

Real-Time Pressure Sensor Pad for Ulcer Prevention in Hospitalized Patients

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Motivation / Aim

Clinical Problem:

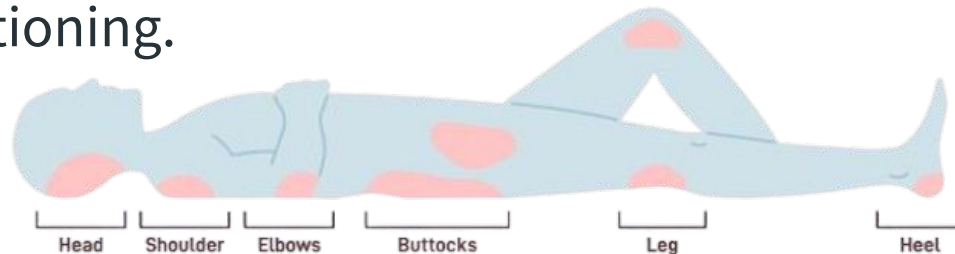
- Ulcers and bedsores are common in ICU & surgical patients.

Impact:

- Increase infections, hospital stays, and costs.

Project Aim:

- Real-time pressure monitoring to **prevent ulcers** by guiding timely repositioning.



Source: [Knox Community Hospital](#)

Background

Current Standard of Care

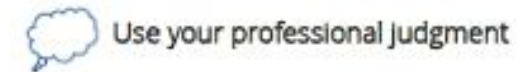
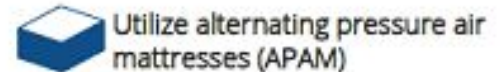
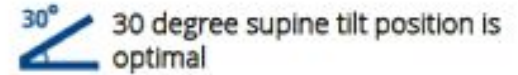
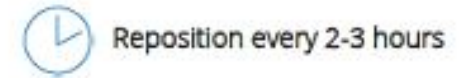
- Manual turning schedules or subjective monitoring.

Limitations:

- No continuous, objective feedback for nurses or physicians.

Our Approach:

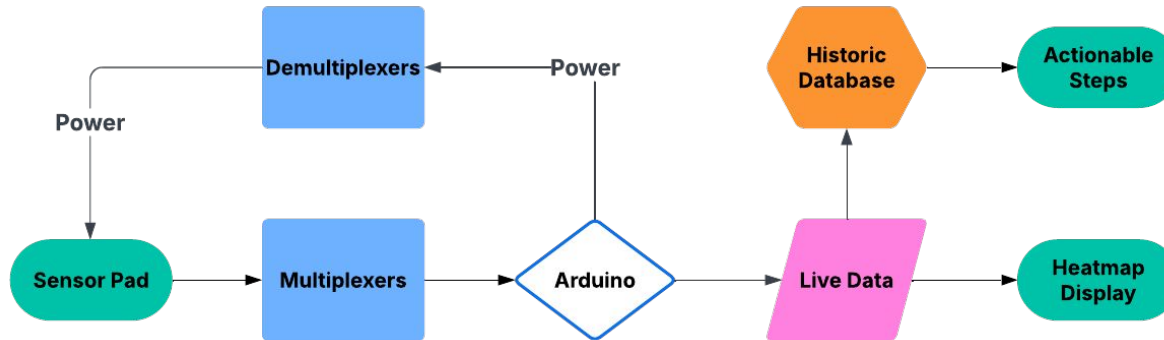
- A **real-time** pad that provides **actionable data** to healthcare professionals.



Source: Wound Care Surgeons

Methods: System Development Overview

◎ Pipeline:



◎ Key Design Goals: High resolution, low noise, scalable to full-body pad.

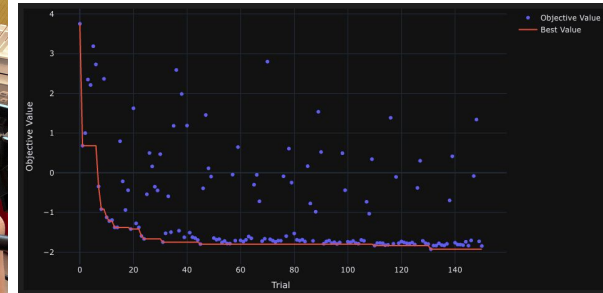
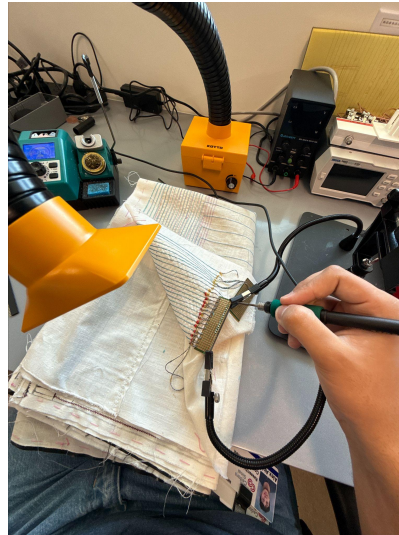
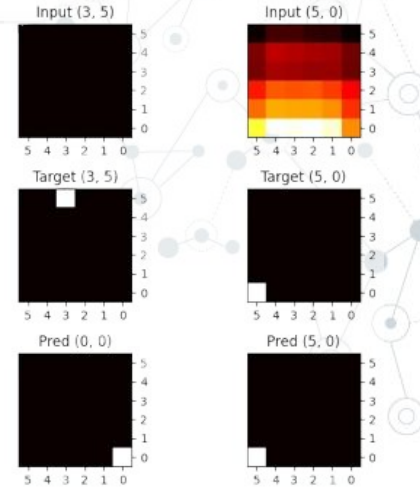
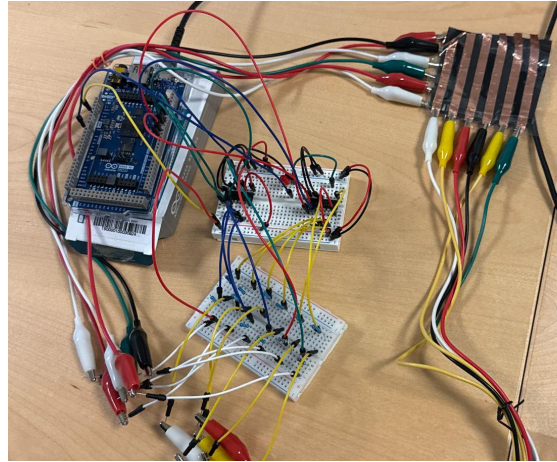
Methods: Early Prototypes

Initial Prototype:

- Used 74HC4051 multiplexers + denoising autoencoder.

Challenges:

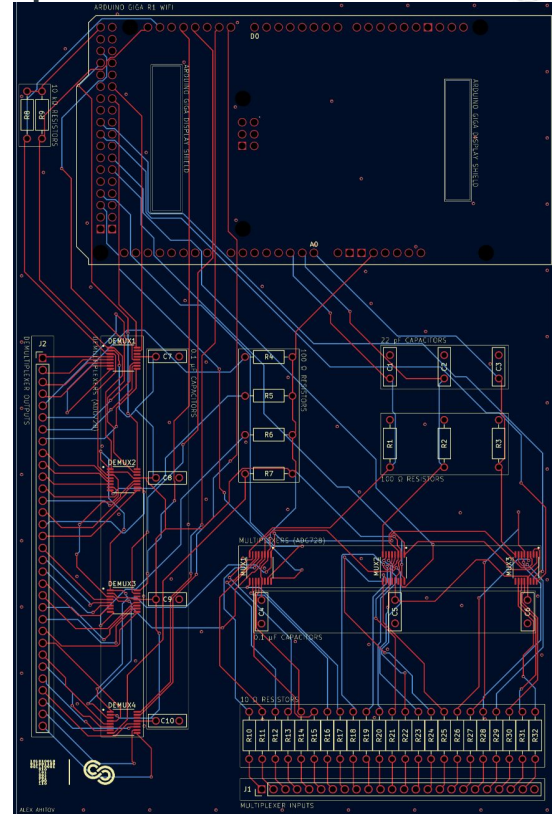
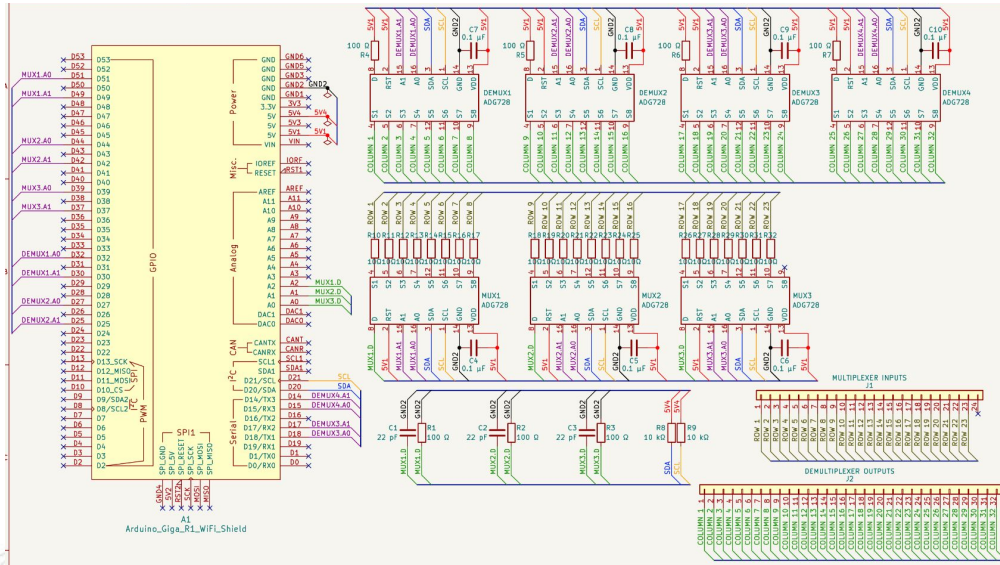
- High signal crosstalk.
- Slow switching speeds → not scalable for 700+ pressure points.
- Autoencoder couldn't compensate for noise.



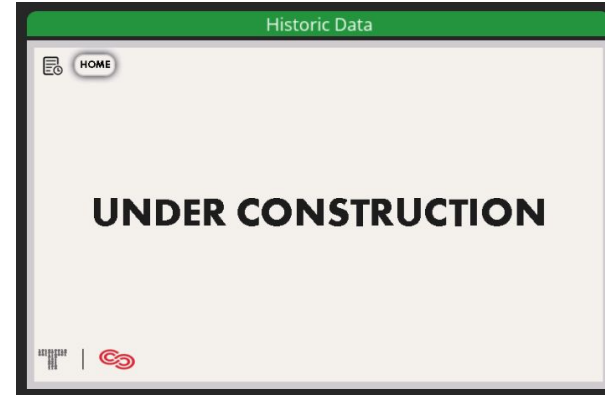
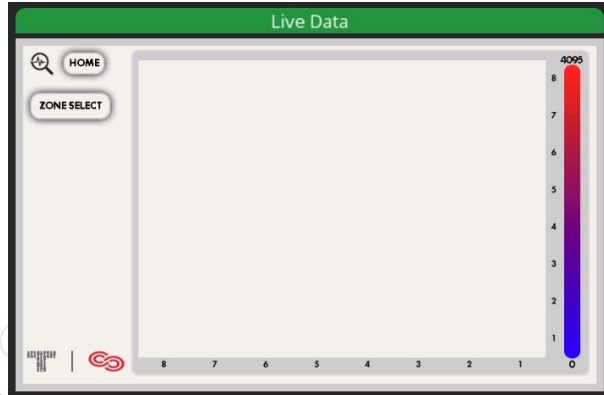
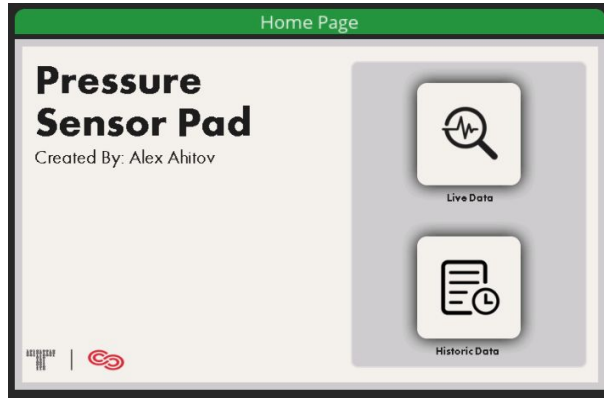
Methods: Final Hardware Design

Multiplexer Selection: Tested multiple options → chose ADG728

PCB Design:



Methods: Software Development



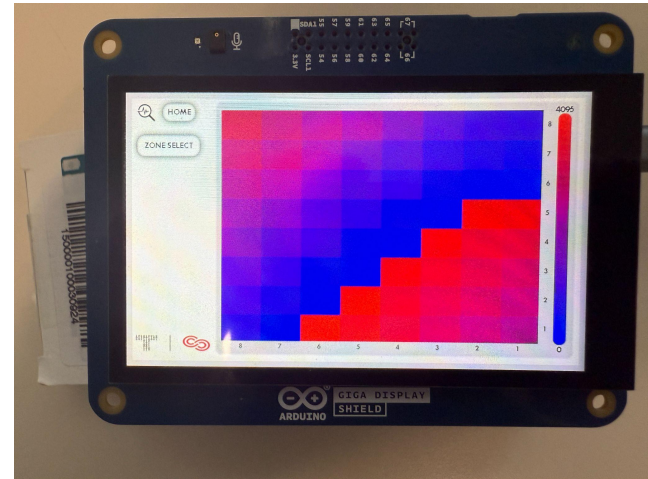
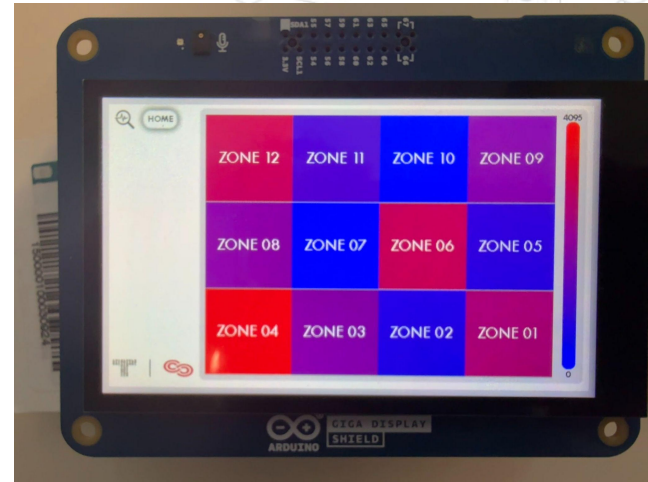
Current Results

What Works Now:

- Real-time data visualization for all zones.
- Zone recoloring reflects relative pressure risk.

Current Status:

- PCB boards arriving today
→ no live demo yet.



Future Steps

Software:

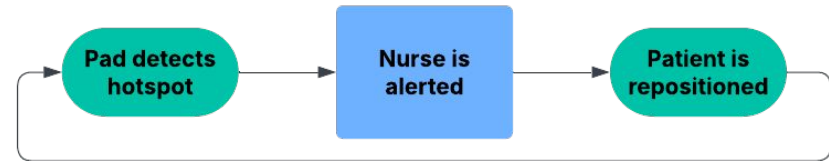
- ⦿ Add historic data logging to show how long high pressure persists.

Clinical Testing:

- ⦿ Test out pressure pad in a Cedars-Sinai surgical suite.

Big Vision:

- ⦿ Automated repositioning alerts for nurses → reduce ulcer incidence.



Conclusion

- ✓ **Built a working real-time pressure-sensing pad** with live heatmap visualization.
- ✓ **Hardware and software ready for clinical testing;** PCB arriving today.
- ✓ **Potential to reduce ulcer incidence** by providing actionable repositioning data for ICU and surgical patients.





Questions?

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