ANIL SIVA KUMAR MEKALA

Masters in Medical Product engineering (MS-MPE) - Dec 2024
Bachelors in Mechanical Engineering - May 2017

EXPERIENCE:

Kmedika

[4 years 3 months]

Sr. Product Design Engineer

Product Design Engineer

Clients worked for Kogitus LLC

MEDLINE, CrossRoads Extremity Systems, DePuy Synthes, VILEX

University of Pittsburgh

[1 year]

NeuEase
Pennsylvania Robotics and Technology Fellow
Jan 24 - Mar 24

JHF Fellow
Jun 24 - Aug 24

PITT XProjects
X Project Mentee
Jan 24 - Dec 24

THE IDEA LAB
Design Engineer intern
Sep 24 - Dec 24

Certifications

DASSAULT SYSTEMES MECHANICAL DESIGN SOLIDWORKS PROFESSIONAL

CSWP- Mechanical Design

LUMA INSTITUTE CERTIFIED PRACTITIONER

Certified Practitioner of Human-Centered Design

pdma Research Foundation

PDMA Body of Knowledge Professional Development Program

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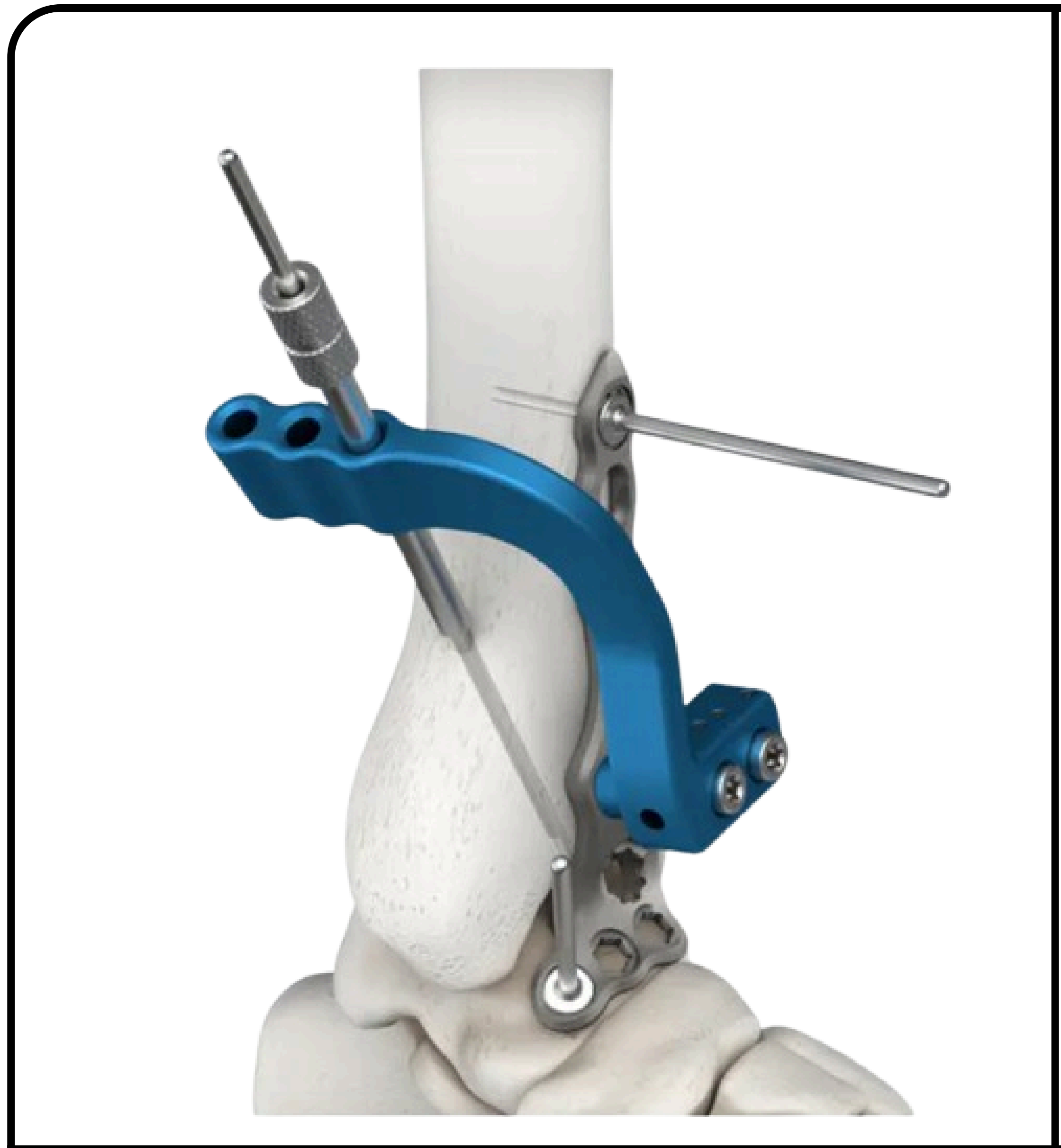
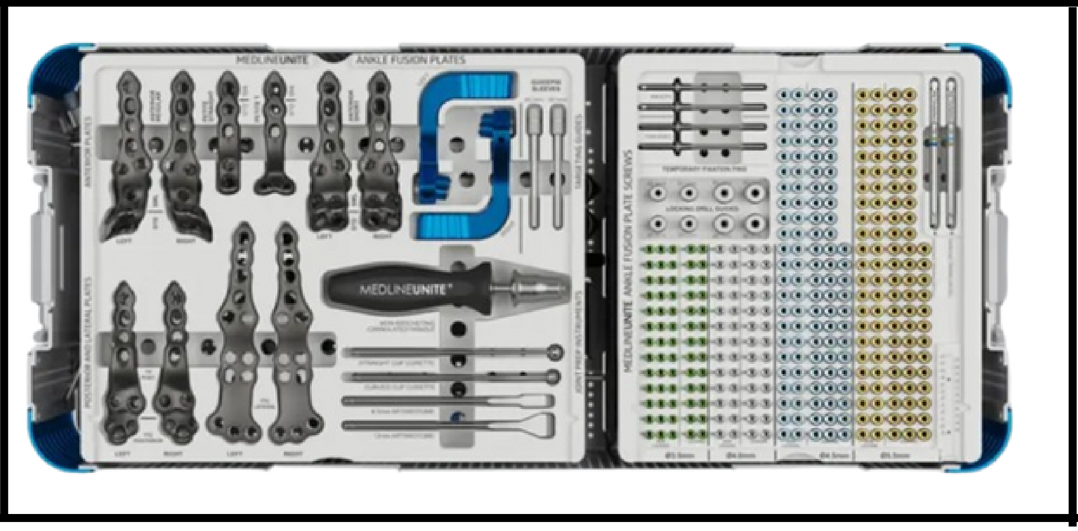
Resume: https://anilsivakumarmekala.github.io/portfolio.github.io/Anil_Siva_Kumar_Mekala_Resume.pdf
Certifications: https://anilsivakumarmekala.github.io/portfolio.github.io/Certificates.pdf
Portfolio: https://anilsivakumarmekala.github.io/portfolio.github.io/

ANKLE FUSION PLATING SYSTEM-MEDLINE





I designed the Ankle Fusion Plating System, including plates, screws, and instrumentation, to address TT and TTC joint fusions through various surgical approaches such as anterior, posterior, and lateral. Among these, the Ankle Pilon Fusion Plate stands out as a unique combination of anterior fusion and pilon plates, offering versatility for complex cases. The system incorporates dual-mode compression technology, enabling both eccentric and interfragmentary compression, ensuring secure fixation. Additionally, I developed a radiolucent Targeting Guide to simplify tibio-talar crossing screw placement with multiple trajectory options, avoiding interference with plate screws.

In managing this project, I prioritized tasks by creating clear timelines, delegating responsibilities, and monitoring progress to ensure timely delivery. Risk management played a critical role in identifying potential issues, such as design complexity or assembly errors, and mitigating them through tolerance stack analysis and iterative design testing.

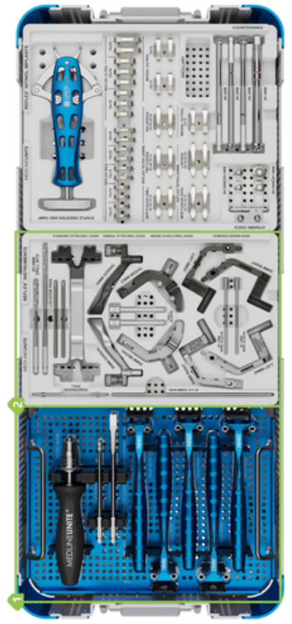
https://medlineunite.com/products/plating-systems/ankle-fusion-plating-systems/

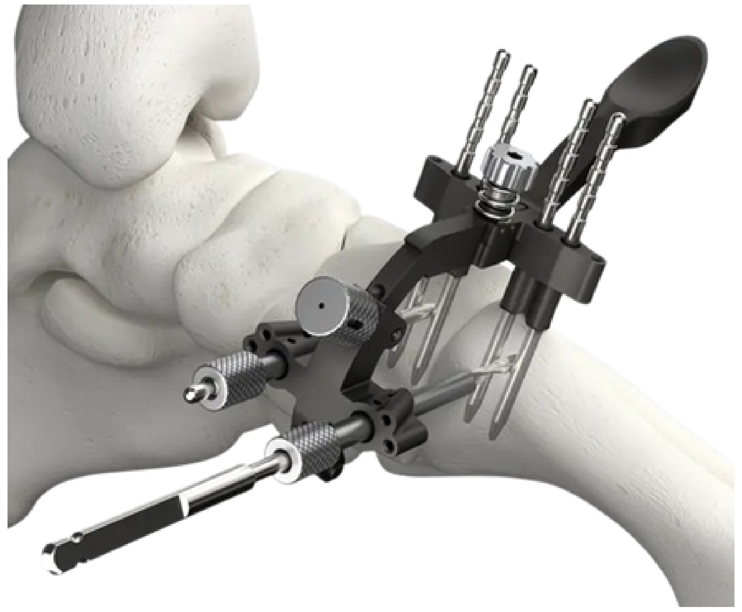
REFLEX NITINOL STAPLES-MEDLINE

4-Leg	REFLEX TETRA	A	B	C	D	E
26mm MTP		16mm	18mm	14mm	12mm	26mm
26mm TMT		20mm	20mm	16mm	14mm	26mm
26mm Lapidus/TN		20mm	20mm	20mm	20mm	26mm
30mm MTP		16mm	18mm	14mm	12mm	30mm
30mm Lapidus		20mm	20mm	20mm	20mm	30mm

REFLEX MINI	REFLEX MAX	REFLEX ULTRA
8 x 8mm	15 x 15mm	18 x 18mm
10 x 10mm	15 x 18mm	20 x 14mm
12 x 12mm	18 x 18mm	20 x 16mm
	18 x 20mm	20 x 20mm
	20 x 20mm	23 x 16mm
		25 x 20mm

	Bridge Width	Bridge Thickness
MINI	1.5mm	1.2mm
MAX	4.0mm	1.4–1.5mm
ULTRA	5.0mm	1.5–1.7mm
TETRA	5.0mm	1.5–1.7mm



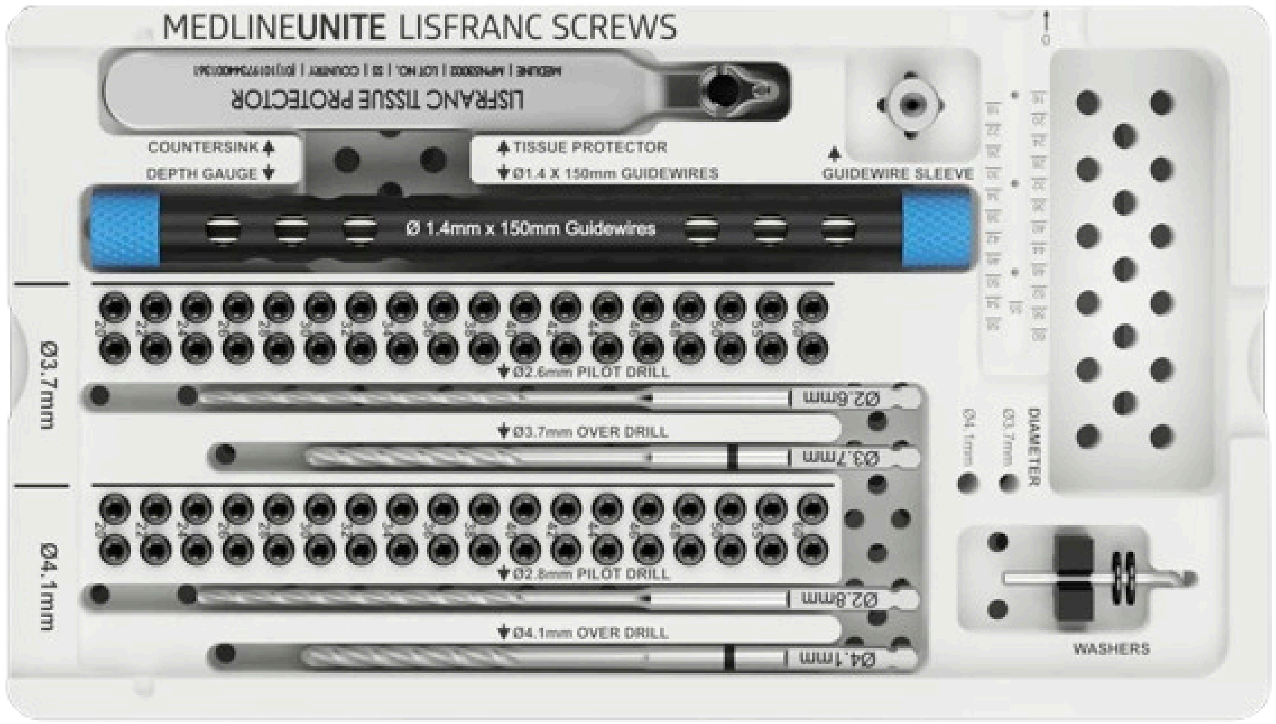


I contributed to the design of Reflex Nitinol Staples and instrumentation, which provide internal fixation for fusions, osteotomies, and fracture fixations in the foot. The system includes 2-leg and 4-leg staples designed to ensure minimal hardware prominence and enhanced stability.

To validate the design, I performed 4-point bending finite element analysis using ANSYS to determine the worst-case performance of the staples. This data was used to compare the implants with existing market staples and to prepare ASTM standard physical testing. The results were instrumental in completing the Design History File (DHF) and ensuring compliance for FDA 510(k) submission.

https://medlineunite.com/products/nitinol-implants/

SCREWS SYSTEM-MEDLINE



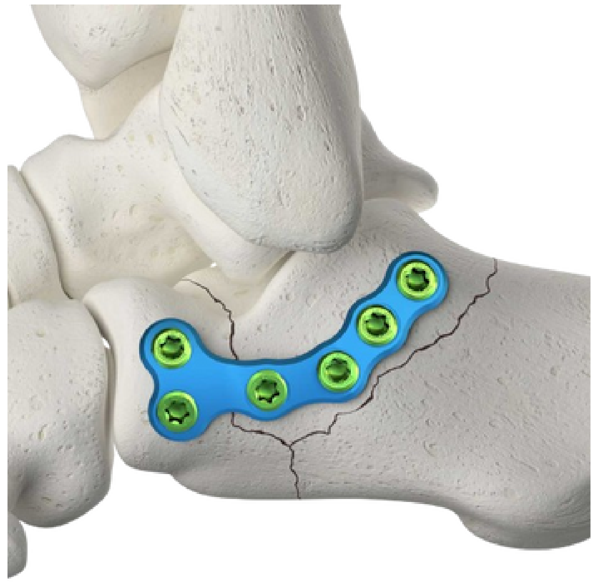
Designed locking and non-locking screws for minimally invasive surgeries (MIS), Lisfranc, and Jones procedures. Additionally, I developed the corresponding instruments necessary for implantation.

A Nitinol Dynamic Disc was designed to provide active compression and gap recovery, ensuring continuous stabilization during the postoperative healing phase. Conducted pull-out and bending analyses to determine the worst-case scenarios for the screws. These analyses identified the weakest design, enabling comparisons with predicate screws. This was instrumental in preparing ASTM-standard tests and supporting the 510(k) submission for FDA approval, ensuring compliance and robust design validation.

https://medlineunite.com/products/screw-systems/

PLATING SYSTEM-MEDLINE

NAVICULAR FRACTURE PLATE

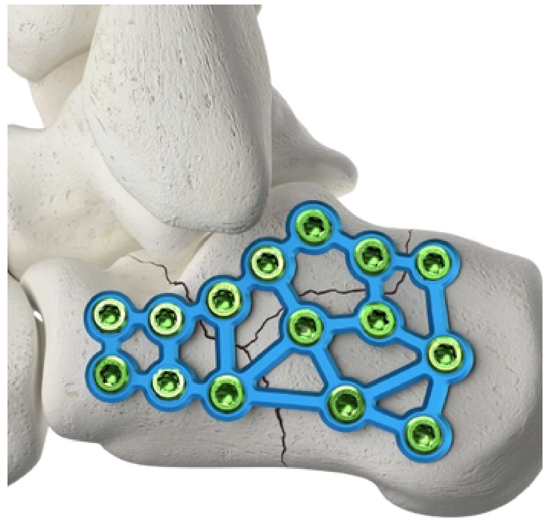


SINUS TARSI PLATES

LISFRANC DUAL-RAY PLATES

MEDIAL MAL PEG PLATES

SYNDESMOSIS BUTTRESS PLATES



PERIMETER PLATES

5TH METATARSAL HOOK PLATES

ANTEROLATERAL DISTAL TIBIA PLATES

https://medlineunite.com/products/plating-systems/

MIDFOOT PLATING SYSTEM- JOHNSON & JOHNSON

I collaborated with my colleagues in designing the Midfoot Plating System to address reconstructive and trauma procedures in the midfoot and forefoot regions. The system features low-profile titanium plates and a screw-plate locking mechanism, ensuring secure fixation, reduced hardware prominence, and compatibility with existing surgical instruments.

My contributions included supporting the development of micro, mini, and small screws paired with low-profile implants to enhance fixation while maintaining minimal implant prominence. I also assisted in optimizing the screw-plate locking mechanism to improve biomechanical performance.

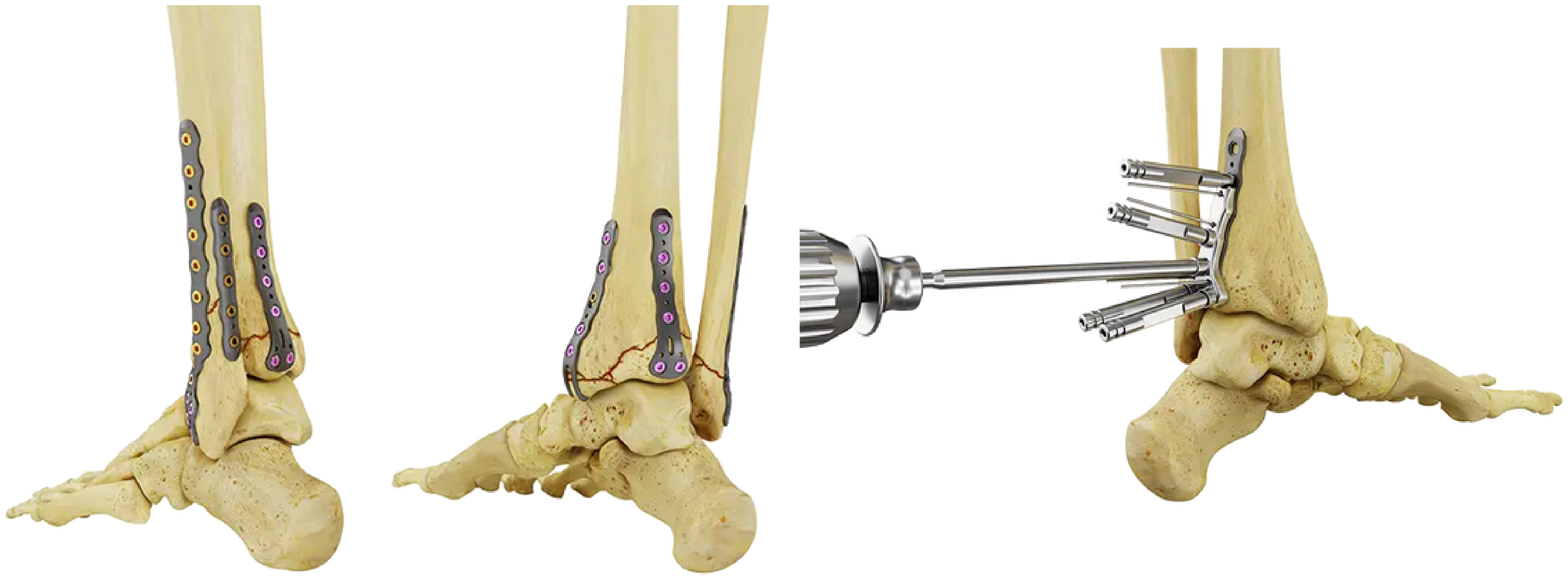
By conducting worst-case scenario analysis at different cross-sections of the plate, I identified the weakest plate in the system. This plate was then tested physically using the ASTM F382 standard. This analysis allowed for a detailed comparison with predicate plates and provided essential data for the 510(k) submission to the FDA. This effort ensured the design met regulatory standards while improving surgical reliability

https://www.jnjmedtech.com/en-US/news-events/depuy-synthes-launches-trileap-lower-extremity-anatomic-plating-system

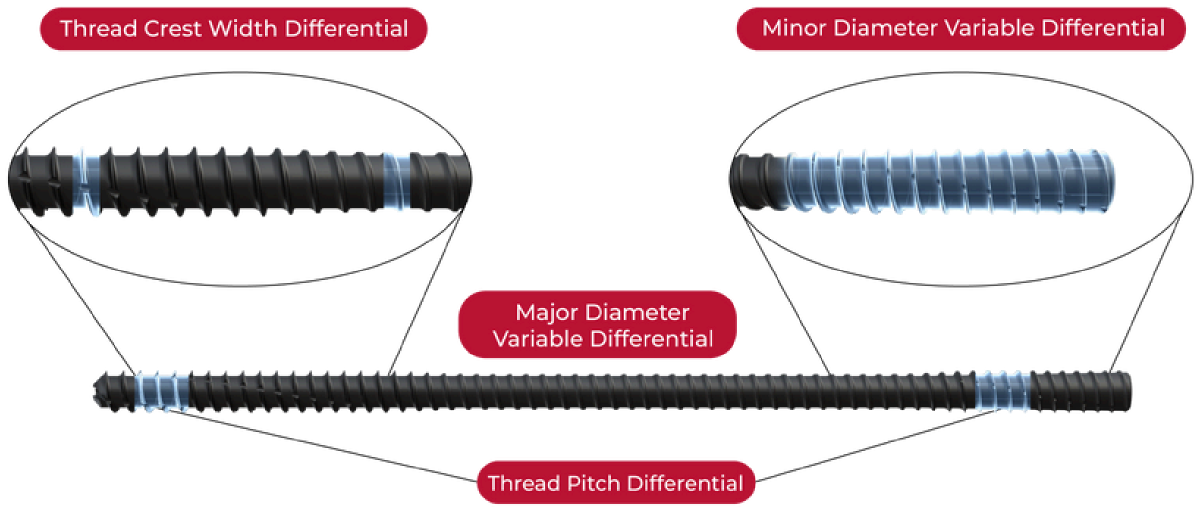
SCREWS & PLATING SYSTEM- VILEX

ALPHALOK METFX

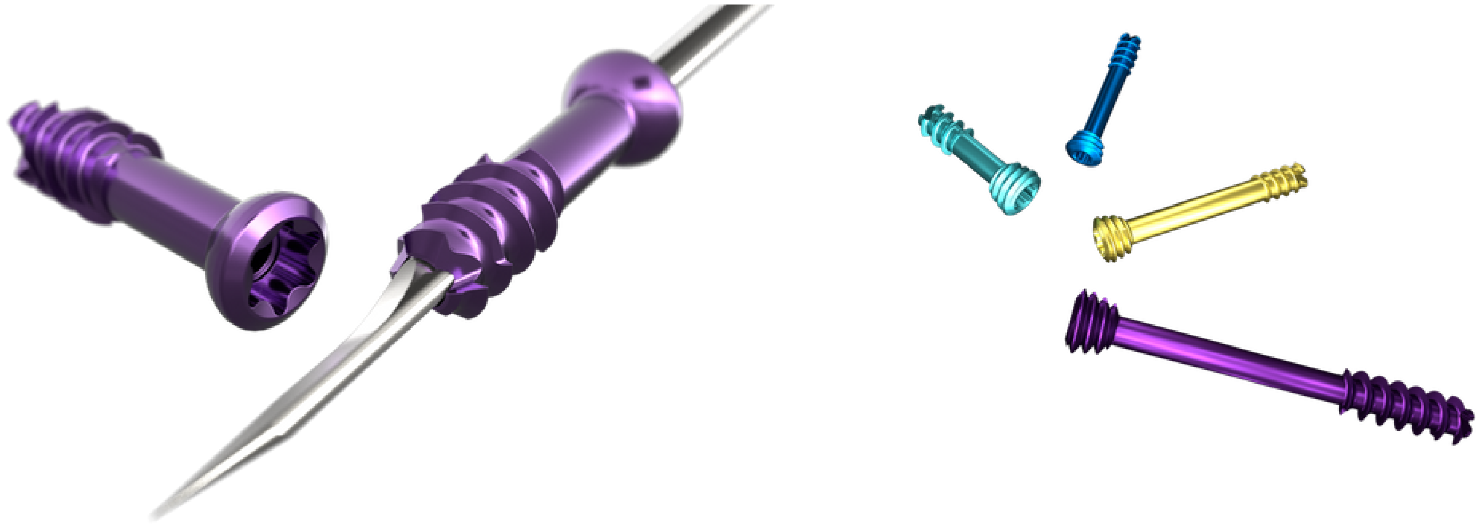
ALPHALOK RECON



ALPHALOK ANKLEFX

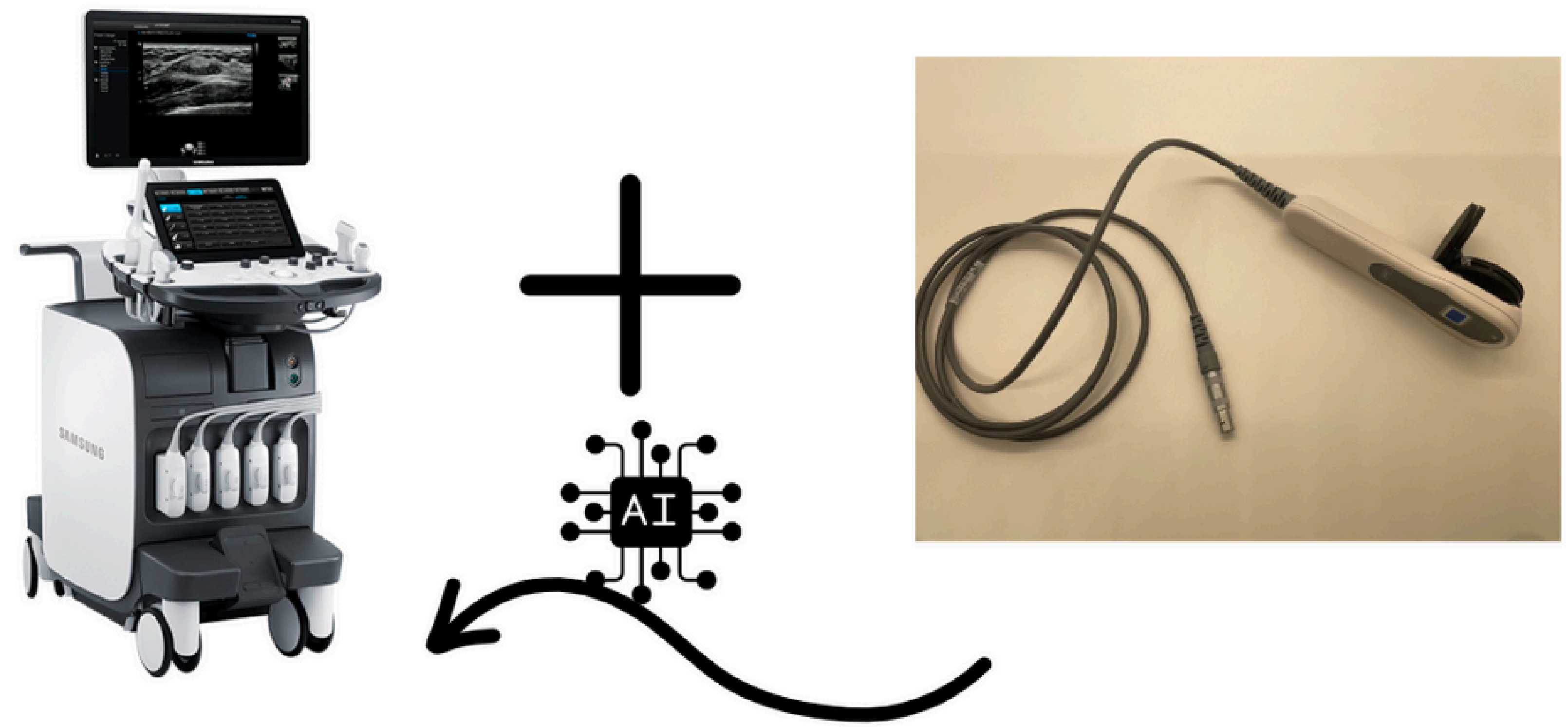


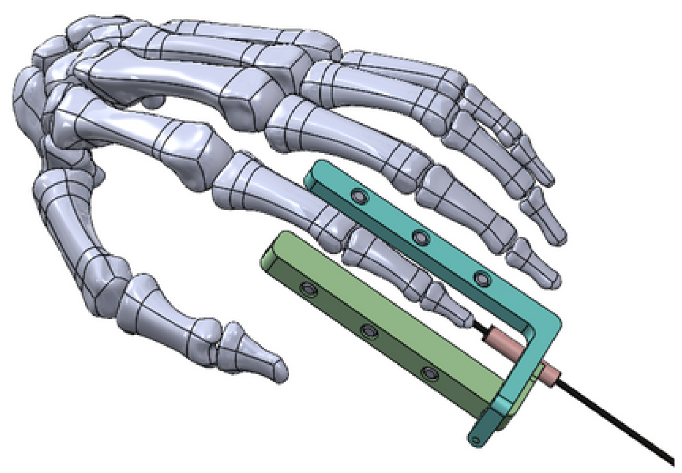
REDEMPTION BEAM

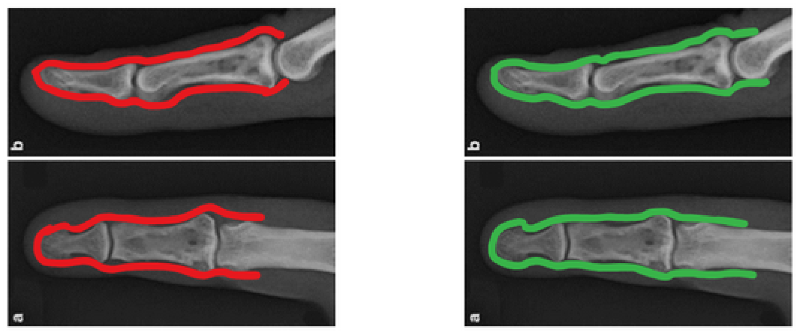


TITANEX SCREWS

PROJECT FINGER FIXER-UNIVERSITY OF PITTSBURGH







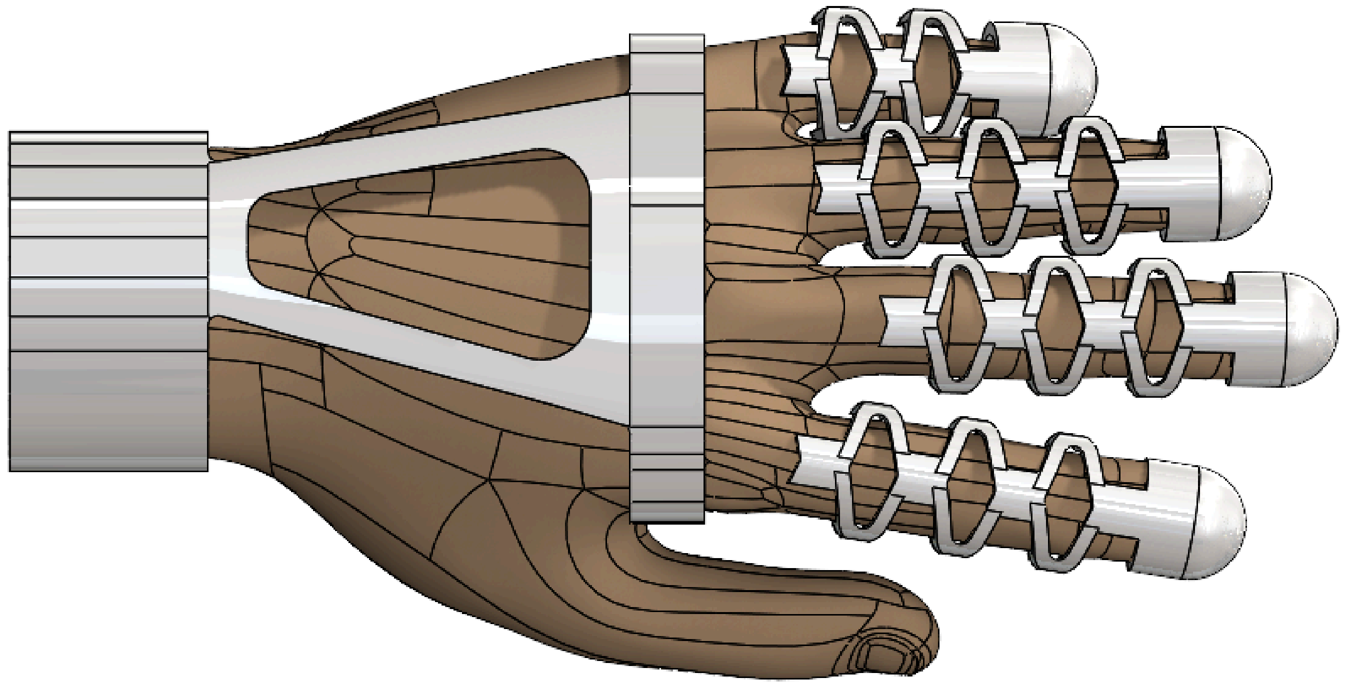
Before fracture reduction

After fracture reduction

As part of the Managing Medical Product Innovation course, our team conceptualized a medical device to reduce the time required and enhance the precision and safety of percutaneous finger-pinning procedures. This addresses critical challenges in traditional surgical techniques, such as the steep learning curve and risks associated with imprecise pin placement. By integrating real-time imaging with AI-driven guidance, the device aims to improve accuracy, minimize the need for repinning, and streamline the procedure.

The project involved a comprehensive evaluation of its commercialization potential, including SWOT and market analyses, as well as stakeholder and competitor assessments. Additionally, we explored regulatory pathways to identify potential hurdles and requirements for approval. Pretotype development focused on refining the concept and evaluating the feasibility of incorporating non-radiation imaging technologies to ensure safe and efficient use in surgical settings.

GARDEN PAL-UNIVERSITY OF PITTSBURGH



As part of the Human Augmentation course, our team developed the "Garden Gizmos" project, which aims to help individuals with arthritis and grip strength impairments enjoy gardening. The device, a pair of smart gardening gloves, combines assistive technology with real-time environmental monitoring to enhance usability and accessibility for diverse users.

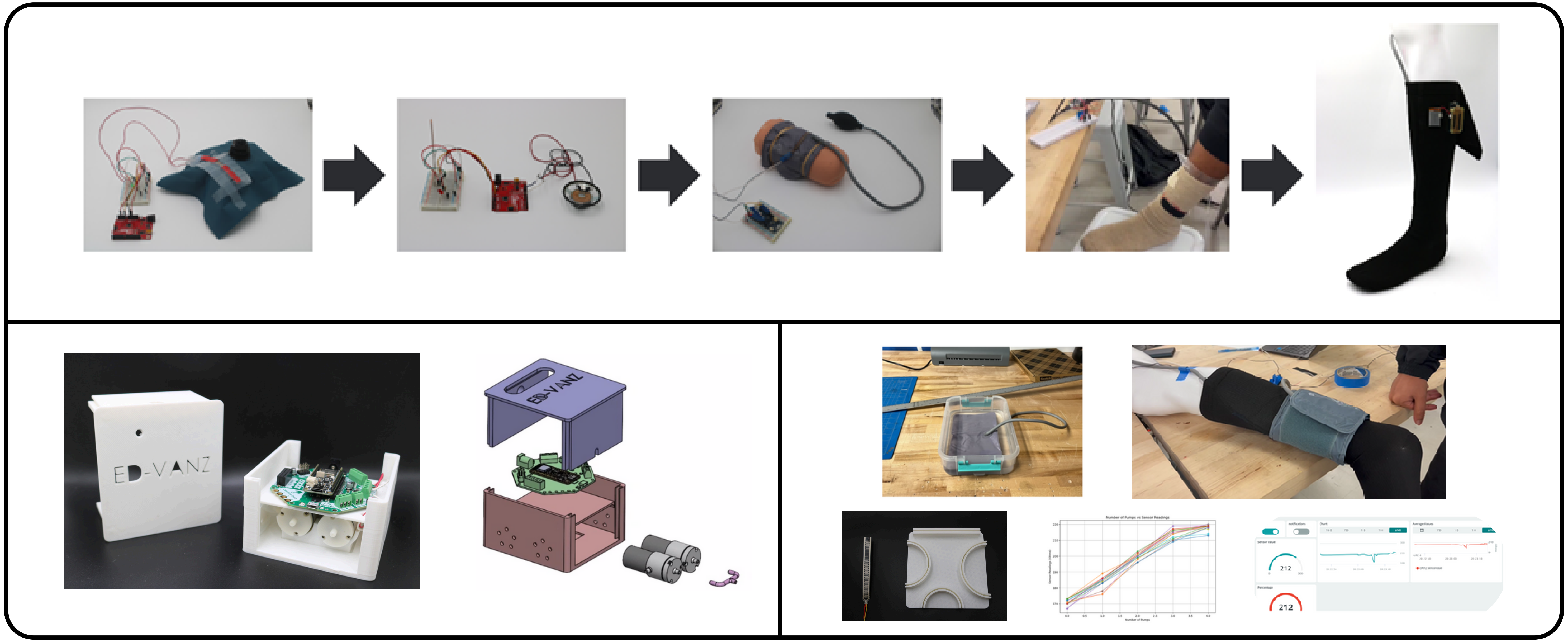
The final prototype features a 3D-printed exoskeleton (using flexible material) with a grip strength assist mechanism to help users handle gardening tools and tasks more effectively. It also integrates soil monitoring sensors to measure temperature and moisture levels, providing insights about garden health through a connected app. The lightweight, user-friendly design ensures easy use, taking under 30 seconds to wear.

Although limited by challenges such as the size of the servo motors and batteries, as well as restricted dexterity, the project demonstrated the potential to democratize gardening by improving accessibility for individuals with physical limitations. Future enhancements could include testing with conductive woven fabric for improved grip, integrating a solar panel for power, and expanding the scope to commercial gardening applications.

https://anilsivakumarmekala.github.io/portfolio.github.io/Gardenpal.html

GardenGizmosFinalVideo.mp4

EDEMA DETECTION SMART SLEEVE-UNIVERSITY OF PITTSBURGH



As part of a Medical product development course, we developed a wearable device for real-time monitoring and management of edema, addressing challenges faced by individuals with limited mobility. The smart sleeve integrates noninvasive flex sensors, dynamic pulsatile compression, and IoT-enabled app notifications to ensure timely interventions and improved patient outcomes.

Our iterative design process included five prototypes, each enhancing functionality, from accurate edema detection to seamless app integration and compression management. The final prototype achieved >96% accuracy in detecting swelling and supported continuous operation for over 120 hours, significantly reducing caregiver burden by automating routine monitoring tasks and enabling early interventions.