ENGINEERING DESIGN PORTFOLIO

SRI RAMANA SAMPATH

Graduate Mechanical Design
& Research Engineer

Siemens NX | ANSYS | Mechanical Design
Engineering Analysis | Prototyping

MSc Advanced Product Design
Engineering and Manufacturing

Kingston University London

MSc average	3D Printing	Engineering projects
78.4%	1.5+ yrs	4+ yrs

"Developing robust mechanical solutions through analysis, prototyping and verification."

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About Me

Hi, I'm

Sri Ramana Sampath

I am a detail-oriented and concept-driven designer who enjoys solving problems through design.

I am an MSc Advanced Product Design Engineering and Manufacturing student at Kingston University London, with a background in Mechatronics, Robotics and Automation Engineering.

My work focuses on mechanical design, CAD modelling, product development, engineering simulation, prototyping and additive manufacturing. I enjoy taking ideas from early concepts through to CAD development, prototype manufacture, testing and refinement.

Through academic projects and independent 3D printing experience, I have developed practical skills in Siemens NX, SolidWorks, Fusion 360, ANSYS, technical drawing, GD&T, design for manufacture and rapid prototyping.

Personal Highlights:

Education:
MSc in Advanced Product Design Engineering and Manufacturing

Location:
London, United Kingdom

Languages:
English, Tamil

Experience:
CAD, simulation, prototyping and 3D printing.

Specialty:
Mechanical design and product development

"Every project I design reflects a balance between creativity, engineering function and practical manufacture."

Software

CAD & Design

- Siemens NX
- SolidWorks
- Fusion 360
- AutoCAD
- Engineering drawings
- Assembly modelling
- Product modelling

Simulation & Analysis

- ANSYS Workbench
- Structural analysis
- Motion analysis
- Design optimisation
- Engineering calculations
- Microsoft Excel
- Minitab

Prototyping & Manufacturing

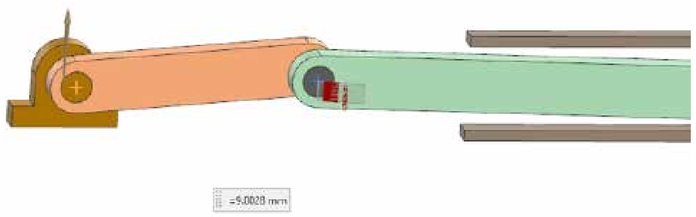
- Bambu Lab X1 Carbon
- FDM 3D printing
- Rapid prototyping
- Design for Manufacture
- Material selection
- CAM fundamentals
- Prototype testing

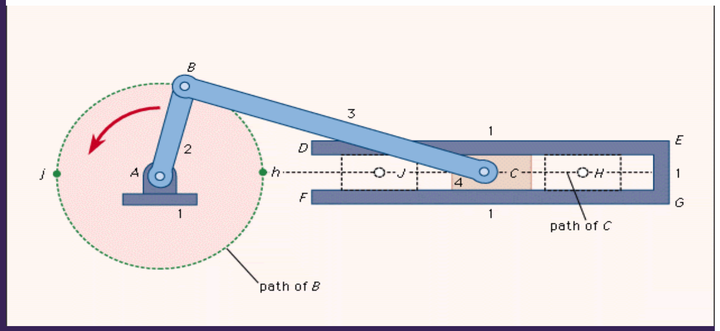
Project 01 : Slider-Crank Mechanism Analysis

Mechanical motion analysis project involving CAD assembly, analytical calculations and simulation-based validation.

Problem

The project focused on analysing the motion behaviour of a slider-crank mechanism and comparing theoretical calculations with simulation results. The objective was to understand the relationship between crank rotation, connecting rod motion and slider displacement across a full range of motion.





My Role

I developed the CAD assembly, carried out analytical calculations, generated motion data and compared the results with simulation outputs. The project required careful interpretation of displacement, velocity and acceleration behaviour to validate the mechanism performance.

Outcome

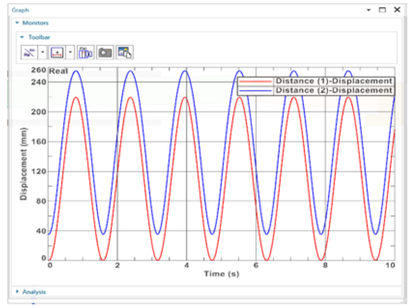
The project resulted in a validated motion analysis of the slider-crank mechanism, supported by CAD modelling, analytical results and simulation comparison. It strengthened my understanding of mechanical motion, engineering calculations, simulation interpretation and technical problem solving.

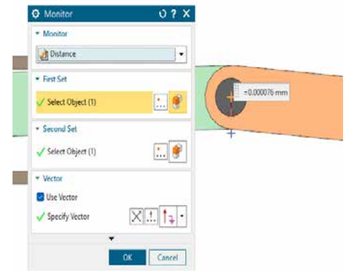
Tools Used

- Siemens NX
- ANSYS Workbench
- Microsoft Excel
- Analytical calculations
- Motion analysis
- Engineering documentation

Design Focus

- Mechanism modelling
- Kinematic behaviour
- Slider displacement
- Crank rotation
- Simulation validation
- Data comparison
- Technical reporting





Project 01
Continued

Analysis & Validation Process

- **Mechanism Setup**

  The slider-crank mechanism was defined using key geometric parameters including crank radius, connecting rod length and frame dimensions. These values were used to establish the movement path and expected slider displacement.

- **CAD Assembly Development**

  A CAD assembly was created using Siemens NX to represent the crank, connecting rod, slider and frame. The assembly helped visualise the mechanism motion and check component relationships.

- **Analytical Calculation**

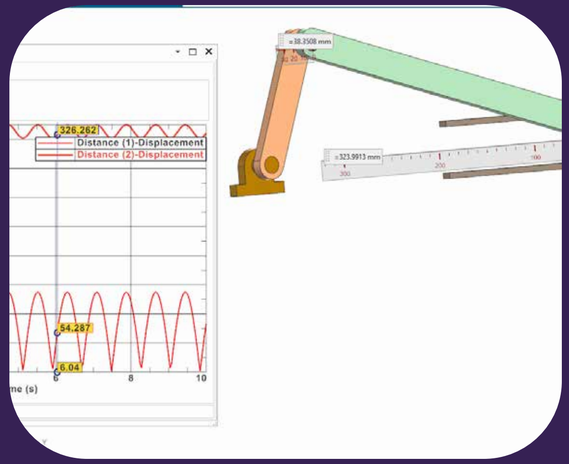
  Manual calculations were carried out to determine slider displacement and motion behaviour at different crank angles. The results were organised using Microsoft Excel to generate graphs and compare trends.

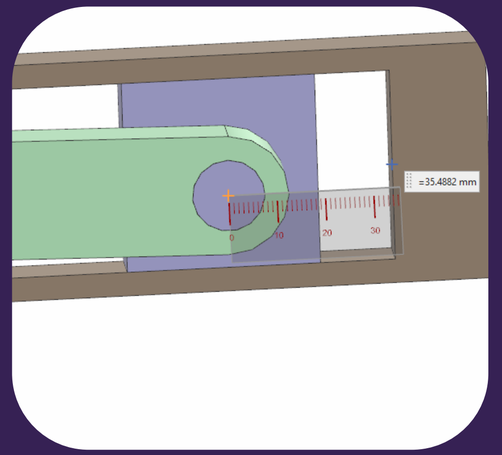
- **Simulation Analysis**

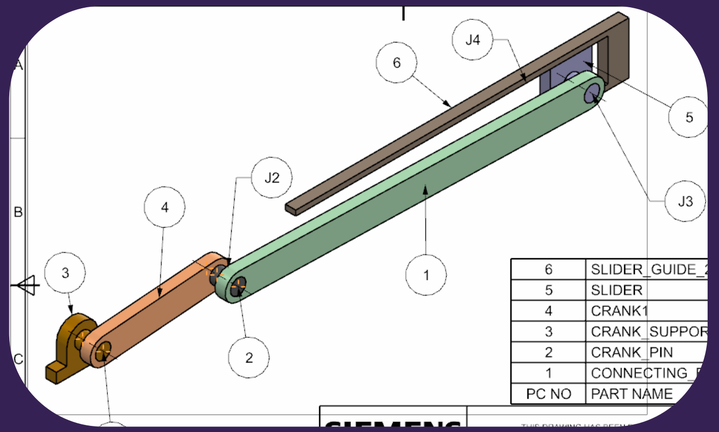
  ANSYS Workbench was used to simulate the mechanism behaviour and obtain motion results. The simulation outputs were used to validate the analytical calculations and identify any differences.

- **Result Comparison**

  Analytical and simulation results were compared to evaluate accuracy and understand the behaviour of the mechanism across its range of motion.







Key Learning

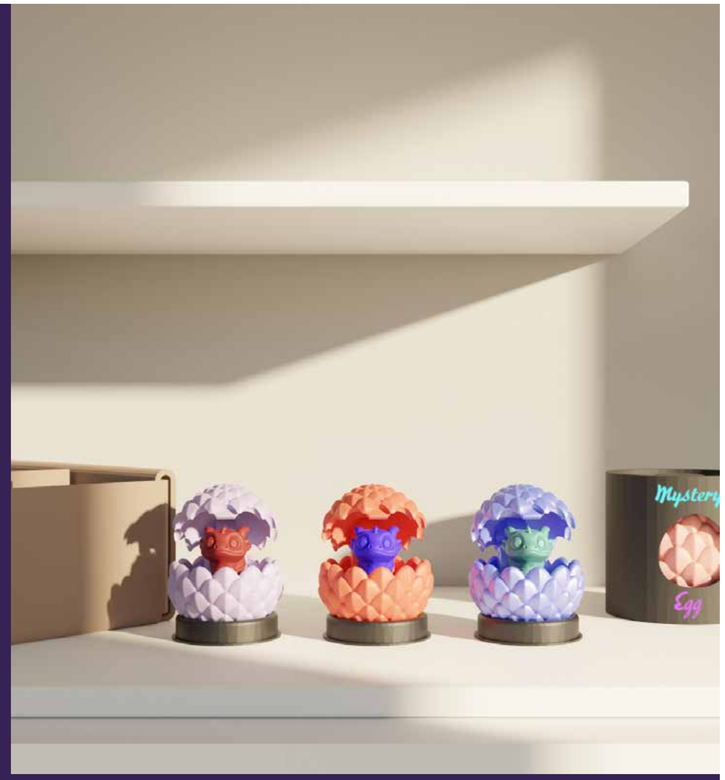
This project improved my understanding of kinematics, mechanical motion analysis and simulation validation. It also strengthened my ability to connect engineering theory with CAD modelling, data analysis and simulation-based interpretation.

Project 02 : Packaging Engineering Design & Simulation

Protective consumer product packaging developed through CAD modelling, engineering analysis and design optimisation.

Problem

The project focused on designing a protective packaging system for a consumer product while balancing structural performance, material use, manufacturability, cost and transport safety. The design needed to protect the product during handling, storage and distribution while remaining suitable for practical production.



My Role

I contributed to concept development, CAD modelling, engineering analysis, design optimisation and technical documentation. The work involved developing packaging geometry, evaluating structural performance and improving the design based on simulation results and manufacturing considerations.

Tools Used

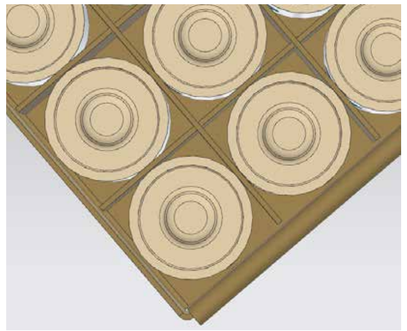
- Siemens NX
- ANSYS Workbench
- DFMEA
- Excel
- Design optimisation
- Engineering documentation
- Material selection

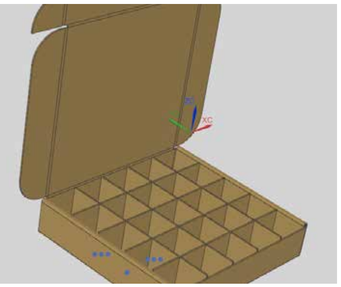
Design Focus

- Product protection
- Structural performance
- Drop-test behaviour
- Vibration resistance
- Material efficiency
- Manufacturability
- Cost-conscious design

Outcome

The project resulted in a refined packaging design supported by CAD models, engineering simulation and design justification. It strengthened my understanding of product protection, simulation-led design, design for manufacture and the importance of using analysis to support engineering decisions.

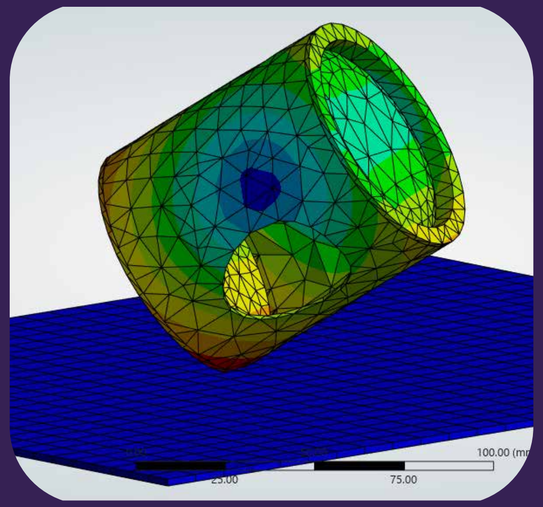


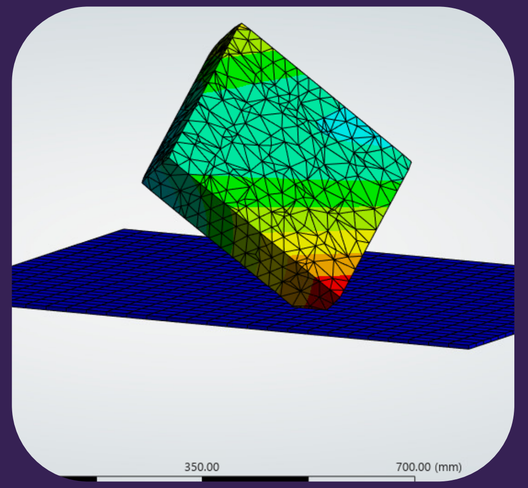


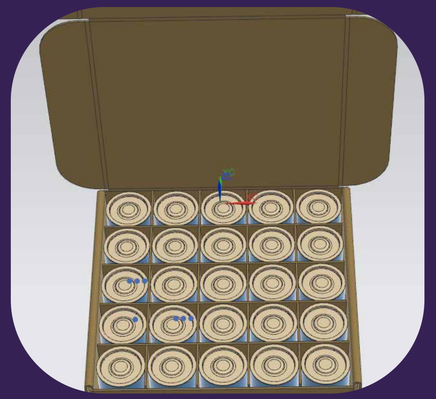
Project 02
Continued

Design & Analysis Process

- **Design Requirement Analysis**
  The project began by identifying the key requirements for protective packaging, including product safety, material efficiency, transport conditions, manufacturability and cost.
- **Concept Development**
  Multiple packaging concepts were explored and compared based on protection, ease of manufacture, material usage and product fit. The most suitable concept was selected for further development.
- **CAD Modelling**
  The selected design was developed into a detailed CAD model using Siemens NX. The model considered product placement, packaging geometry, wall thickness, assembly features and overall structural layout.
- **Engineering Simulation**
  ANSYS Workbench was used to evaluate the packaging under structural, vibration and drop-test conditions. Simulation results helped identify areas of weakness and opportunities for improvement.
- **Optimisation & Refinement**
  The design was refined by adjusting geometry, material thickness and structural features to improve performance while maintaining practical manufacturing and cost constraints.







Key Learning

This project strengthened my ability to use CAD and simulation together to support engineering decisions. It also improved my understanding of design optimisation, product protection, DFMEA, material selection and design for manufacture.

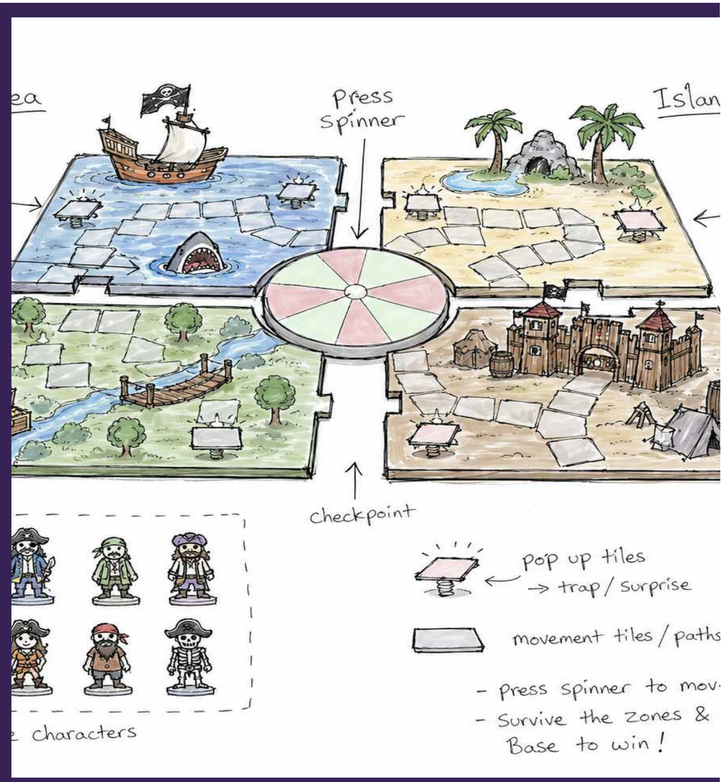
Project 03 :

MSc Dissertation: Mechanically Randomised Pop-Up Mechanism

Mechanism design research focused on mechanical randomisation, reliability, manufacturability and prototype verification.

Problem

The project focuses on designing and developing a mechanically randomised pop-up trap tile that creates surprise, interaction and replay value within a physical tabletop game. The main challenge is to create a mechanism that is engaging for users while remaining reliable, manufacturable and suitable for prototyping.



My Role

I am responsible for the full design development process, including research, concept generation, mechanism exploration, CAD development, prototyping strategy, testing planning and design documentation. The project combines product design, mechanical mechanism development, user interaction and manufacturing considerations.

Tools Used

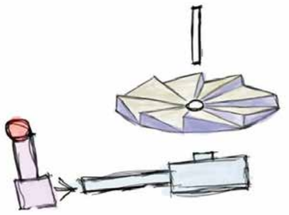
- Siemens NX / CAD modelling
- Concept sketching
- Mechanism design
- 3D printing
- Design for Manufacture
- Prototype planning
- Testing methodology

Design Focus

- Mechanical randomisation
- Pop-up tile movement
- Spring and latch mechanism
- Rotating disc interaction
- Modular board design
- User engagement
- Prototype reliability

Outcome

The project is currently in development and has produced a clear mechanical design direction supported by concept sketches, mechanism research, CAD planning and testing strategy. It demonstrates my ability to independently manage a long-term engineering design project from early concept through to prototype development.



Project 03
Continued

Mechanism Development Process

- **Research & Inspiration**

  The project began by studying existing mechanical toys, board game mechanisms and interactive products. Inspiration was taken from simple spring-loaded mechanisms, clicker systems and randomised mechanical actions used in toys and games.

- **Concept Exploration**

  Multiple mechanism options were explored for creating a surprise pop-up action. The concepts were compared based on reliability, manufacturability, reset method, user interaction and suitability for 3D printed prototyping.

- **Selected Mechanism Direction**

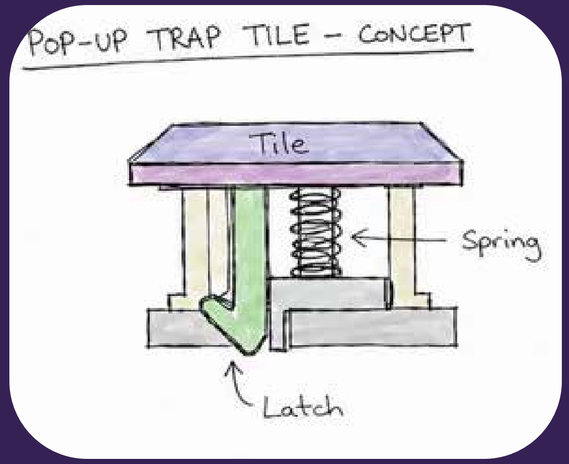
  The chosen direction uses a spring-loaded pop-up tile controlled by a latch and a rotating disc. The disc creates different safe or trap outcomes, allowing the tile to either remain down or pop up depending on the hidden mechanical position.

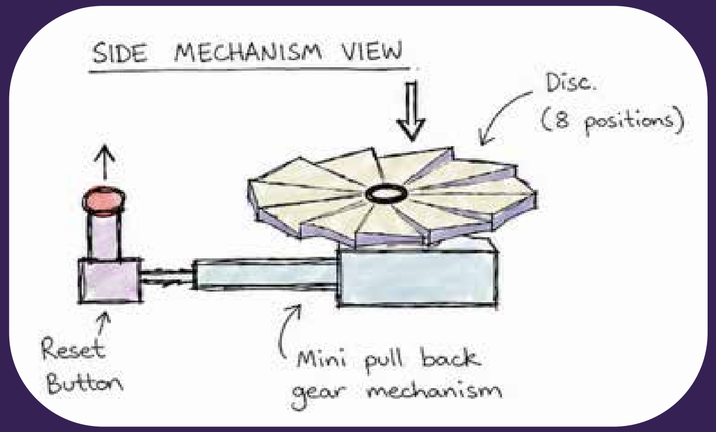
- **Reset & Randomisation**

  A reset action is planned to return the tile to its starting position while slightly changing the disc position. This allows the mechanism to produce varied outcomes and improves replay value without requiring electronic components.

- **Prototype & Testing Plan**

  The mechanism is planned for CAD modelling, 3D printing and physical testing. Testing will focus on pop-up reliability, reset consistency, randomness, durability and user experience.





Key Learning

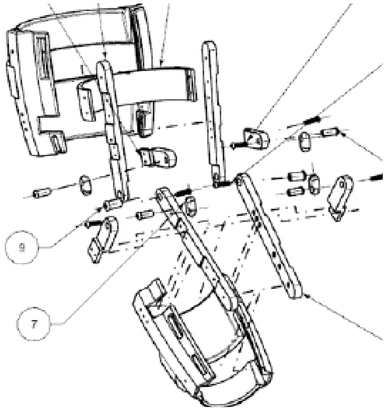
This project has strengthened my ability to develop mechanical systems from early research through to concept selection, mechanism planning and prototype strategy. It has also improved my understanding of how engineering design can be used to create engaging physical product interactions.

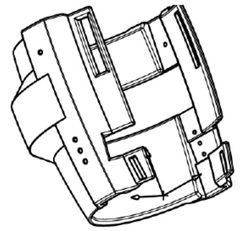
Project 04 : Beeflex Mechanical Support Device

Wearable mechanical support concept designed to reduce arm fatigue during lifting and repetitive upper-arm movement.

Problem

Repetitive lifting and sustained arm movement can cause discomfort, fatigue and reduced efficiency. The project focused on developing a lightweight wearable support device that could assist the user while remaining practical, comfortable and manufacturable.





My Role

I contributed to concept development, CAD modelling, design refinement and engineering documentation. The work involved considering ergonomics, assembly, component layout, manufacturability and prototype feasibility.

Outcome

The project resulted in a refined mechanical support concept supported by CAD models, technical drawings and design documentation. It strengthened my understanding of user-centred mechanical design, wearable product development, assembly thinking and practical design constraints.

Tools Used

- Siemens NX
- CAD assembly modelling
- Technical drawing
- GD&T / PMI
- Product design methods
- Prototype development

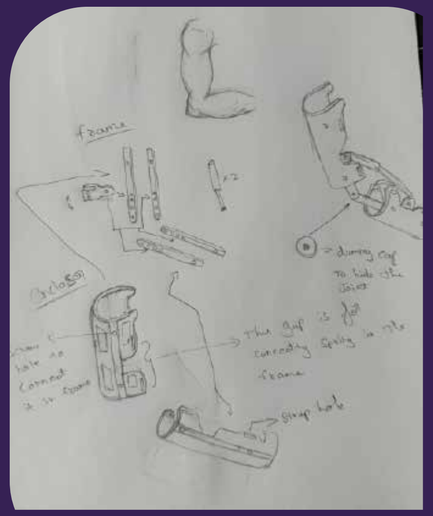
Design Focus

- Lightweight wearable structure
- Compact enclosure design
- User comfort and movement
- Assembly using mechanical fasteners
- Manufacturable component geometry

Project 04
Continued

Design Process

- **Problem Understanding**
  Identified the need for a wearable mechanical support device that could help reduce arm fatigue during lifting or repetitive upper-arm movement.
- **Concept Generation**
  Explored different support concepts, considering user comfort, range of motion, compactness, weight and ease of assembly.
- **CAD Development**
  Created CAD models and assembly layouts to define the product structure, component positioning, enclosure geometry and fastening strategy.
- **Design Refinement**
  Improved the component shapes and assembly arrangement by considering ergonomics, manufacturability, material choice and prototype feasibility
- **Engineering Documentation**
  Produced technical drawings and design documentation to communicate dimensions, tolerances, assembly features and design intent.



Key Learning

This project helped me understand the importance of balancing user comfort, mechanical function and manufacturability in wearable product design. It also strengthened my CAD modelling, assembly thinking, technical drawing and design communication skills.

Project 0 5: Robotic Arm for Pulse Oximetry Monitoring

Healthcare-related robotic concept designed to assist with remote pulse rate and blood oxygen monitoring.

Problem

Pulse rate and SpO_2 monitoring are important in healthcare, but manual measurement can be repetitive and requires physical presence. This project explored the development of a robotic system that could assist with remote monitoring by integrating mechanical movement, sensors and electronic control.

My Role

I contributed to the development of the system concept, mechanical arrangement, sensor integration and functional planning. The project involved combining mechanical design with Arduino-based control, flex sensors, pulse oximetry sensing and wireless communication.

Tools Used

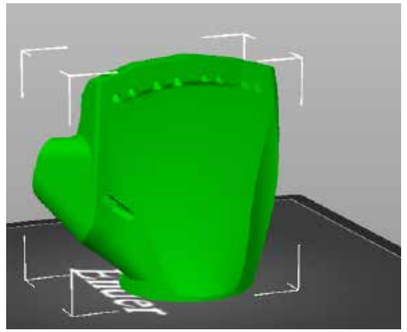
- Arduino Uno
- Flex sensors
- Pulse oximetry sensor
- Bluetooth communication
- Mechanical arm concept
- CAD / system layout
- Electronics integration

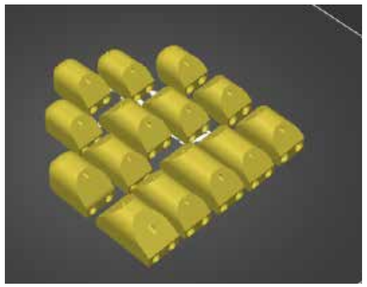
Design Focus

- Remote health monitoring
- Mechanical movement control
- Sensor positioning
- User interaction
- System integration
- Practical functionality

Outcome

The project resulted in a working healthcare-related robotic concept that demonstrated how mechanical design, sensors and electronics can be combined to support remote monitoring applications. It strengthened my understanding of mechatronic systems, prototype development, electronics integration and problem-solving in a healthcare context.





Project 05
Continued

System Development Process

- **Problem Definition**

  The project began by identifying the need for a system that could support pulse rate and SpO_2 monitoring without requiring continuous manual measurement.

- **System Planning**

  The concept was developed around a robotic arm structure combined with sensor-based monitoring and electronic control. The system needed to position the sensor correctly, collect readings and transmit information effectively.

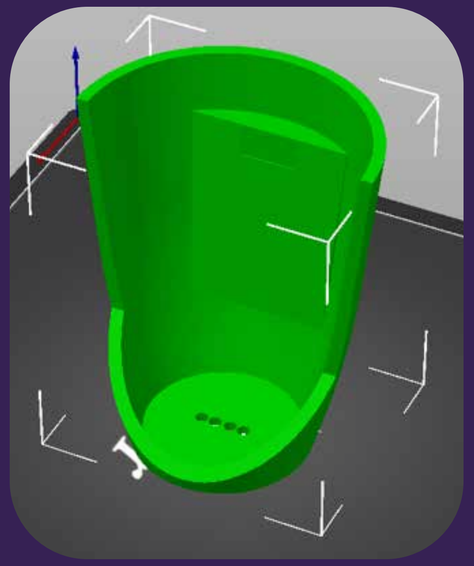
- **Mechanical Design**
- The arm concept was designed to support controlled movement and sensor positioning. The structure had to be stable enough to hold the sensor while remaining simple and practical for prototype development.

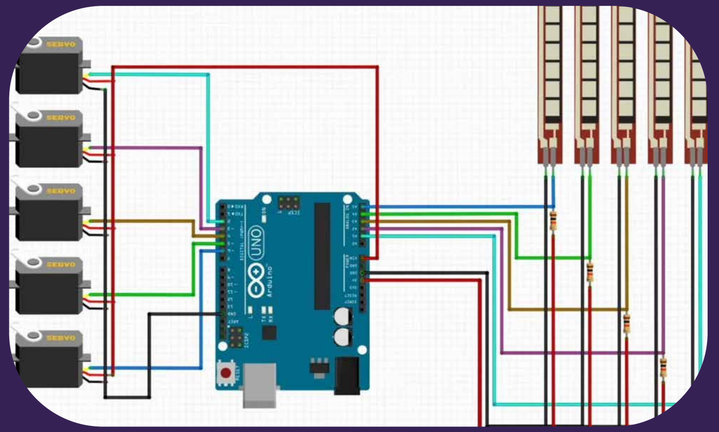
- **Electronics Integration**

  Arduino-based control was used alongside flex sensors, pulse oximetry sensing and Bluetooth communication. The project required integrating mechanical movement with electronic input and output.

- **Testing & Refinement**

  The system was evaluated by checking sensor placement, signal response and overall functional behaviour. Adjustments were made to improve reliability and practical usability.





Key Learning

This project strengthened my understanding of mechatronic product development, where mechanical design, electronics, sensing and user needs must work together. It also improved my ability to think across disciplines and develop practical engineering solutions for healthcare-related applications.

Additive Manufacturing & 3D Printing

Independent Product Design and Prototyping Experience

Overview

Outside of university, I have developed practical experience in 3D modelling, FDM 3D printing and small-scale product manufacturing. This experience has helped me understand how design decisions affect print quality, assembly, strength, surface finish and manufacturability.

Experience

I have designed and produced a range of custom products, articulated models, fidget toys, keychains, decorative items and functional prototypes. Many designs required multiple iterations to improve geometry, print orientation, tolerances, moving features and final appearance.

Tools & Equipment

- Bambu Lab X1 Carbon
- FDM 3D printing
- CAD modelling
- Slicer preparation
- Material selection
- Prototype testing
- Design iteration

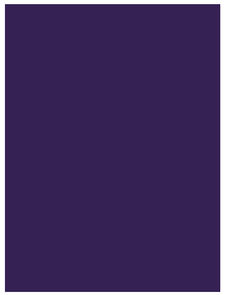
Design Focus

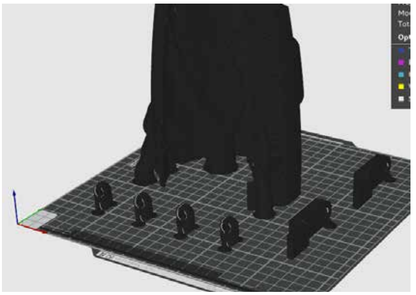
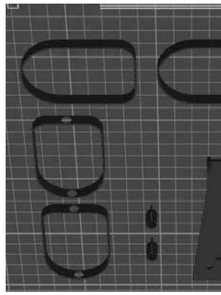
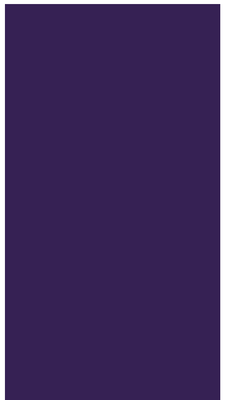
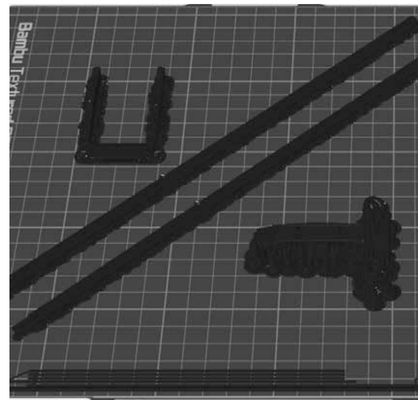
- Printability
- Tolerance control
- Surface quality
- Assembly fit
- Material efficiency
- Design for Manufacture
- Product customisation

Key Learning

This experience strengthened my practical understanding of the full design-to-manufacture workflow. It taught me how to move from an idea to a digital model, prepare it for printing, evaluate the result and refine the design based on real physical performance.





CAD & Technical Drawing Gallery

Selected Engineering Design Work

Overview

This section showcases selected CAD models, assemblies, technical drawings and engineering visuals developed through academic projects and independent design work. These examples demonstrate my ability to communicate design intent through 3D modelling, assembly development, engineering documentation and technical presentation.

Focus areas

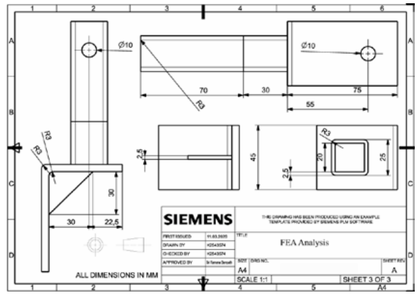
- 3D CAD modelling
- Assembly design
- Technical drawings
- GD&T and PMI
- Exploded views
- Product geometry development
- Engineering communication

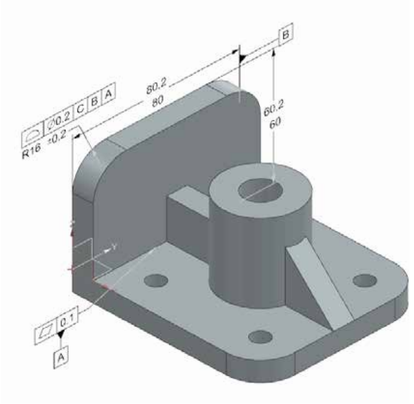
Tools Used

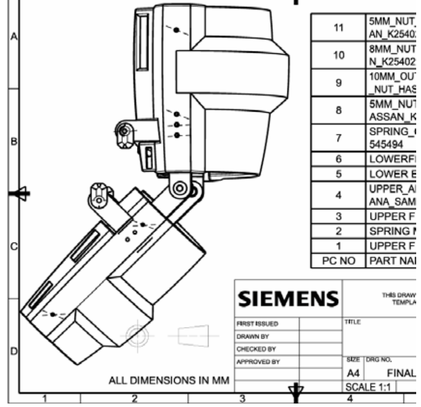
- Siemens NX
- SolidWorks
- Fusion 360
- AutoCAD
- ANSYS Workbench
- Microsoft Excel

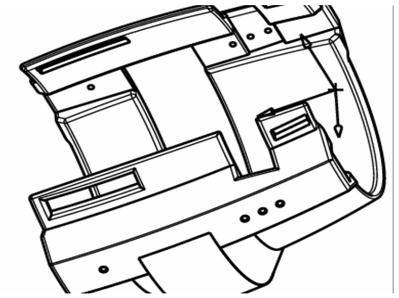
Key Learning

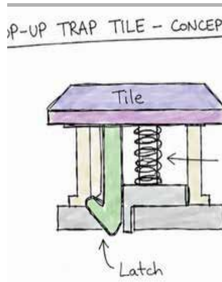
- Translating concepts into CAD models
- Developing assemblies with practical component relationships
- Creating technical drawings for manufacture and communication
- Using engineering visuals to explain design function
- Presenting design work clearly for technical review

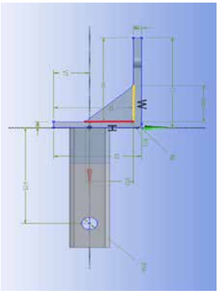


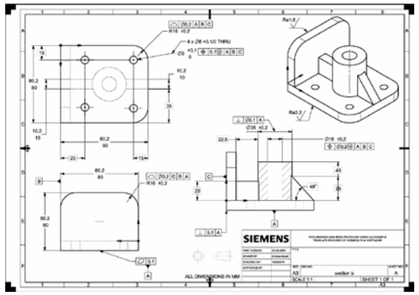


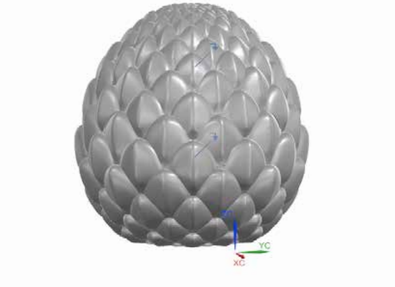


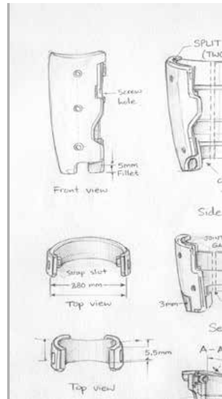












Leadership & Collaboration

Teamwork, Communication and Professional Experience

Overview

Alongside my technical engineering work, I have developed strong teamwork, communication and leadership skills through university projects, part-time work, student organisations and startup experience. These experiences have helped me become more adaptable, organised and confident when working with people from different backgrounds.

2022-2024

Co-Founder and CMO

Aurelion Future Forge Pvt. Ltd.

Coordinated branding, communication and project planning activities within an early-stage startup environment. This experience strengthened my ability to manage responsibilities, communicate ideas clearly and collaborate with others to move projects forward.

2023-2024

Head Designer

TEDx Chennai Institute of Technology.

Led design-related tasks for event branding and visual communication, working under deadlines with a student team. This role improved my teamwork, organisation and ability to deliver high-quality work under pressure.

2024-2025

Community Coordinator

Impact CIT

Helped organise student and community activities, developing leadership, communication and coordination skills.

2025-Present

Online Assistant

Sainsbury's

Currently working in a fast-paced UK retail environment while balancing postgraduate study. This has strengthened my time management, reliability, accuracy and ability to work effectively under pressure.

Key Skills Demonstrated

- Team collaboration
- Communication
- Organisation
- Leadership
- Time management
- Responsibility
- Working under deadlines
- Adaptability

Education

Academic Background

2025-Present

MSc Advanced Product Design Engineering and Manufacturing

Kingston University London

Current taught-module average: 78.4%
Predicted classification: Distinction

2022-2025

B.E. in Mechatronics, Robotics and Automation Engineering

Chennai Institute of Technology

CGPA: 8.05 / 10

Training & Certifications

- KUKA Robotics Training
- Industrial Automation Training - Mitsubishi MELFA Industrial Robot
- Ek Bharat Shreshtha Bharat Student Exchange Programme

Thank You For Watching

Thank you for reviewing my engineering design portfolio.

I am actively seeking graduate opportunities in mechanical design, product development, CAD engineering, prototyping and manufacturing. I would welcome the opportunity to discuss how my skills, projects and enthusiasm for engineering can contribute to your team.

Contact

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