Sudarshan V.

Biomedical Engineering | Medical Image Analysis & Surgical AI

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Final-year biomedical engineering student (CGPA 8.6, ranked 2nd in batch) working on 3D medical image segmentation, surgical video AI and gesture-driven anatomy visualization. Two international IEEE conference papers accepted in 2026 (EMBC, TENCON). Seeking a funded MS in medical imaging AI.

EDUCATION

B.E. Biomedical Engineering *Expected 2027*
KPR Institute of Engineering and Technology, Coimbatore, India

- CGPA 8.6; ranked 2nd in batch
- Final year project: *Bio-Vision AR*, a gesture-driven augmented reality pipeline for AI-powered 3D medical image segmentation and visualization

RESEARCH & INDUSTRY EXPERIENCE

Coronary Segmentation Research
Supervisor: Dr. Haseeb Hassan, CUHK-Shenzhen

- Trained a semi-supervised (CPS) 3D coronary artery segmentation baseline on ImageCAS with only 10% labeled data: Dice 0.5725, HD95 48.73 mm
- Designing **CardioMesh-Joint**, a single-pass multi-task 3D U-Net for joint coronary vessel and cardiac chamber segmentation, using TotalSegmentator pseudo-labels alongside ImageCAS labels

Trainee, R&D, Cogniaxis AI Technologies Pvt. Ltd. *Present*
Surgical intelligence platform

- Contributed to a MedSAM-based segmentation model and worked with the Cholec80 surgical video dataset
- Built a procedure-master backend module (SNOMED lookup, search, CRUD APIs) and a video watermarking and integrity system (SHA-256 checksums, tamper detection)
- Built live captioning for teaching-venue surgical video viewing

Research Intern, UnivLabs Technologies *From Feb 2026*
Parent company of Cogniaxis AI Technologies

- Worked on a suturing-phase detection and surgical video summarization pipeline for laparoscopic and OR videos, moving from instrument detection toward motion-pattern and temporal-cycle classification

PUBLICATIONS & PRESENTATIONS

1. **Sudarshan V.**, Dhakshatha M K. “Zero-Footprint Virtual Dissection: Democratizing Anatomy Education via Web-Based Monocular Gesture Recognition.” *IEEE EMBC 2026*, Toronto. Accepted; poster presented (July 2026).
2. **Sudarshan V.**, Dhakshatha M K. “Bio-Vision Surgical.” *IEEE TENCON 2026*, Bali. Accepted and presented; proceedings publication pending.
3. Sono-Ink wound healing patch. *ICIRIMST 2024*. Published.

In preparation: journal paper on Bio-Vision (with Dr. Haseeb Hassan); CardioMesh-Joint multi-task coronary and cardiac segmentation.

SELECTED PROJECTS

Bio-Vision: gesture-controlled 3D anatomy viewer *GitHub*

- Built with Three.js, MediaPipe and Draco; validated at 60 Hz rendering, 30 FPS hand tracking and under 50 ms latency on an Intel i3 with no GPU
- Funded by the Innovesence competition win; extended into SurgiLearn, a gesture-based surgical simulation layer

MedMesh

- DICOM-to-3D pipeline (TotalSegmentator, marching cubes, trimesh) with a gesture-controlled Three.js viewer

Gesture-Controlled Bionic Hand *Rehabilitation Engineering*

- MediaPipe hand tracking driving a low-cost cardboard hand with five servos over WiFi

INTERACTIVE SIMULATIONS (WEB)

Motion Twin: real-time rehabilitation biomechanics *suducodes.github.io/kinema/live*

- Camera-driven OpenSim skeleton (Lenhart 2015 model, scaled to user height) using MediaPipe pose tracking; estimates joint moments by inverse dynamics and activation of 44 muscles per leg by static optimisation, all on-device

KINEMA: predictive gait lab *suducodes.github.io/kinema*

- Web presentation of OpenSim Moco predictive gait simulations; “Twin Walkers” compares a healthy walker with a 40% calf-strength walker at 1.2 m/s, with joint curves, muscle map and X-ray load views

MRISafe Twin: 1.5 T MRI suite you can take apart *suducodes.github.io/mrisafe-v2*

- Interactive teaching simulation of MRI operation and MR safety checks; after an original by Dr. Allwyn Gnanadas A

Pico W Teardown Bench: RP2040 explorer *suducodes.github.io/RP2040*

- 3D Raspberry Pi Pico W model with explode and X-ray views, RP2040 die floorplan, logic-analyzer signal lab and a five-unit course with a PIO simulator

LEADERSHIP

- **President, BMESI (KPRIET):** built a full-year chapter strategy across five pods and an operations dashboard; goal of a student journal with junior co-authors
- **Technical Lead, IEEE EMBS Student Chapter (KPRIET)**
- **Mentor to junior students:** guiding a MediaPipe-based strabismus screening project and conference submissions

SKILLS & HONOURS

Medical imaging	3D U-Net segmentation, semi-supervised learning (CPS), MedSAM, TotalSegmentator, ImageCAS and Cholec80 datasets, DICOM handling, mesh generation (marching cubes, trimesh), Dice and HD95 evaluation
Surgical video AI	Surgical phase detection, video summarization pipelines, instrument and motion-pattern analysis
Vision & biomechanics	MediaPipe (pose, hand and face landmarks), gesture recognition, OpenSim (Moco predictive simulation, inverse dynamics, static optimisation), signal smoothing
Programming	Python; JavaScript and TypeScript; React; Three.js; REST API development; Git and GitHub; browser-based deployment (GitHub Pages)
Embedded & hardware	ESP32 (XIAO ESP32-S3), servo control with PCA9685 (I2C), WiFi communication, low-cost prototyping
Research	IEEE paper writing, poster presentation, literature review, mentoring junior researchers

Honours: Innovesence competition winner; Smart India Hackathon 2026 entry (MedTech); represented Tamil Nadu at the Republic Day Parade, New Delhi