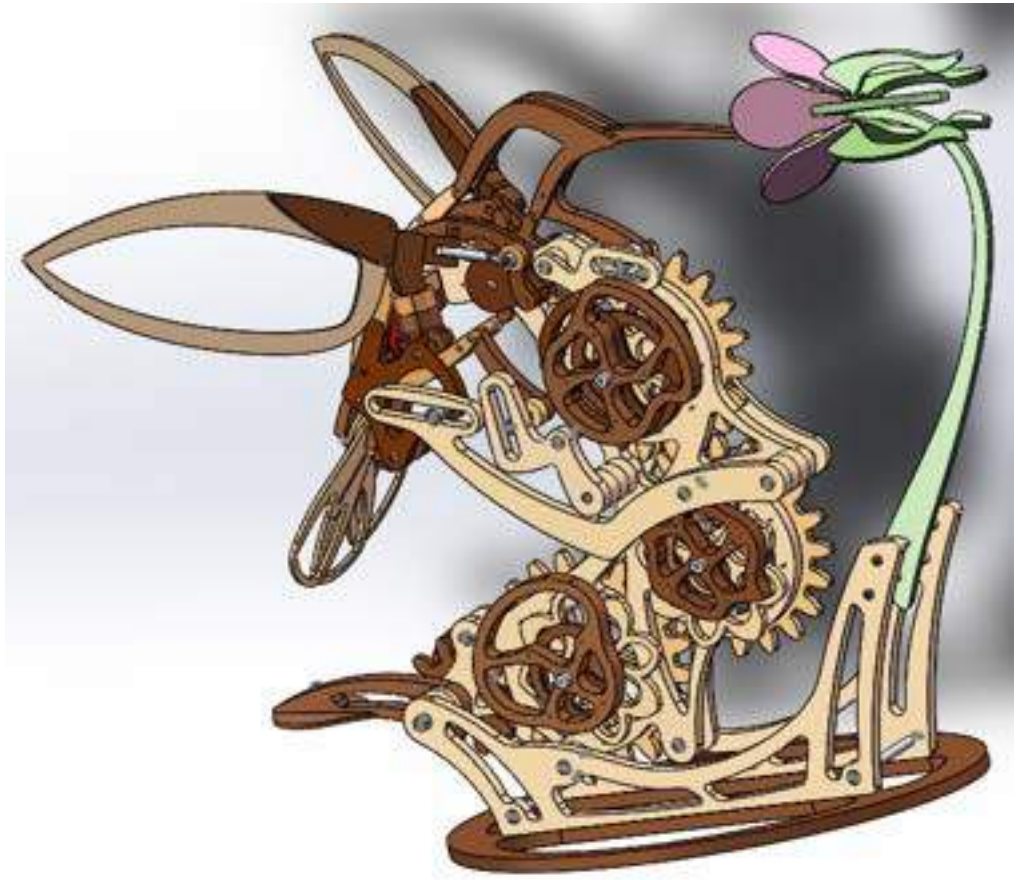
Undergrads 2019-2023

CAD & FEA Project

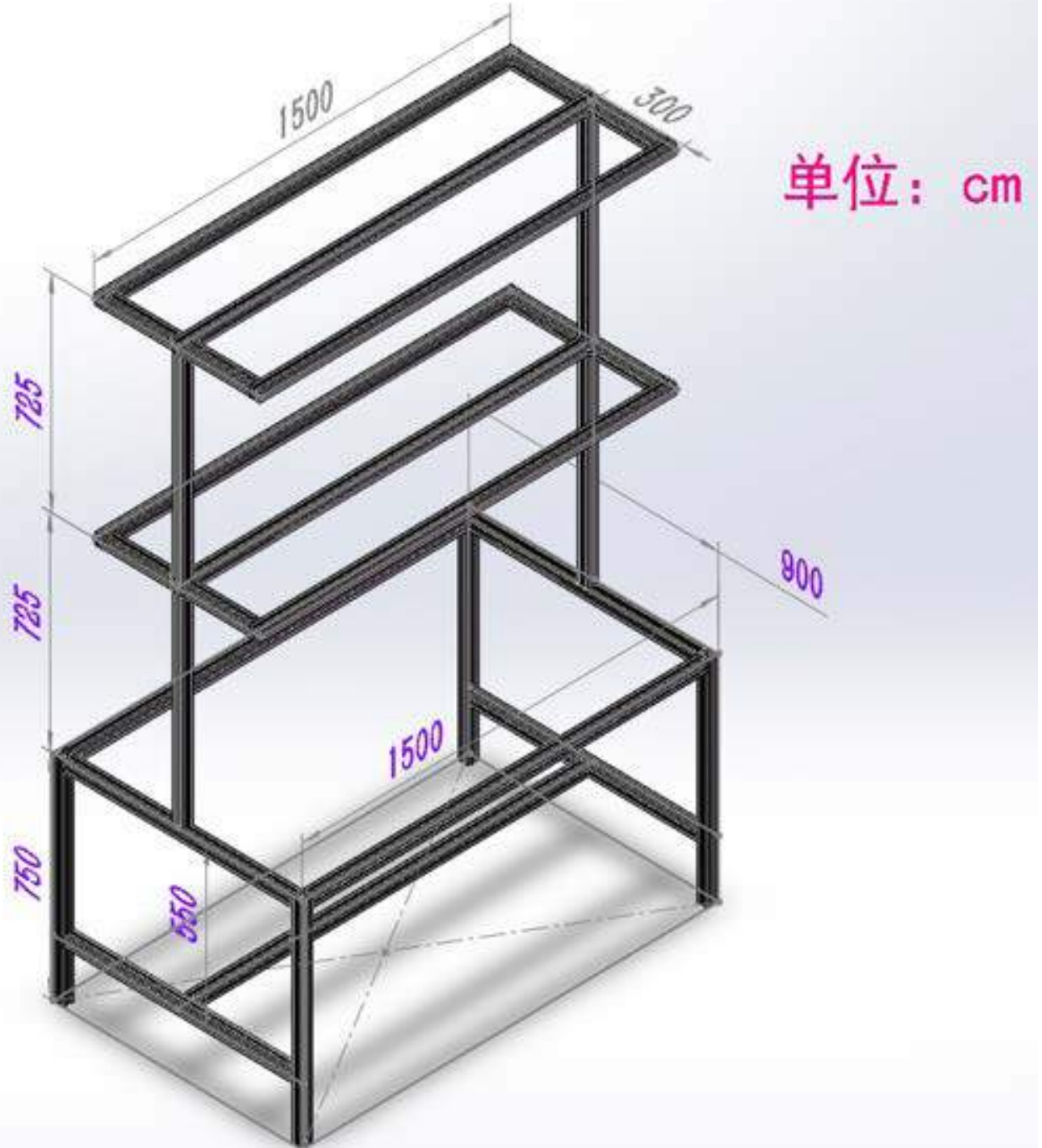
SUSTech Southern University of Science and Technology



Replicated Mechanical Hummingbird(there are parts online and I assembled and colored it, and also made an animation of it)

Desk lamp with a fan, a replica of the lamp I used on my dormitory table

I CAD these two models on a CAD course I took in my undergrads

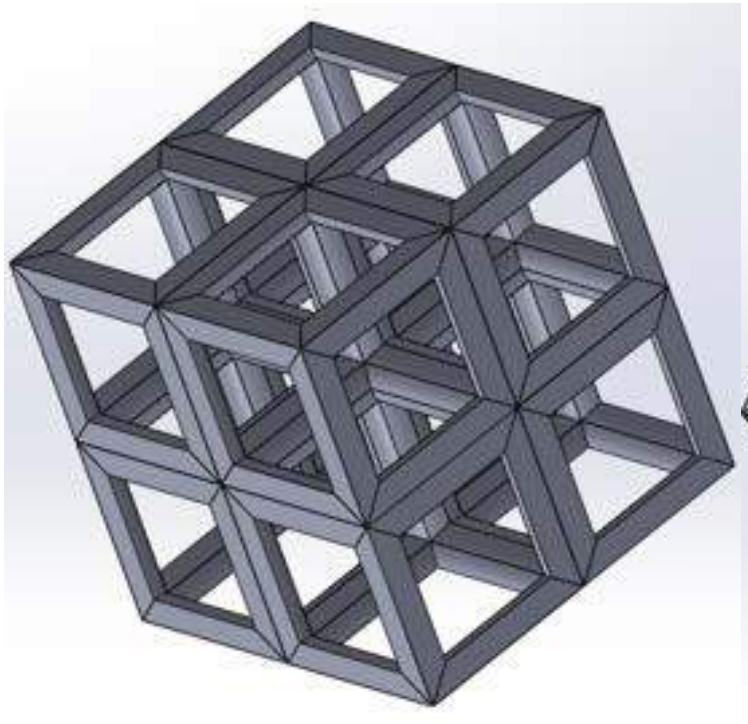


SUSTech Southern University of Science and Technology

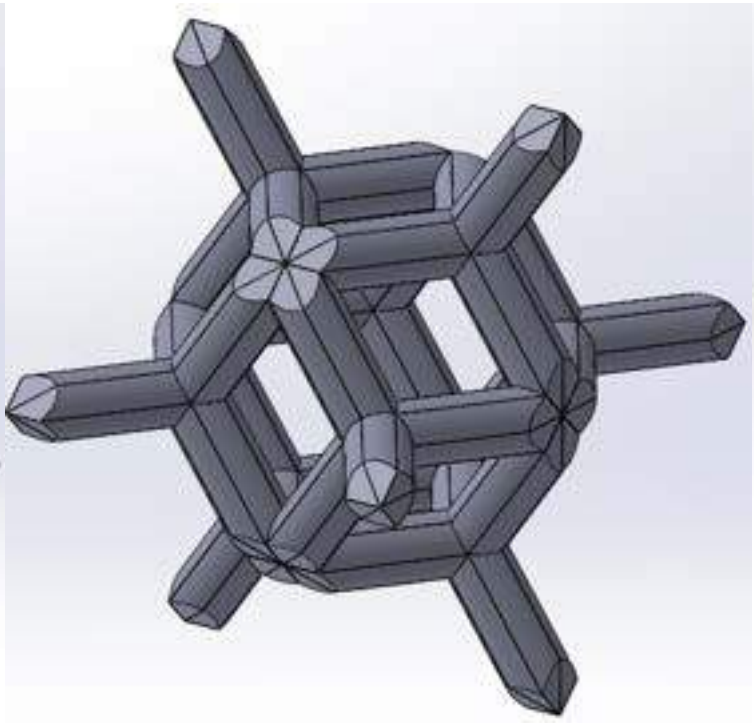
CADed this Aluminic Extrusion Table for Lab renovation

I CAD these and the following page's models, the TRUSS & TPMS structures for my

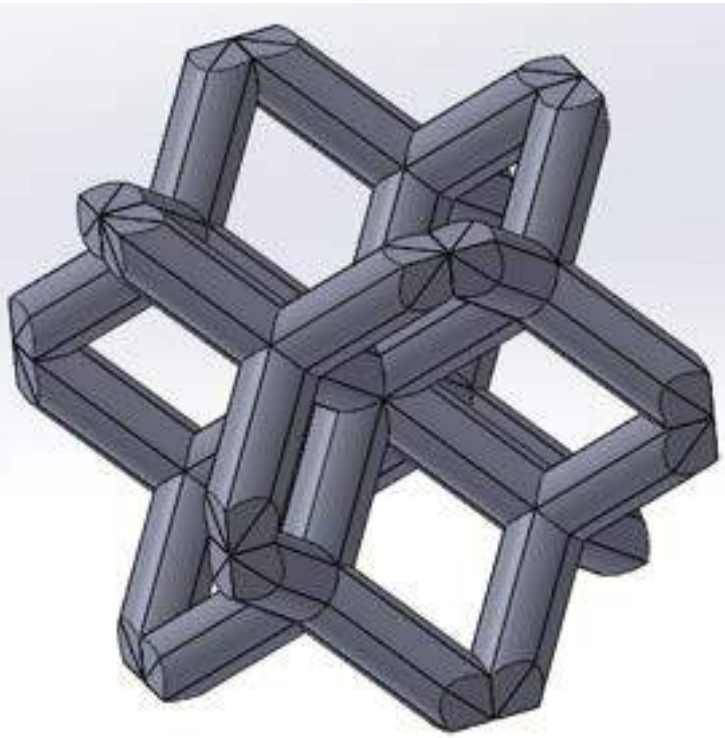
graduation project(3D bone scaffold modeling and mechanical simulation)



B



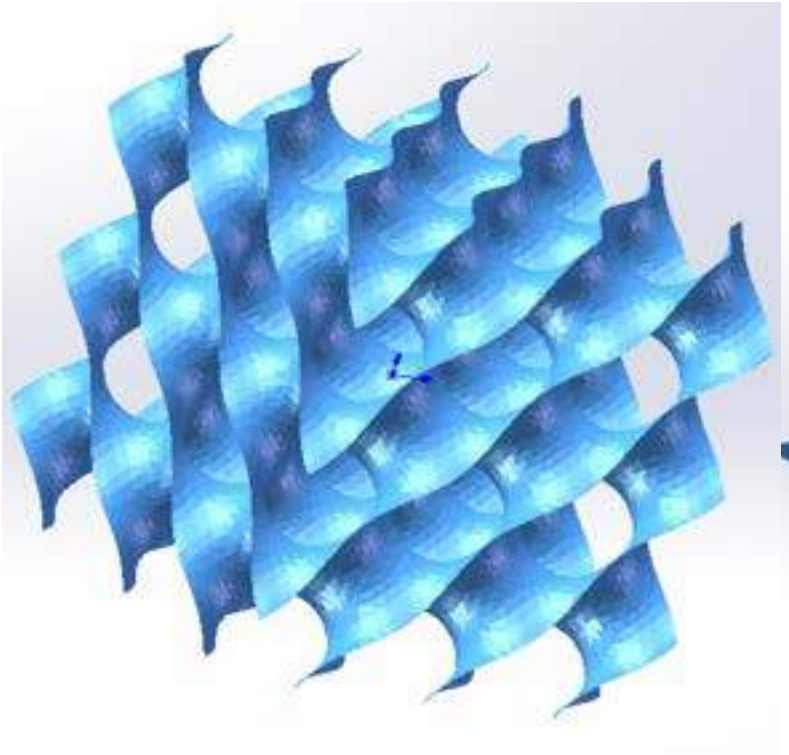
C



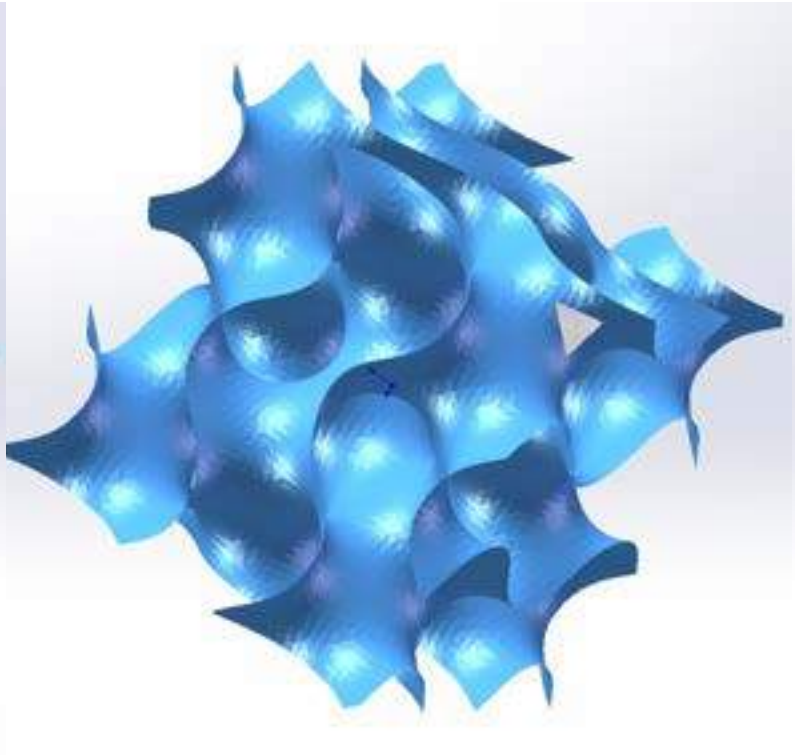
F

TRUSS STRUCTURE UNIT

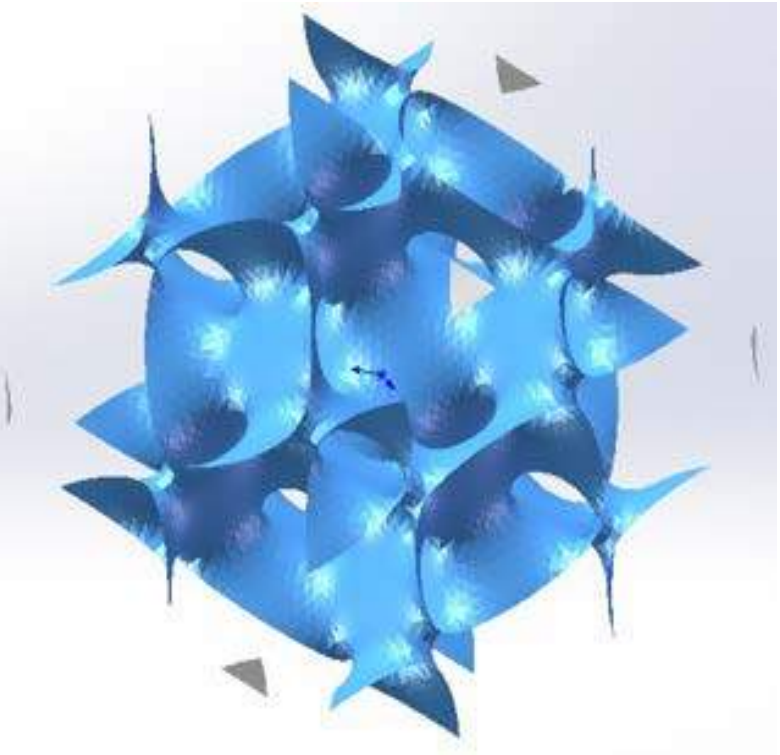
I used MATLAB Algorithm to generate TPMS(Triple periodic minimized surface) unit structure



SchwarzD



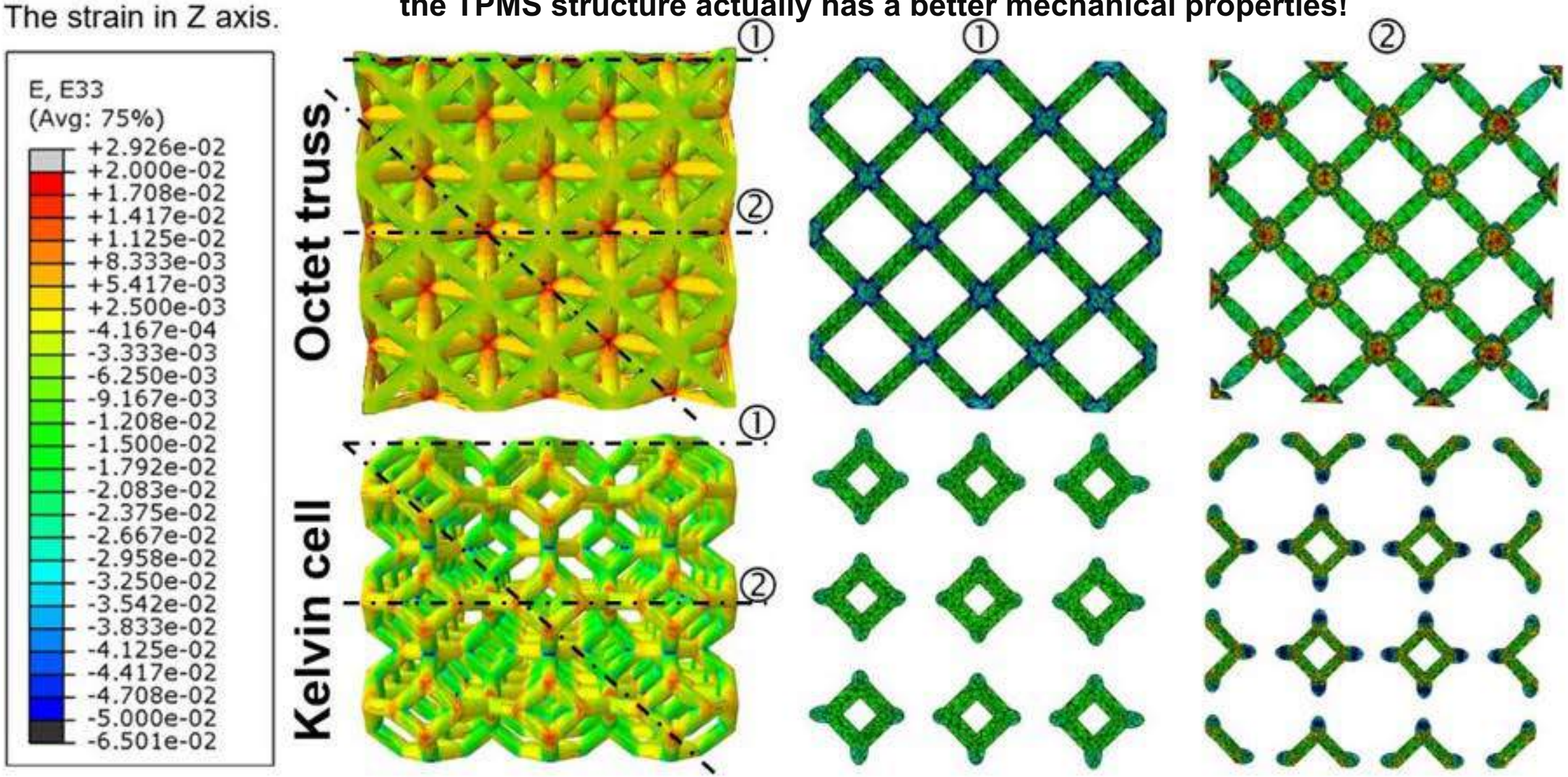
Gyroid



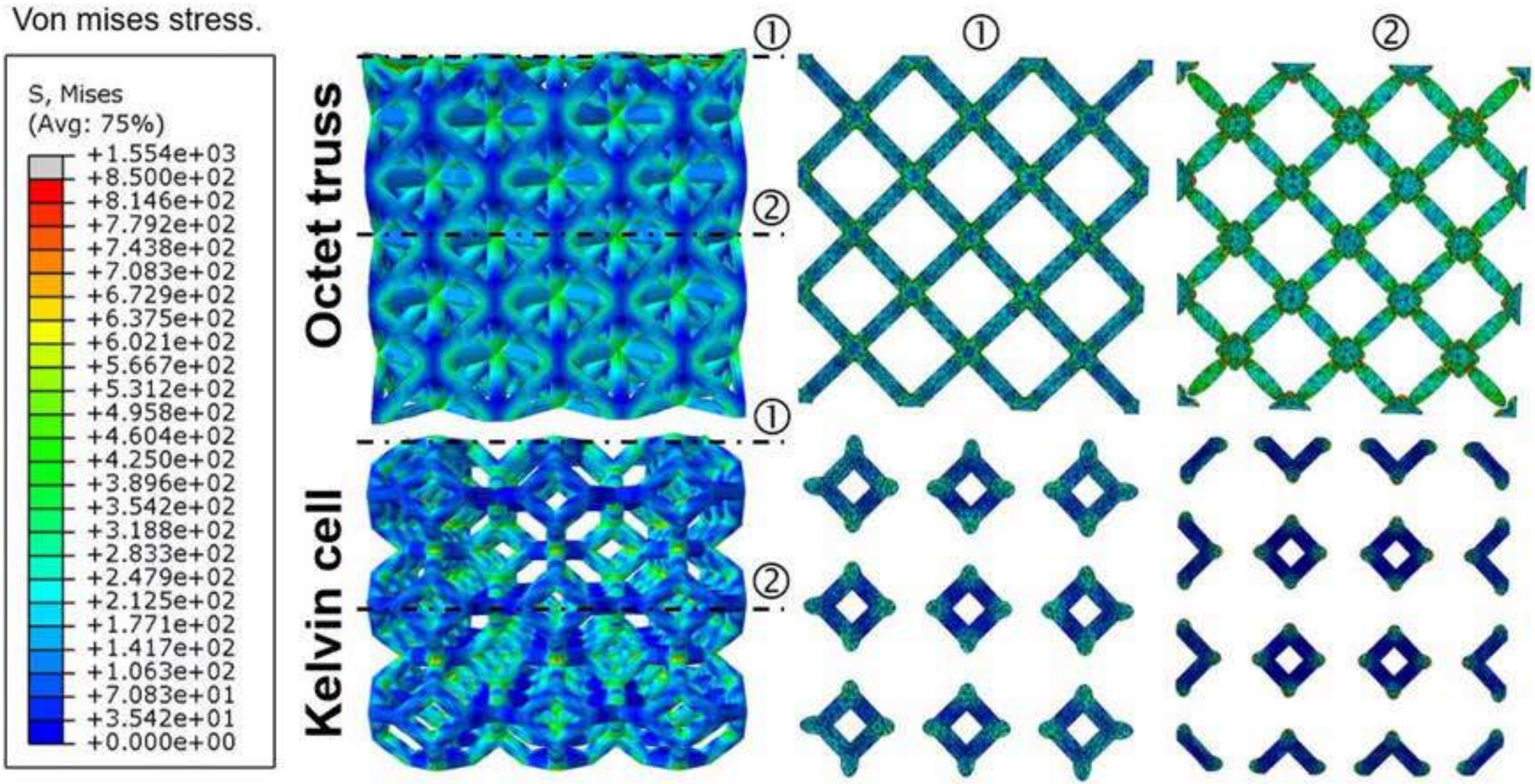
Neovius

TPMS STRUCTURE file

Carried out Finite element analysis to discover different mechanical properties between different geometric shape, and the TPMS structure actually has a better mechanical properties!



TRUSS STRUCTURE FEM

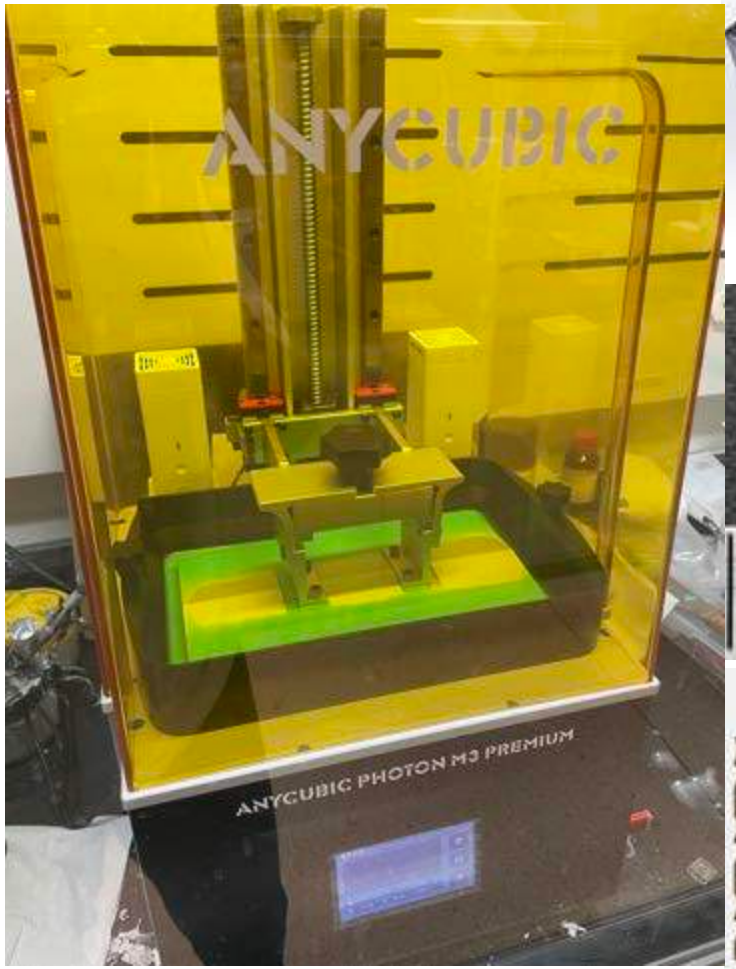


Modeling and mechanical simulation of three-dimensional skeletal scaffolds(Graduation project)

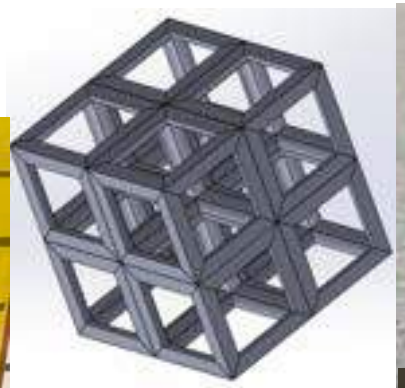
3D printing

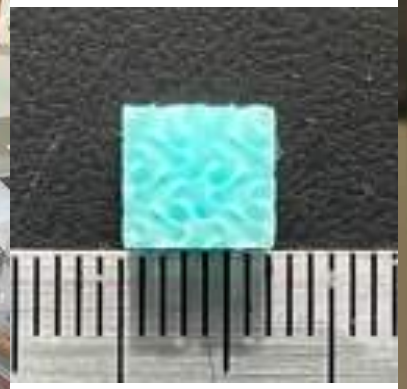
I 3D printed the models to carry out actual mechanical testing using mechanical testing machine

SUSTech Southern University of Science and Technology

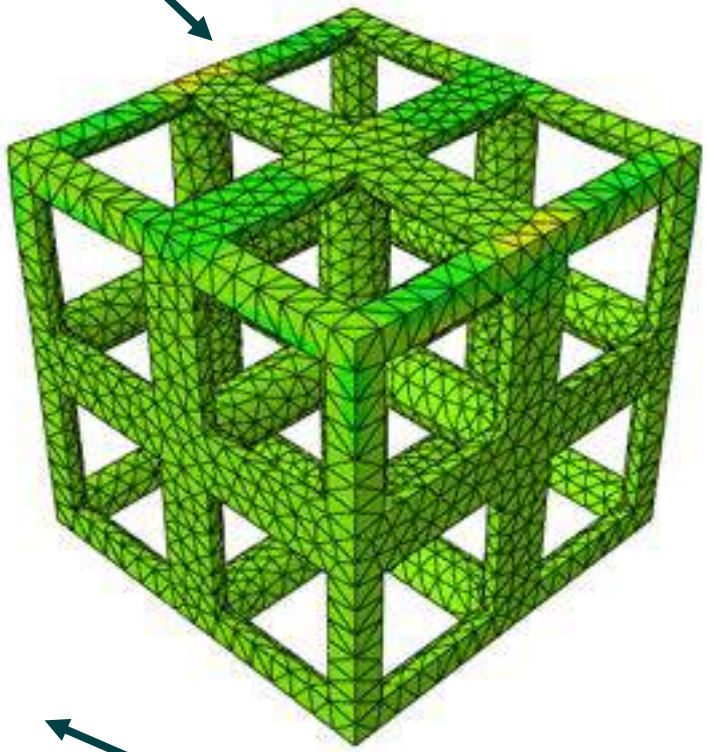


Light-curing liquid 3D printer





FEA analysis. GIF



Mechanical testing machine

证书号第18820659号

实用新型专利证书

实用新型名称：预临床动物模型膝关节软骨加载平台

发　明　人：刘超;刘洋;李嘉伟;闫炳彤;胡淦清

专　利　号：ZL 2023 2 0187985.8

专利申请日：2023年01月19日

专　利　权　人：南方科技大学

地　　址：518000 广东省深圳市南山区桃源街道学苑大道1088号

授权公告日：2023年04月11日　　授权公告号：CN 218832954 U

国家知识产权局依照中华人民共和国专利法经过初步审查，决定授予专利权，颁发实用新型专利证书并在专利登记簿上予以登记。专利权自授权公告之日起生效。专利权期限为十年，自申请日起算。

专利证书记载专利权登记时的法律状况。专利权的转移、质押、无效、终止、恢复和专利权人的姓名或名称、国籍、地址变更等事项记载在专利登记簿上。

局长
申长雨

国家知识产权局
2023年04月11日

第1页(共2页)

其他事项参见续页

SUSTech Southern University of Science and Technology

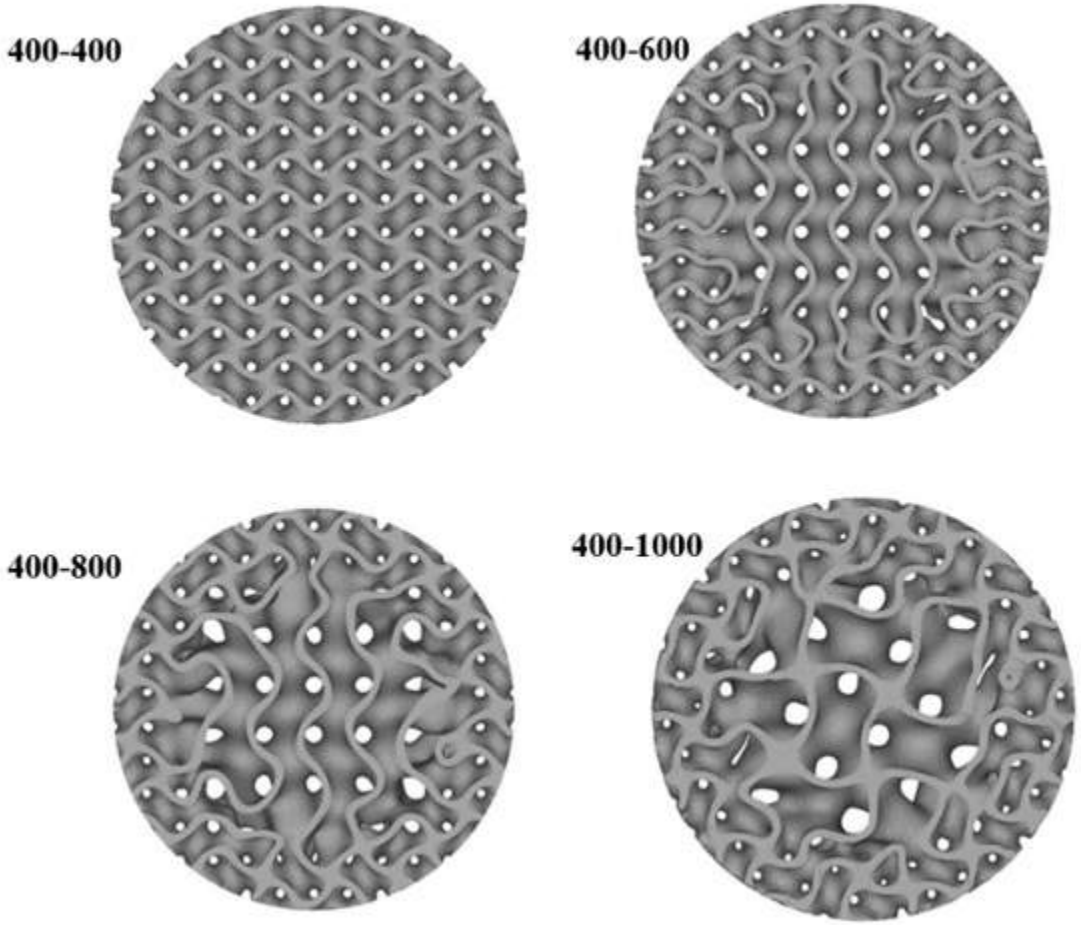
A CAD model patent

I Participated in an innovation and submitted a Patent for a new animal mechanical testing model

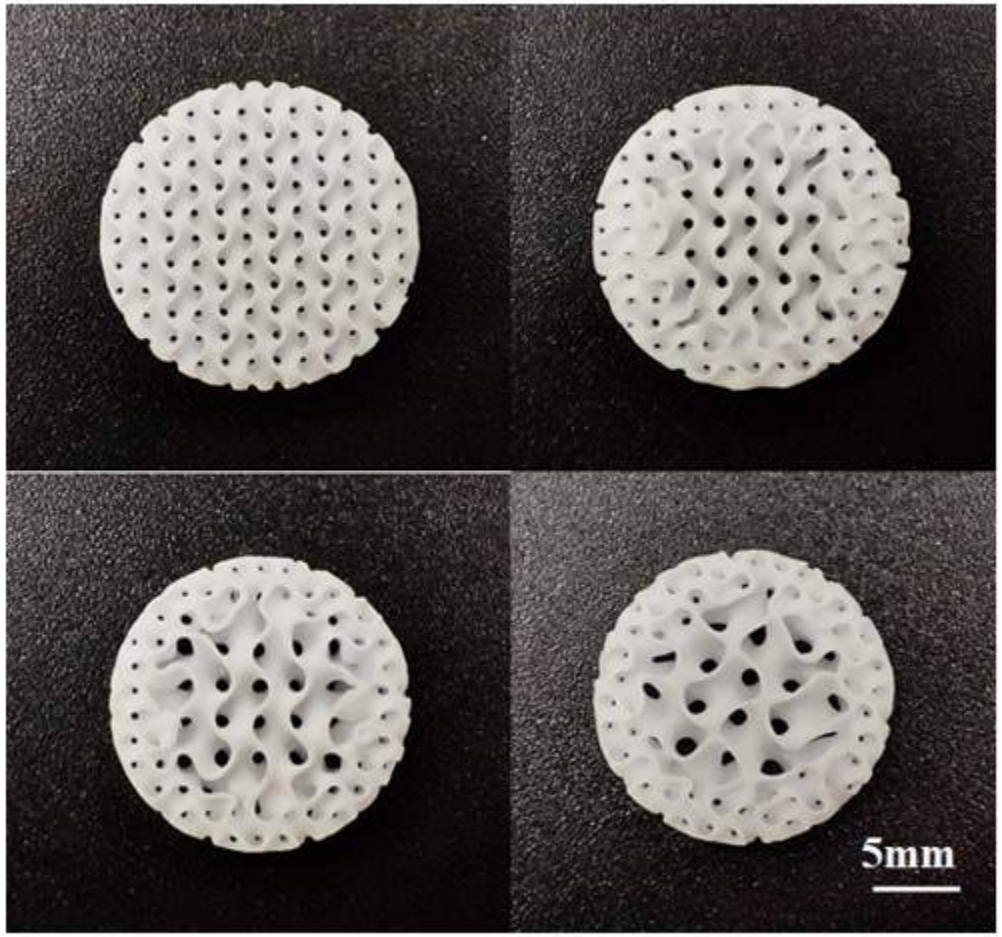
Wet Lab Experience

Gyroid structure(TPMS)

This project(Gradient Scaffolds to Study Cell Adhesion and Biocompatibility) is to explore the effects of scaffolds with different pore sizes on cell adhesion activity, osteogenic differentiation, bone tissue regeneration and vascular invasion



Same porosity: 70%



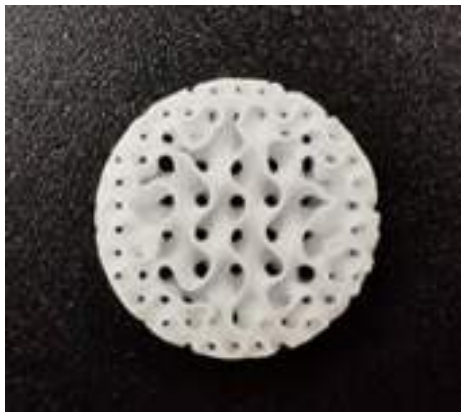
A CAD model patent

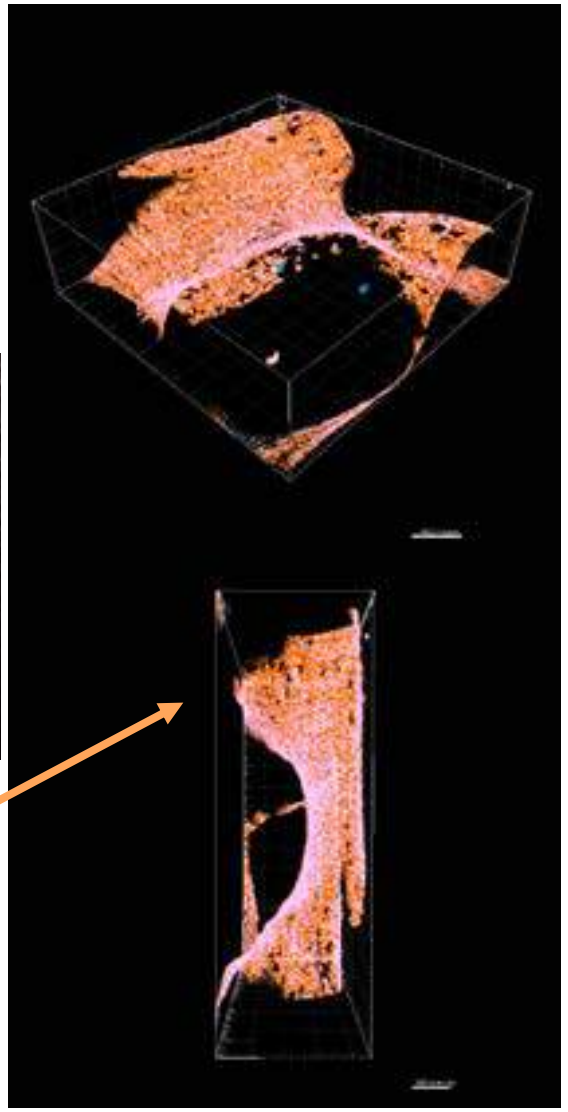
Me doing cell staining on the 3D printed cell plate as shown on the previous slide.

Wet Lab Experience

Confocal Microscopy

Bio-Ceramic 3D Cell Plate





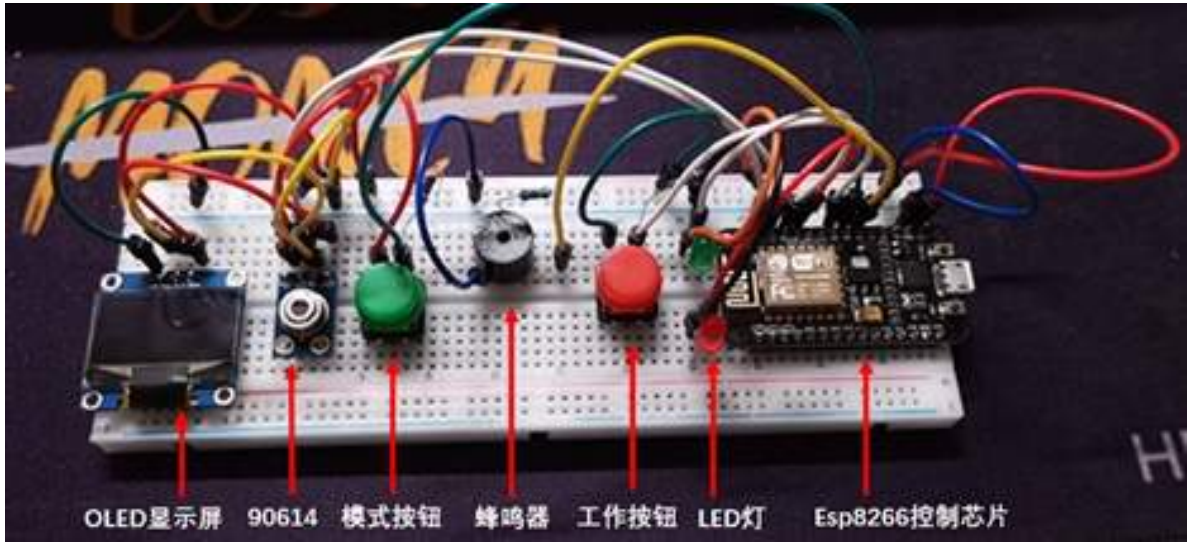
I did the Confocal image for cells growing on the plate, showing 3D wave distribution

SUSTech Southern University of Science and Technology

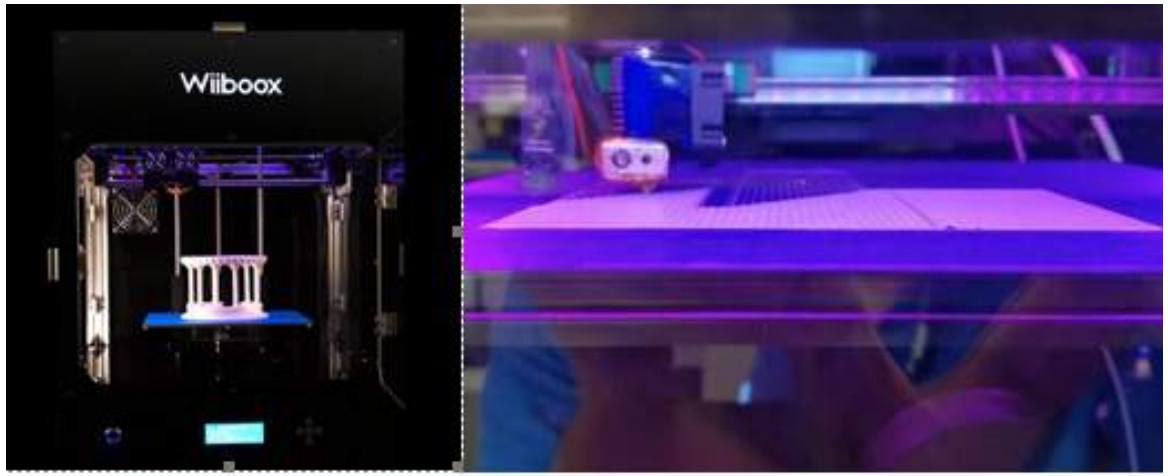
BME Innovation design

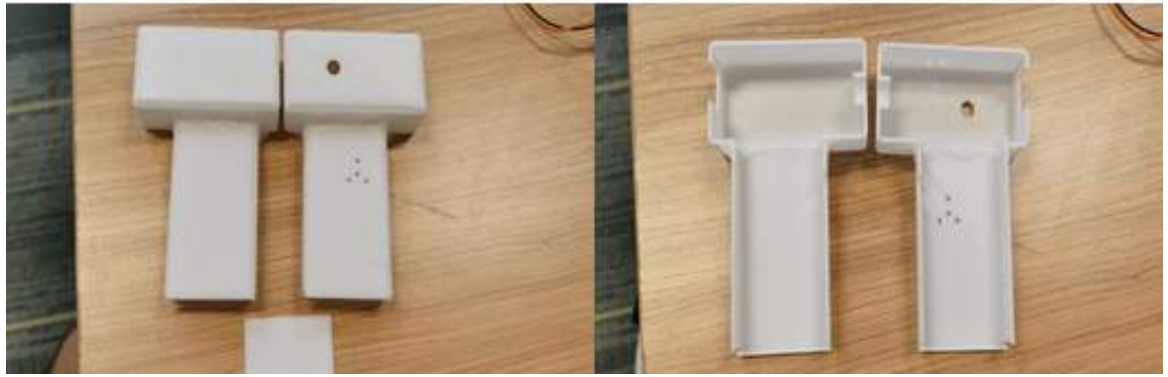
SUSTech Southern University of Science and Technology

Using fused deposition rapid prototyping 3D printer to print the shell



Temperature measurement and respiration measurement integrated system





We made this in during covid 19 became pandemic, the reason why we also added the function of reparation detection is hoping to implement this device in Hospital Maternity Nursery to prevent neonatal apnea syndrome

Master 2023-2024.05

Developing an sEMG-based speech device for individuals with larynx loss or intubated, utilizing wearable tech and algorithms. This project involved collaboration with stakeholders and sponsors.

Silent Speech Device for Speech Recognition

Aniqa Tabassum, Ganging Hu, Thomas Mawdsley, Ian Zobrist, Daniel Morgan
Sponsors: Anais Rameau, M.D., Weill Cornell Medicine
Advisors: Dr. Newton de Faria, Jordan McMahan, Jack Thompson

The Need

- Develop a silent speech device for speech recognition
- Use Surface Electromyography (sEMG) from articulatory muscles
- Develop better wearable technology to make data collection easier
- The goal is to restore voice in those who are intubated in the ICU

Fig. 1: Electromyography (EMG) electrodes placed on the face

Fig. 2: Anatomical graphic depicting oral endotracheal intubation

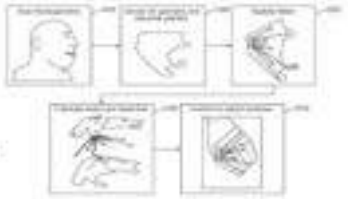


Fig. 3: Proposed concept for wearable technology

Current Solutions and Limitations

- **Pen and Paper Communication**
  Very basic
  Patients typically anesthetized during intubation, leading to lack of hand-eye coordination
- **Communication boards**
  Can facilitate interactions with doctors
  Patient-family interactions unsupported
- **Electrolarynx**
  Patients dissatisfied due to the robotic nature of the voice produced

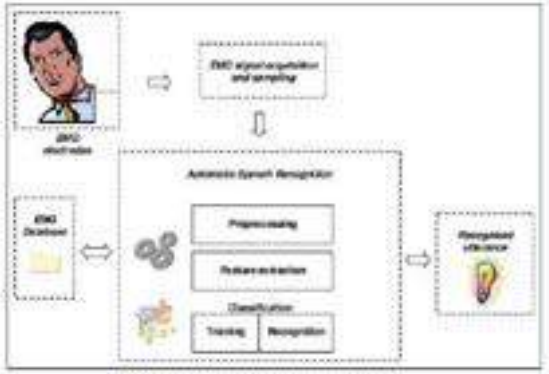


Fig. 4: Silent speech recognition using sEMG

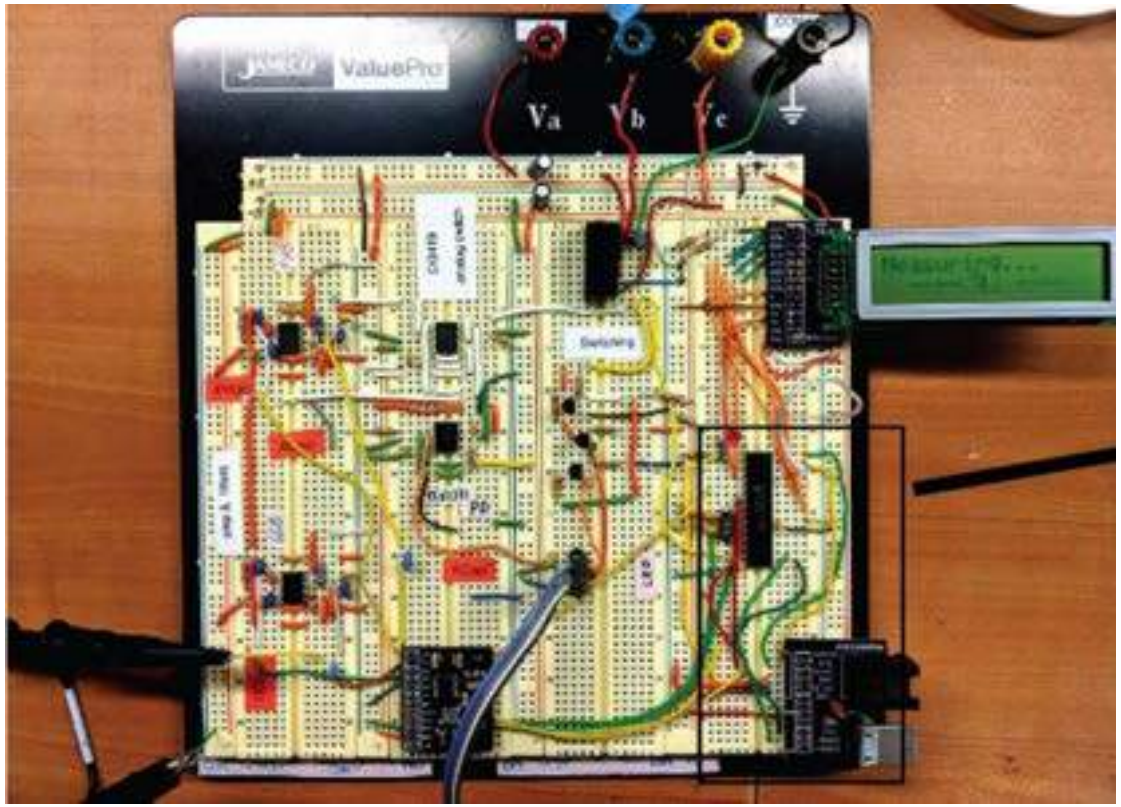
Market analysis

- 15.5 million intubations take place per year in the operating room
- 650 thousand outside
- Intubations relevant as long as respiratory diseases exist
- This device can appeal to hospitals looking to raise patient satisfaction and treatment standards
- Offset the investment cost in our device

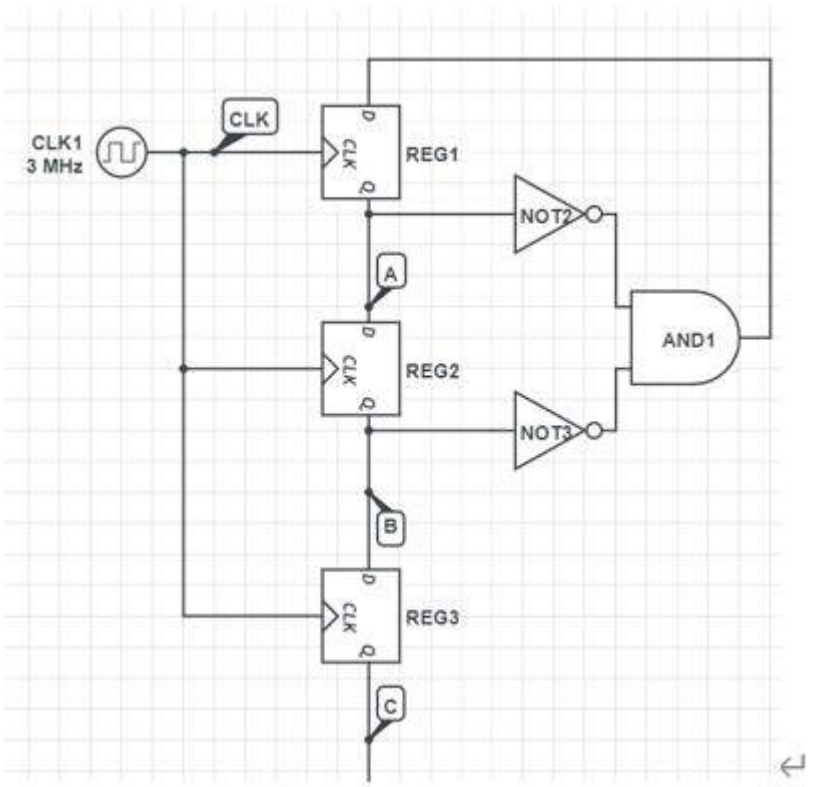
Stakeholder Analysis

- Restore the capability of speech to patients
- Immediate impact on communication between patients and families
- Physicians interviewed advised that communications in the ICU should be simple and non-demanding
- Device appealing also as current methods are simple and basic
- The existing standard of care is not consistent across different countries
- Not all hospitals have access to tablets

BME 4390/5390 Circuits, Signal and Sensors



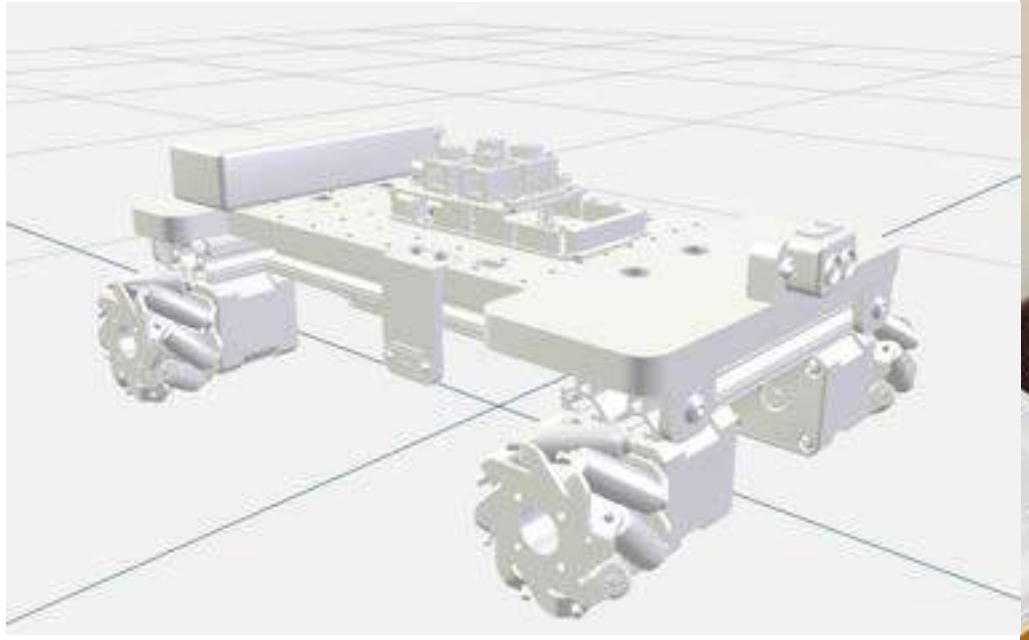
TWO color oximeter board we built



Using circuits lab to build different circuits
A 120° delay and 1/3 duty time circuits schematic

CornellEngineering
Meinig School of Biomedical Engineering

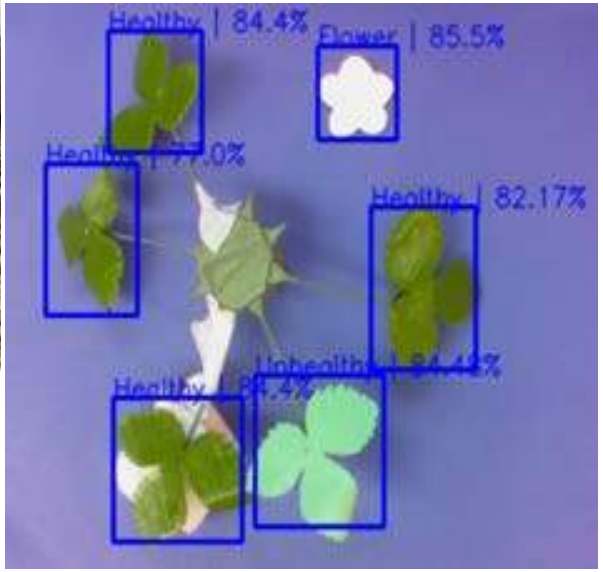
BEE5900 Bio-robotics, our group CADed and designed a robot that utilizing robotic arms and machine learning algorithms to pick up the leaves



Chassis CAD

Chassis assembly

Robotic arm CAD



Machine learning leaves detection

Ganqing (Luke) Hu

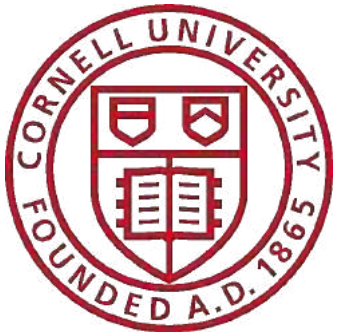
Cornell Meng of Biomedical Engineering | Seeking for Biotech & Medical Device position| Creative, Logically, Patience, Like Team Work

Ithaca, New York, United States · **Contact info**

Cornell University

Cornell Engineering

My LinkedIn: www.linkedin.com/in/ganqing-hu-27723127b



Ganqing Hu (Luke): Biomedical Engineering Master from Cornell. Innovator with patented research and hands-on medical imaging experience. Proven leadership in national competitions. Skilled in SolidWorks, MATLAB, Python.

Ready to advance biomedical solutions.

Contact: 📞 +01 6076974002 | ✉ gh444@cornell.edu