**Shreenandan Sahu | CL24M013 | Indian Institute of Technology Madras |** *GitHub | LinkedIn* |

## EDUCATION and SCHOLASTIC ACHIEVEMENT

| Education | Institute | % / CGPA | Year |
|---|---|---|---|
| M Tech, Clinical Engineering | Indian Institute of Technology Madras, Tamil Nadu | 8.38 CGPA | 2026 |
| B Tech, Biomedical Engineering | National Institute of Technology Rourkela, Odisha | 8.74 CGPA | 2024 |
| Class XII (CBSE) | Kendriya Vidyalaya No-1 Cuttack, Odisha | 89% | 2019 |
| Class X (CBSE) | Kendriya Vidyalaya No-1 Cuttack, Odisha | 10 CGPA | 2017 |

- Secured **AIR 21** (All India Rank) in GATE 2024 – Biomedical Engineering (BM) out of 2345 students.
- **AIR 2276** in GATE 2024 – Instrumentation Engineering (IN) out of 12451 students

## PROFESSIONAL EXPERIENCE

**Research Intern**
*Glowvista Instruments*
*(May-June 2024)*

- Conceptualised and prototyped an autofocus system for AI based microscope using **DIP*** and stepper motors.
- Designed a **2D linear actuator** for sample stage translation and a **BMS*** for powering and charging the system.

**Hardware Design Intern**
*Jayma Bio Innovations*
*(May-July 2024)*

- Developed a 555 timer–based astable multivibrator with variable input impedance for **PWM* signal**.
- Designed an **ATmega328 MC* based Embedded System** to capture PWM, transmit wirelessly as MIDI notes.
- Designed and assembled custom PCB, 3D-printed enclosure and did branding for the final prototype.

## KEY PROJECTS

*Course-CMC* Vellore* | **EKOBIT - Electronic Stethoscope for physiological Sound Acquisition and Auscultation.** | *(Mar-Jun 2025)*

- Developed an e-stethoscope using **active filters** & **noise cancelation**, helping **over 150 medical students** in learning physiological sounds.
- Designed and simulated the circuit and PCB* using **KiCAD** and **LTspice**. Realised the circuit using **6th order filter**, INA128 and **Op-amps**.
- Developed **Python-based software** for visualizing, filtering, & recording the signals. Designed 3D enclosure and adaptor for chest piece.

*Course-CMC* Vellore* | **COHMET - Cognitive and Hand Motor skill Enhancement Trainer** | *(Mar-Jun 2025)*

- Designed & developed a smart electronic pegboard for **cognitive and motor rehabilitation** of **stroke and spinal cord injury patients**.
- Developed **custom sensors for color detection**, **PCB for ATmeg328** MC* based system, 3D printed mechanical structures for the device.
- Built **custom app** to control the device via HC05 module and store the patient data to **google sheets API** accessible via **custom website**.
- Successfully tested the device on **5 different patients** at CMC* Vellore rehabilitation centre with **validation from doctors and therapists**.

*Personal Project* | **Hospital Management System for OPD (Outpatient Department)** | *(Jul-Aug 2025)*

- Developed a **Python**-based Hospital Management System to manage patient, doctors, appointment scheduling and prescription data.
- Implemented core functionalities using **Object-Oriented Programming**, **SQLite** for data management and **Tkinter** for a user-friendly GUI.
- Built **CRUD*** operations-based methods for search, update, and delete features to streamline database management and user efficiency.

*Course-SCTIMST** | **Design and Development of non-invasive device for Haemoglobin Detection** | *(Aug 25- present)*

- Conceptualised, designed and developed a device for **haemoglobin** detection using **photoplethysmography** and signal processing.
- Developed a **PIC18F** based PCB for **sensor integration, data acquisition, signal processing** and displaying the values on the screen.
- Applied the principles of **medical device development** from the ideation stage to the final prototype stage using **waterfall model**.

*Course-SCTIMST** | **Development of a custom control & acquisition system for different biosensor & actuators.** | *(Aug 25- present)*

- Conceptualised an integrated embedded system for controlling actuators and acquiring signals from biosensors using custom app.
- Developed the PCB based on ESP32 and peripherals like ADC, Multiplexer, amplifiers, and indicators with modular organisation in mind.

*Course-SCTIMST** | **Design and Analysis of Novel Insulin Storage Device** | *(July-Aug 2025)*

- Conceptualized an **evaporation-based cooling** system using sand, water, ethanol, and a custom earthen vessel for storing insulin vials.
- Modelled the design in **PTC Creo** and performed thermal capacity analysis of the structure using **ANSYS** to evaluate its cooling efficiency.

*Course-AM5011-IITM* | **Virtual Rebirth- Visualization of Lost Monuments Using VR* and custom navigating hardware.** | *(Oct-Dec 2024)*

- Designed a Unity Based VR game for **visualizing old lost structure** of Konark Sun temple modelled using Sketchup with literature inputs.
- Developed ATmega328 MC* based **wireless VR controller** with rotary encoder input for navigation & vibrational **haptic feedback.**
- Learnt and applied the concepts of vection, XR Rig, **rendering pipeline**, **collision detection physics**, **spatial audio** to realise the project.

*Course-AM5050-IITM* | **Development of single supply electromyogram (EMG) sensor for human computer interaction.** | *(Sept-Nov 2024)*

- Conceptualised and designed a circuit to capture EMG, **filter and amplify** it using Operational Amplifier powered by **single supply**.
- Simulated it using **LTspice**, prototyped it on Vero board and **digitized using 10-bit ADC** of Arduino nano and transferred it to computer.
- Learnt & applied concepts of impedance matching, reference voltage, common mode rejection ratio, **sampling rate** & **digital filters**.

*Course-AM5510-IITM* | **Modelling and its evaluation for Time Series Data using (AR, MA, ARMA, ARIMA) models.** | *(Sept 24-Oct 24)*

- Modelled and evaluated **time series data** like ECG and EMG using different models like Auto Regression, Moving Average, ARMA, ARIMA
- Analysed the data using **time domain**, **frequency domain** methods. Used **NumPy, Pandas & Matplotlib** to implement those methods.

*Personal Project* | **Classification of Diabetic Retinopathy using custom CNN and Transfer Learning** | *(Jul-Aug 25)*

- Classified diabatic retinopathy images using **Random Forest** & **Support Vector Machine** with features extracted from CNN dense layers.
- Trained a **custom CNN** model, applied **image augmentation** for generalization, and evaluated performance using a **confusion matrix.**

*B Tech Final Year Project* | **Fabrication & Validation of NIR Device for Photo Bio Modulation Therapy on Affective Disorder** | *(Aug 23-May 24)*

- Developed a compact, non-invasive transcranial **PBM therapy** device using **830nm NIR* LEDs** for treating depression, anxiety, and stroke.
- Designed custom **PCB for ATmega328** based controlling unit with Bluetooth for connecting to **custom APP** for controlling parameters.
- Fabricated device enclosure and head unit using 3D printing and Validated device efficacy on **zebrafish model** by behavioural analysis.

*Course-BM4701-NITRkl* | **Google Cloud based IoT enabled ECG monitoring device.** | *(Nov 23-Dec 23)*

- Fabricated a **portable ECG monitoring** device using Arduino, Bluetooth module and AD8232 based ECG sensor to **port data to cloud**.
- Developed a python-based software to receive data from device and port it to **Google cloud** at 100Hz updating every 2 second.
- Designed a Google Sheets–based **live dashboard** for **real-time ECG visualization**, enabling healthcare professionals to monitor patient.

## Relevant Courses, Tools, and Skills

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|---|---|---|---|
| • Digital Electronics<br>• Analog Electronics<br>• Signals and Systems<br>• Embedded System<br>• Sensors and Transducers<br>• Instrumentation Lab<br>• Electrical/Electronic Lab<br>• MC MP Lab<br>• Numerical Methods<br>• AI & ML | • Digital Signal Processing<br>• Statistics for Bioengineers<br>• Biomedical Instrumentation<br>• Biomedical Signal Processing Lab<br>• Critical Care Instruments<br>• Medical Device Technology<br>• Bio MEMs and Microfluidics<br>• Design Tools<br>• Medical Diagnostic Techniques<br>• Biomedical Image Processing | • Virtual Reality<br>• Telemedicine Lab<br>• Biofluid Mechanics<br>• Biomechanics<br>• Biomaterials<br>• Physiology & Anatomy<br>• Clinical Attachment<br>• Quality system management | ▪ **Language**-Python, C, C++, basic (MATLAB, C#, JS)<br>▪ **Software-** Creo, ANSYS, KiCAD, LTspice, VS code, Figma, Sketchup, Arduino IDE, STM32 cube IDE, Git, GitHub, Microchip Studio, Inkscape, Unity<br>▪ **Skills-**Web Development (basic), OOP, 3D Modelling, Graphics Design, Prototyping, PCB Designing, 3D printing & product development, documentation, DSA.<br>▪ **Framework-** STL, FreeRTOS, Tkinter, pyserial, NumPy, Pandas, Matplotlib, OpenCv, SQLite, Flask, Django, TensorFlow, Keras, Jupyter |

## Publications, Hackathon, Conferences

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|---|---|
| **Hackathon** | ▪ Secured 3rd place in Hack4Odisha event, developed a VR based tourism app to visualize old monuments |
| **Publication** | ▪ Co-Authored a book chapter, 2nd Chapter Transdisciplinary Approaches to Healthcare Solutions during COVID-19. |
| **Conference** | ▪ Attended the Winter Symposium on "Health Data & AI" at CMC Vellore.<br>▪ Part of organizing team of National Bioengineering Conference 2022 at NIT Rourkela. |

## Position of Responsibility & co curricular

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|---|---|
| **Club Secretary (2023)** | Managed events like Maze Hunt (by Genesys- bioengineering club of NIT Rourkela) in Inovision (Tech fest of NIT) with footfall of over 1000 students. Organised different events both online and offline. |
| **Design Head (2023)** | Managed the publicity of Stellar Night (Inovision) using posters and banners, designed merchandise for the club purchased by over 50 students and managed footfall of over 1500 students. |
| **Student Mentoring** | Mentored over 25 students regarding college and branch selection, made them understand the possibilities of biomedical branch and career prospects through YouTube channel. |

## Hobbies and Others

**Hobbies**-Photography, DIY* Projects, cooking, stargazing, **Languages**- English, Hindi, Odia,

* Digital Image Processing, Battery Management System, Pulse Width Modulation, Microcontroller, Printed Circuit Board, Christian Medical College, Virtual Reality, Create Read Update Delete, Sri Chitra Tirunal Institute of Medical Science and Technology, near infra-red, do it Yourself