Abhishek Manish Lele

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Education

University of California San Diego, M.Eng. in Bioengineering (Medical Device Engineering) Sept 2025 – Dec 2026

- GPA: 3.67/4.0
- **Relevant Coursework:** Soft Robotics, Biomedical Integrated Circuits and Systems, Design and Control of Haptic Systems, Biomaterials & Medical Devices, Finite Element Methods I, Regulatory Affairs, Patient-Centric Clinical Medicine

Dr. Vishwanath Karad MIT World Peace University, B.Tech. in Mechanical Engineering Aug 2021 – May 2025

- GPA: 3.98/4.0
- **Relevant Coursework:** Finite Element Analysis, Strength of Materials, Fluid Mechanics, Mechatronics, Manufacturing Science, Dynamics of Machines

Work Experience

R&D Intern – Dental & Maxillofacial Implants, Precima Technologies Pvt. Ltd. – Pune, India Jan 2025 – June 2025

- Developed mechanically accurate 3D implant models in SolidWorks from 2D specifications, incorporating realistic boundary conditions and load paths. Improved design manufacturability using Mastercam.
- Conducted experimental fatigue testing of implants under cyclic loading using Ultimate Testing Machine and performed Abaqus-based finite element simulations to predict damage accumulation and fatigue life, achieving 93% agreement with experimental results. Iteratively refined geometry and modeling assumptions to improve simulation–experiment correlation to 96%.

Biomechanics Research Intern, Deenanath Mangeshkar Hospital – Pune, India June 2024 – Dec 2024

- Acquired and analyzed kinematic, kinetic, and spatiotemporal gait data from Parkinson's disease patients using Vicon motion capture system and static and dynamic pressure-sensing platforms, extracting joint angles, plantar pressure distribution, forces, and gait cycle features.
- Utilized obtained biomechanical insights to further develop and test SoleSense, a custom made wearable, sensor-based insole for plantar pressure, gait stage and foot orientation monitoring, enabling out-of-lab human motion assessment.

Academic Projects

TactiCath: Soft-Tip Cardiac Catheter with Contact-Force Haptic Feedback Sep 2025 - Dec 2025

- Designed an 8Fr cardiac ablation-style catheter with an elastic resin distal tip and Pebax braided shaft and Nitinol flexure, integrating piezoresistive contact-force sensing to monitor catheter–tissue interaction forces.
- Developed real-time force estimation and haptic feedback control using Arduino Nano 33 BLE and MATLAB, translating measured forces into graded vibrotactile alerts via 3V coin motors in the catheter handle.
- Modeled and prototyped the system using SolidWorks, ANSYS, and SLA 3D printing, achieving detectable force sensing in the 0.05–0.5 N range with $<$50 ms feedback latency.

TeleGlove: Bidirectional-Glove for Real-Time Hand Motion Tracking and Haptic Feedback Jul 2024 - Dec 2024

- Developed a wearable haptic glove integrating force-sensitive resistors at the fingertips, flex sensors for finger joint movement, and an IMU mounted on the dorsal wrist to capture hand position and finger-bending.
- Sensor data were fused to map position and motion within a real-time virtual environment implemented in Unity, enabling visualization and interaction such as grasping, squeezing, and throwing of virtual objects.
- The glove used vibrotactile motors at the outer fingertips to form a closed-loop system by providing a force-proportional haptic feedback based on measured fingertip contact forces and finger flexion. Achieved 65% motion translation and feedback efficiency from real-time hand gestures to system response.

SoleSense: A Smart Insole for Foot Pressure Mapping and Orientation Analysis Jan 2024 - May 2024

- Designed a smart insole system instrumented with custom-fabricated pressure sensors and an inertial measurement unit (IMU) incorporated in a fPCB to capture plantar pressure distributions and foot orientation.
- Implemented real-time visualization in Processing, converting raw sensor data into gait features such as stance/swing phases, step timing, orientation. Used the insole in patient evaluations achieving 80% accuracy in foot orientation tracking during over-ground walking as compared to dynamic walkways.

Technical Skills

CAD/FEA Softwares: AutoCAD, SolidWorks, Creo, Fusion360, Catia, Ansys (Structural, Fluent), Abaqus, Mastercam

Human Motion and Biomechanical Data Acquisition Systems: FootWork, Vicon Nexus, OpenSim, LabChart

Programming & Visualization: MATLAB, Python, C++, SQL, Arduino IDE, Processing, Unity