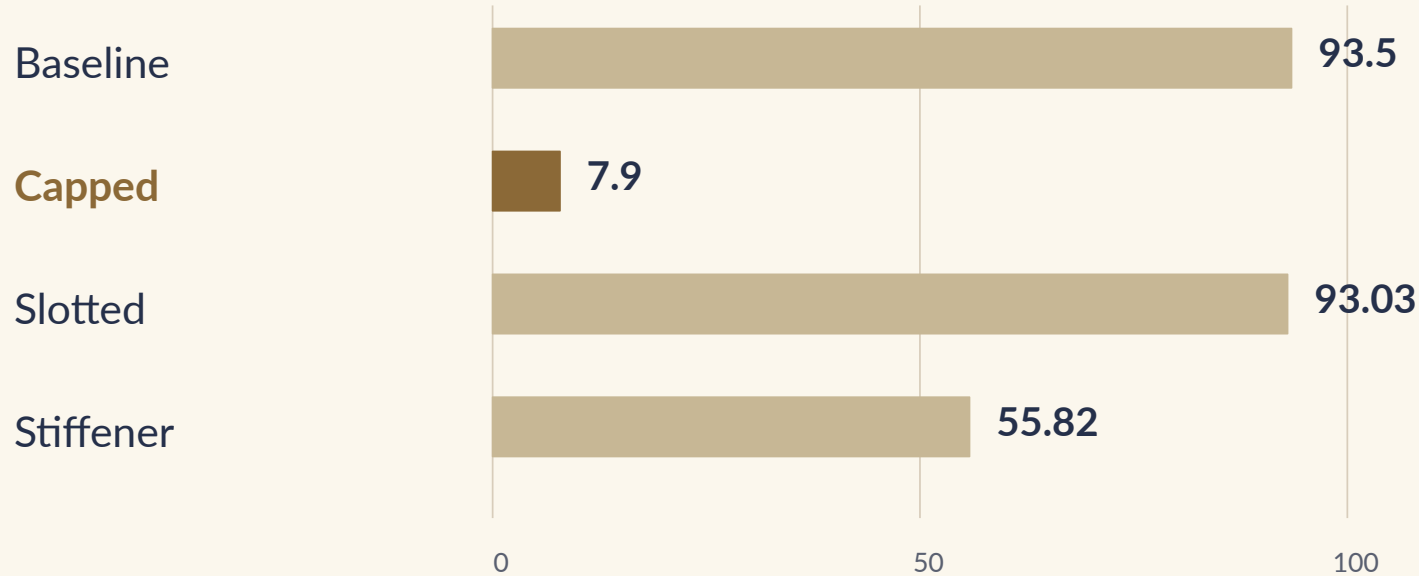
Team simulation output: baseline, capped, slotted and stiffener lids.

Make the geometry earn its place.

Four lid concepts compared within the same reported model.

PACKAGE WARPAGE / μm

Lower is better • maximum minus minimum displacement



CAPPED VS BASELINE

~91%

**lower simulated
package warpage**

The capped concept was selected in the team study for its lower warpage.

Selected shared inputs: 250 W die heating | 298.15 K ambient | Copper lid | 0.005 K/W TIM resistance

Reduce stress at the system level.

A separate comparison: the same capped-lid geometry, without and with modeled epoxy underfill.

Without underfill

70.21

Peak modeled stress / MPa

With underfill

25.10

Peak modeled stress / MPa

64.2%

reduction with underfill
Relative to the 70.21 MPa capped model

Geometry-only comparison: 81.75 → 70.21 MPa (~14%).
This is a different comparison from the underfill result above.

SELECTED MODEL ASSUMPTIONS

Solder-layer compliance

2.0 GPa effective elastic modulus

Epoxy underfill

10 GPa modeled elastic modulus

System scope

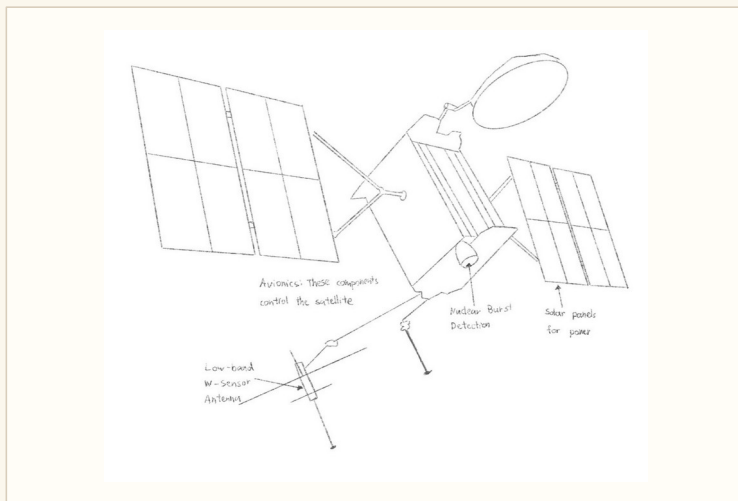
Package, motherboard and retention mechanism

Scope: numerical comparison, not hardware qualification or a measured fatigue-life result. The report notes residual stress above its cited indium yield value.

Build for the printer, then for the test.

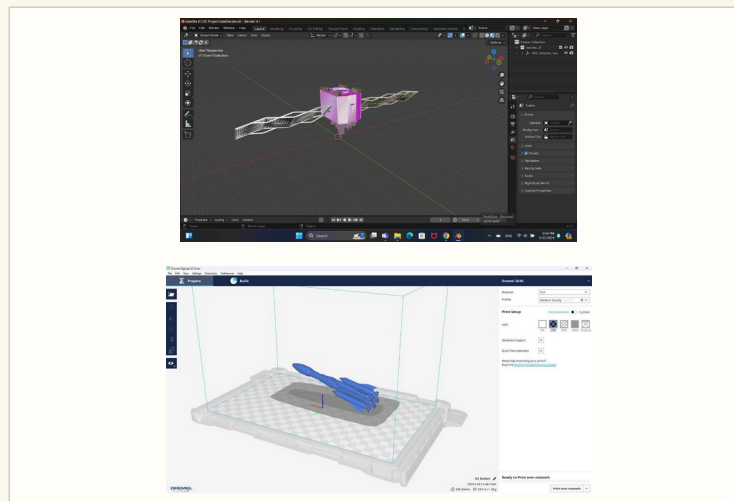
Rocket and satellite demonstrators | Queen Ethelburga's Collegiate | September 2023–March 2026

01 / CONCEPT



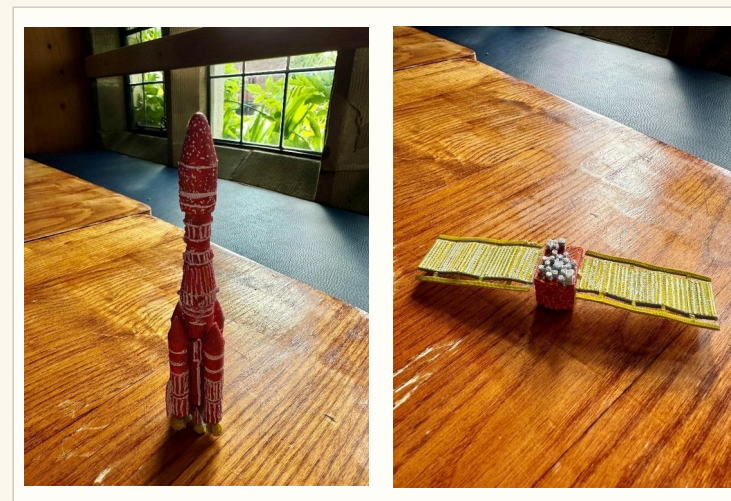
Simplified spacecraft geometry into models that could be built with school resources.

02 / CAD + PRINT PREPARATION



Kept dimensions within 20 cm; adjusted print orientation and split the satellite for assembly.

03 / ASSEMBLED DEMONSTRATORS

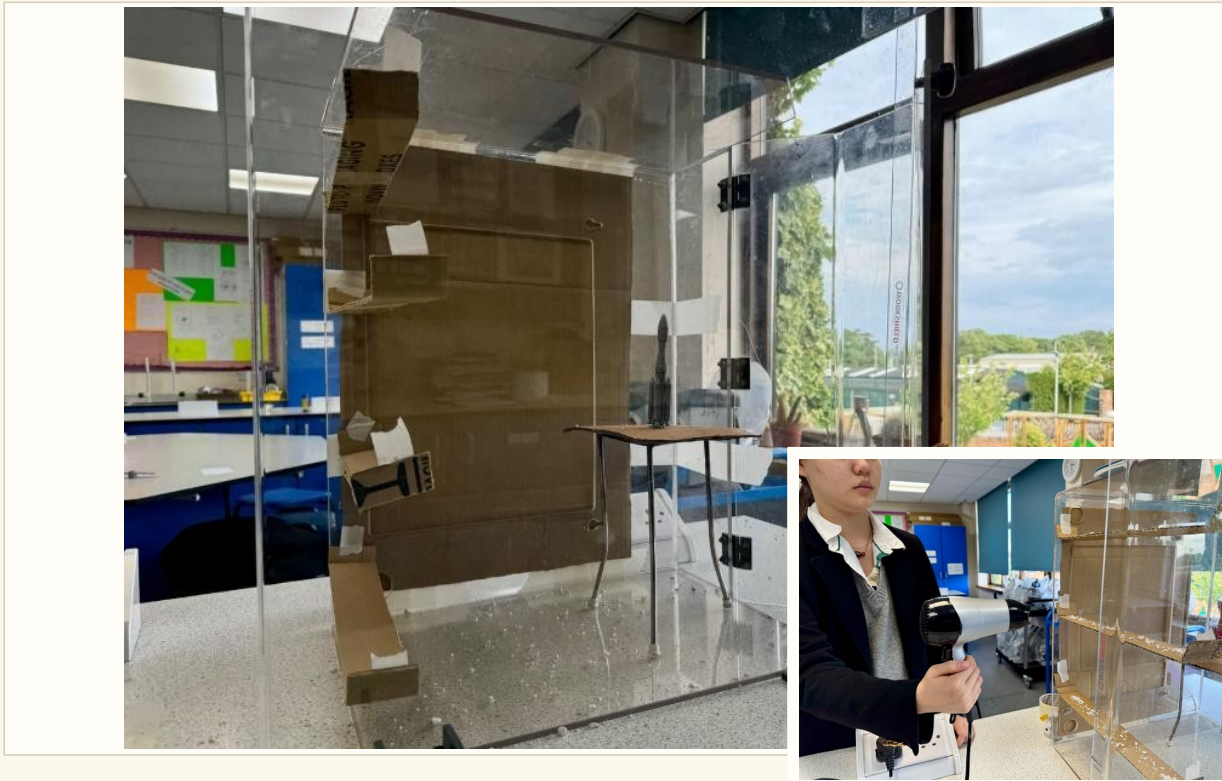


Printed, assembled and color-coded the models. Colors indicate proposed materials, not multi-material prints.

My work: 3D model design and production; report writing. Shared work with Lulu Shen: literature research and collision testing.

A useful test begins with a workable setup.

Developing a contained classroom particle-impact demonstration under equipment constraints.



Original project photographs: test enclosure and airflow-driven particle test.

01 Contain and observe

Used a fume cupboard, transparent screens and cardboard to contain particles while preserving camera visibility.

02 Change the debris analogue

Replaced paper and polystyrene trials with spillage-kit absorbent after observing poor particle delivery.

03 Refine the test procedure

The report records a 1 m spacing and a 15° upward airflow angle. Horizontal and vertical tests were recorded in slow motion.

Outcome: two physical demonstrators and a documented build-test workflow. Qualitative classroom testing, not hypervelocity qualification.

From a design question to a published review.

Aerospace materials, additive manufacturing and the limits of polymer substitution.

IJHSR

ijhsr@independentmaterialsresearch.org

■ REVIEW ARTICLE

Could 3D-Printed Plastic Replace Traditional Aerospace Materials When Producing Rockets and Satellites?

Lok Teng Cheung

Queen Edithburg's Collegiate, Car Park F, Thorpe Underwood, Estate, Yorkshire, YO26 9SS, UK; kelvindude828@gmail.com

Mentor: Julia Milton

ABSTRACT: Modern aerospace materials like metals are expensive, heavy, and radioactively susceptible, so they increase cost during manufacturing and space exploration and can be vulnerable in space environments. The high design freedom of 3D printing and the durability, lightweight through structural optimization and novel design, and low cost of plastic can mitigate these issues, while contributing to sustainability by creating less waste and reusing used plastic. Through a review and analysis of the existing literature on 3D printing technologies and their applications in the space environment, this research paper examines the differences between current aerospace materials and 3D-printed plastics and assesses the potential of 3D-printed plastics as an alternative to current aerospace materials. The results of this study indicate that plastics can replace current aerospace materials in some applications, such as PEEK plastics for spacecraft structural components and ULTEM for satellite components and housings, but not all applications are well-suited for plastics, since they have disadvantages such as low heat resistance and high brittleness, and some plastics are even susceptible to cosmic radiation. To mitigate some of these disadvantages in the space environment, technologies such as multi-material 3D printing, self-healing materials, and carbon nanotubes can be potential solutions. 3D printing also contributes to futuristic long-term applications that only appeared in sci-fi movies before, and leads humanity into deeper space.

KEYWORDS: Aerospace and Aeronautical Engineering, Condensed Matter and Materials Mechanics, 3D Printing, Plastic, in-space Manufacturing.

■ Introduction

1.1. Context and Importance of Aerospace Engineering:

Since the space race during the Cold War, the rapid development of aerospace engineering has transformed modern life through cutting-edge technology such as GPS, weather forecasting, climate monitoring, and satellite communications. These innovations, once considered futuristic, are now essential parts of everyday life.

For decades, science fiction has imagined technologies such as reusable rockets, space stations, and robotic exploration that once seemed impossible, but have since become reality. Similarly, ideas such as space elevators, lunar bases, and asteroid mining may seem far-fetched now, but with advancements in new materials and manufacturing techniques—like 3D printing—they are becoming more feasible.

One of the most crucial challenges in aerospace engineering is material selection. This is due to the extreme conditions in space, such as the vacuum environment, broad temperature range, and detrimental cosmic radiation. Traditional aerospace materials such as titanium are durable but are usually expensive. This research will investigate new aerospace materials, especially 3D printed plastics, for their potential as affordable, lightweight, and durable alternatives to traditional materials.

In the future, 3D printed materials will have the potential to advance space exploration by helping to reduce costs and enable in-space manufacturing, as the future of aerospace takes shape on the moon, Mars, and beyond. For instance, nanomaterial technologies like carbon nanotubes could be crucial for

the construction of the tether of the space elevator (Figure 1), which would provide a sustainable space transportation alternative to the current rockets and spacecraft.



Figure 1: Illustration of the space elevator's tether.

Efficient 3D printing technology is not only a new manufacturing method on Earth but is also an opportunity to develop space industries and factories in zero gravity. Instead of transporting materials from Earth at high costs, 3D printing in space could be used to manufacture spacecraft and habitat parts. However, challenges remain in running and maintaining 3D printers in space, including the different and extreme conditions in space compared to Earth, such as microgravity and a vacuum environment.

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DOI: 10.36838/v7i12.141

Could 3D-Printed Plastic Replace Traditional Aerospace Materials When Producing Rockets and Satellites?

Lok Teng Cheung | IJHSR | Review article | 2025

COMPARE

Metals, composites and 3D-printed polymers in aerospace applications.

EVALUATE

Strength, mass, thermal limitations, radiation exposure and cost.

SYNTHESIZE

Application-specific opportunities and constraints, rather than treating plastics as a universal replacement.

SOLE AUTHOR

36 REFERENCES

13 PUBLISHED PAGES

Published article / first-page preview

DOI: [10.36838/v7i12.141](https://doi.org/10.36838/v7i12.141)

Literature synthesis, not a separate experimental test campaign.

The wider engineering context.

Additional experience in systems research, aircraft design and launch-vehicle structures.

ONGOING RESEARCH

ASDL Lunar architecture

Undergraduate Researcher

August 2026–Present

Evaluate lunar infrastructure, transportation and logistics concepts under mission-level constraints.

Assess subsystem interactions and the design drivers that shape sustained surface operations.

Trade studies · Systems thinking

COMPLETED TEAM EXPERIENCE

AIAA Design Build Fly Puck subsystem

Aerospace Design Engineer

August 2025–May 2026

Developed an aircraft storage system and used MATLAB for design-related analysis.

Evaluated manufacturing and performance trade-offs, and supported team CAD and fabrication work.

CAD · MATLAB · Fabrication

NEW TEAM ROLE

YJSP Elytra project

Structural Engineer

September 2026–Present

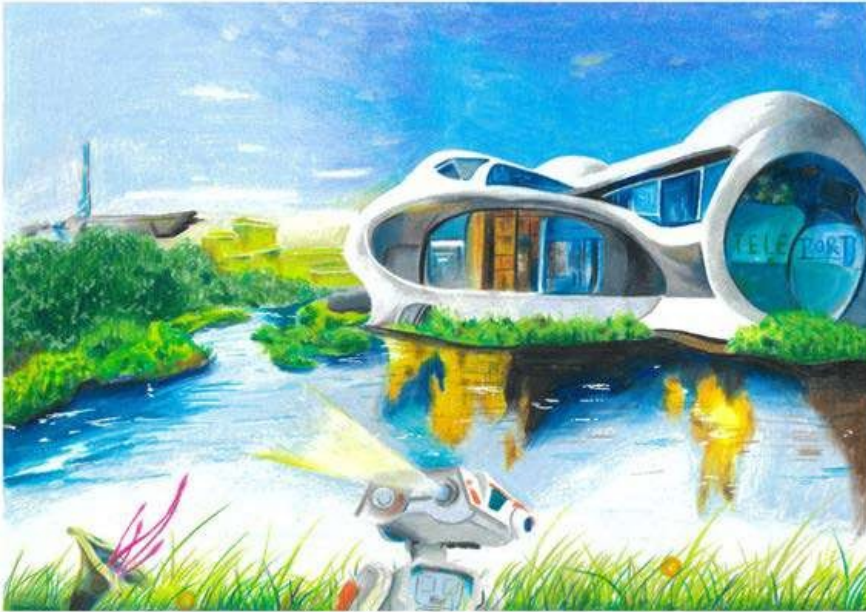
Support preliminary SolidWorks CAD and structural requirements for vehicle components.

Coordinate with propulsion, avionics and manufacturing subteams on vehicle-level integration.

Structures · CAD · Integration

A visual practice alongside engineering.

Drawing is another way I explore form, perspective and possible futures.



The House In The Future

Colored-pencil concept artwork • FISO 2023 Gold Award



The Spirit Of Maverick

Aviation illustration • Study of shape, reflections and light

Presented as artworks and visual studies—not technical drawings or validated engineering designs.

Let's build what comes next.

Aerospace Engineering
Georgia Institute of Technology

GET IN TOUCH

kelvindude0828@gmail.com

[LinkedIn / Kelvin Cheung](#)

Summer 2027
Engineering internships + research

SOURCES / PROJECT CREDITS

A portfolio built on documented work.

[1] ECTC team manuscript

H. Sakuma, L. T. Cheung and D. Gao. Low-Cost Robust Thermal Solution for High Power AI/Datacenter Processors. Supplied ECTC 2026 team report, pp.1, 3–6.

[2] CREST Gold project report

K. Cheung and L. Shen. What is the Potential of 3D Printing Technology When Integrating with Aerospace Engineering? Design, fabrication and test records, pp.20–35; team credits p.37.

[3] Published review article

L. T. Cheung. Could 3D-Printed Plastic Replace Traditional Aerospace Materials When Producing Rockets and Satellites? IJHSR, 2025, pp.141–153. DOI: 10.36838/v7i12.141.

[4] Engineering resume

Resume I_Kelvin Cheung(3).pdf, p.1. Source for education, skills, current roles, project dates and ECTC competition placement.

[5] Art portfolio

My Art Portfolio_Lok Teng Cheung(2).pdf, pp.4–5 and 10–11. Selected original artworks and their descriptions.

Team outcomes are identified as team results. Charts are redrawn from the cited tables. No new simulation or experimental results are claimed.