SUGAWAVE

WEARABLE GLUCOSE-MONITORING DEVICE

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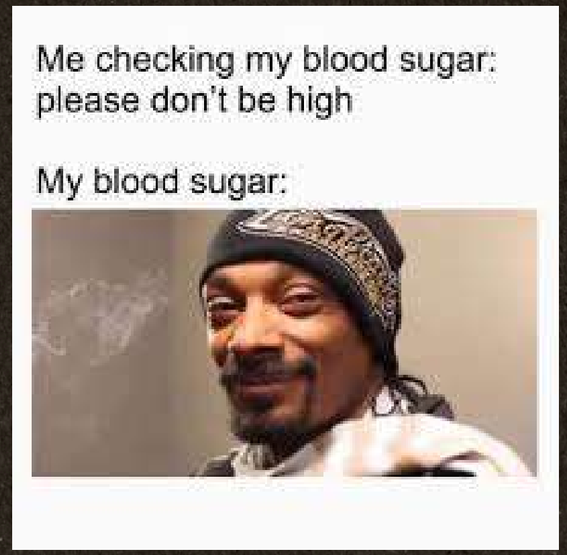
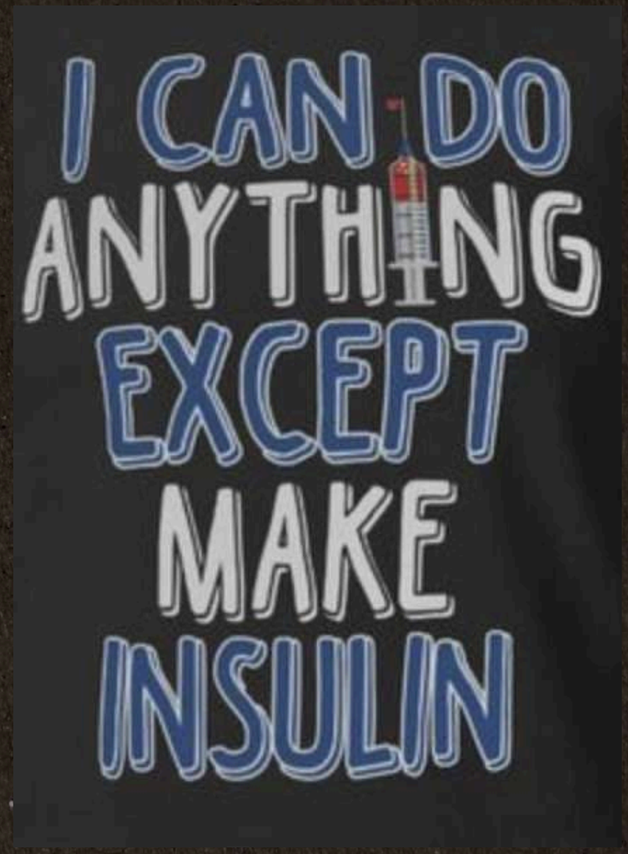
PROJECT CONCEPT OVERVIEW

- A “NON-INVASIVE” GLUCOSE MONITORING WEARABLE.
- TRACKS GLUCOSE, HEART RATE, AND BLOOD OXIGEN.
- COMPACT DESIGN (CUFF OR BRACELET).



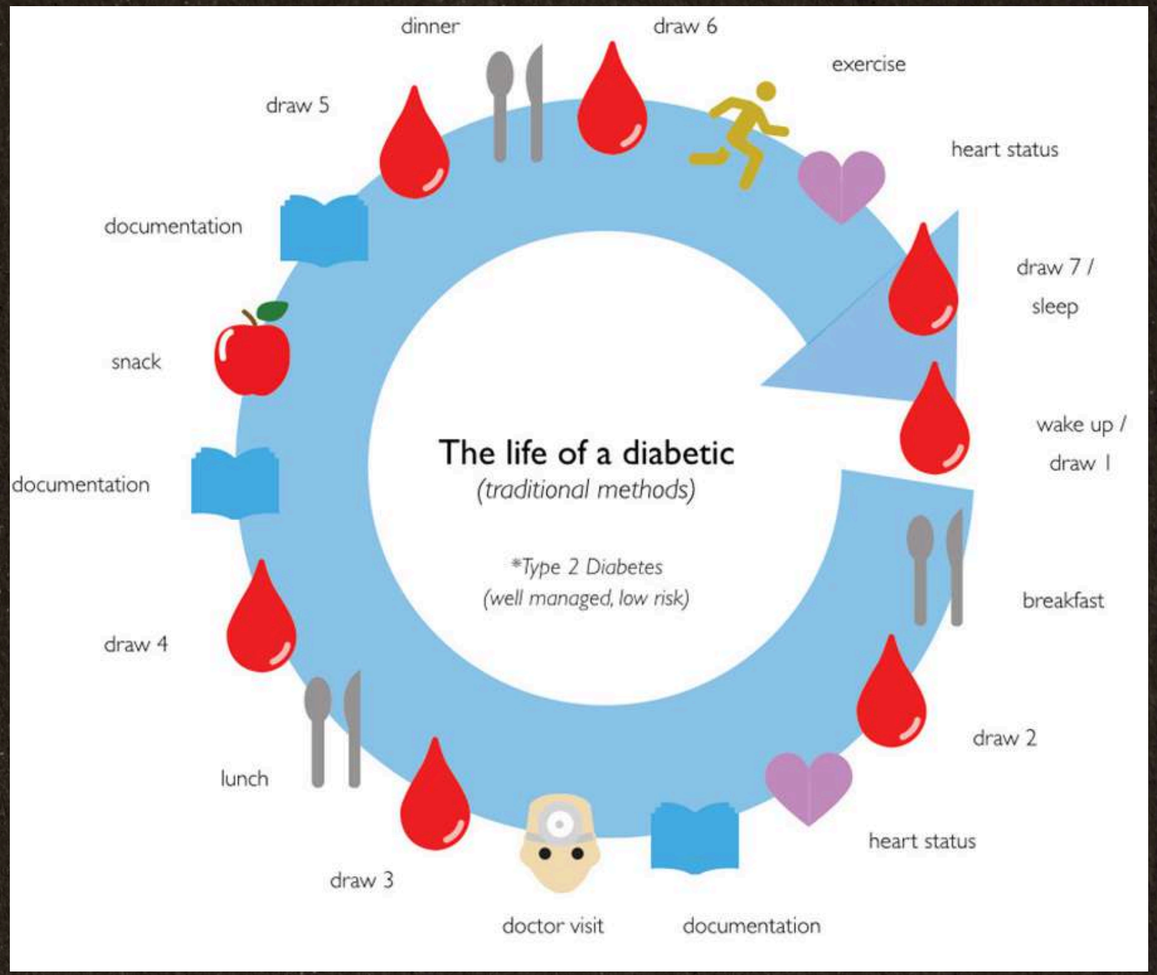
LIVING WITH DIABETES - MY STORY

EVERY DAY, MILLIONS OF PEOPLE WITH DIABETES FACE A SIMPLE YET FRUSTRATING REALITY: CONSTANT GLUCOSE MONITORING. I KNOW THIS STRUGGLE PERSONALLY. THE PRICK OF A LANCET, THE TINY DROP OF BLOOD, THE REPEATED TESTS—IT'S PAINFUL, INCONVENIENT, AND HONESTLY, SOMETHING I AVOID AS MUCH AS POSSIBLE.



THE PROBLEM

FOR YEARS, I'VE ONLY CHECKED MY GLUCOSE LEVELS ONCE A MONTH BECAUSE I HATE PRICKING MY FINGER. BUT THAT MEANS I'M NOT MANAGING MY HEALTH AS WELL AS I SHOULD. AND I'M NOT ALONE— MANY PEOPLE SKIP MONITORING BECAUSE TRADITIONAL METHODS ARE INTRUSIVE AND UNCOMFORTABLE.

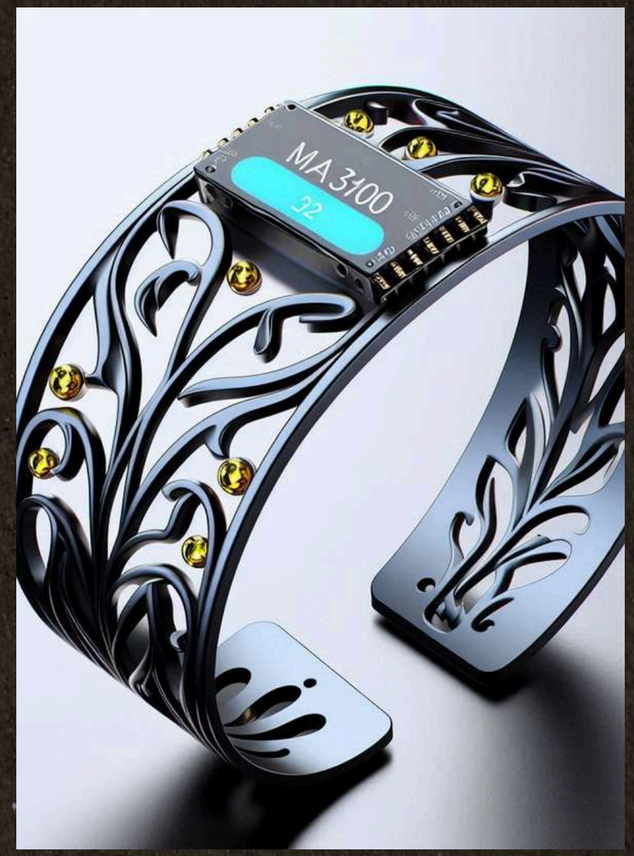


THE VISION

WHAT IF GLUCOSE MONITORING COULD BE SEAMLESS? WHAT IF IT FELT LIKE WEARING A SIMPLE PIECE OF JEWELRY—SOMETHING STYLISH, COMFORTABLE, AND EFFORTLESS? THAT'S WHY I CREATED SUGAWAVE

INTRODUCING SUGAWAVE

SUGAWAVE IS A SLEEK, NON-INVASIVE WEARABLE DESIGNED TO MAKE GLUCOSE MONITORING PAINLESS AND ACCESSIBLE. NO MORE FINGER PRICKS. NO MORE DISRUPTIONS. JUST REAL-TIME INSIGHTS INTO YOUR HEALTH—ON YOUR WRIST OR YOUR FINGER

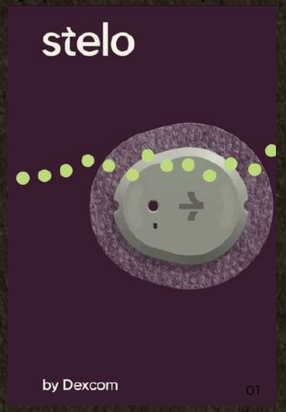


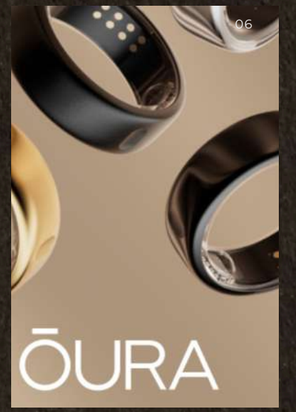
THE IMPACT

SUGAWAVE ISN'T JUST A DEVICE; IT'S A STEP TOWARD FREEDOM FOR PEOPLE WITH DIABETES. IT'S ABOUT RECLAIMING CONTROL OVER OUR HEALTH WITHOUT THE DAILY PAIN. WITH THIS WEARABLE, GLUCOSE TRACKING BECOMES AS EASY AS CHECKING THE TIME

REFERENCE PROJECTS & INNOVATIONS

1. DEXCOM STELO CGM: COMPACT, MINIMAL INVASIVE GLUCOSE MONITOR.
2. FREESTYLE LIBRE 3: NFC-BASED REAL-TIME GLUCOSE TRACKING.
3. KNOW LABS: NON-INVASIVE OPTICAL GLUCOSE SENSING.
4. SAMSUNG GALAXY RING: COMPACT WEARABLE BIOMETRICS TRACKER.
5. LUMEN: PORTABLE CO2-BASED METABOLIC HEALTH TRACKER.
6. OURA RING: SMART JEWELRY FOR HEALTH MONITORING



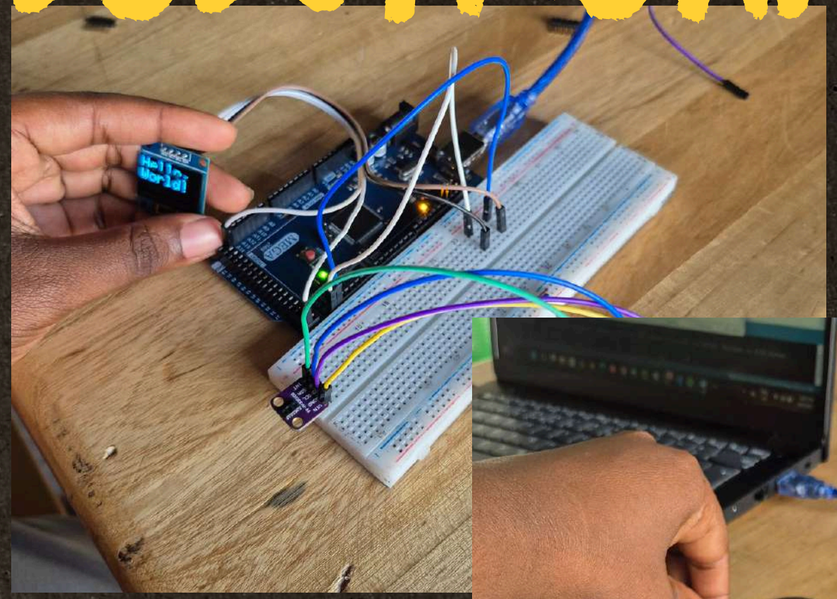


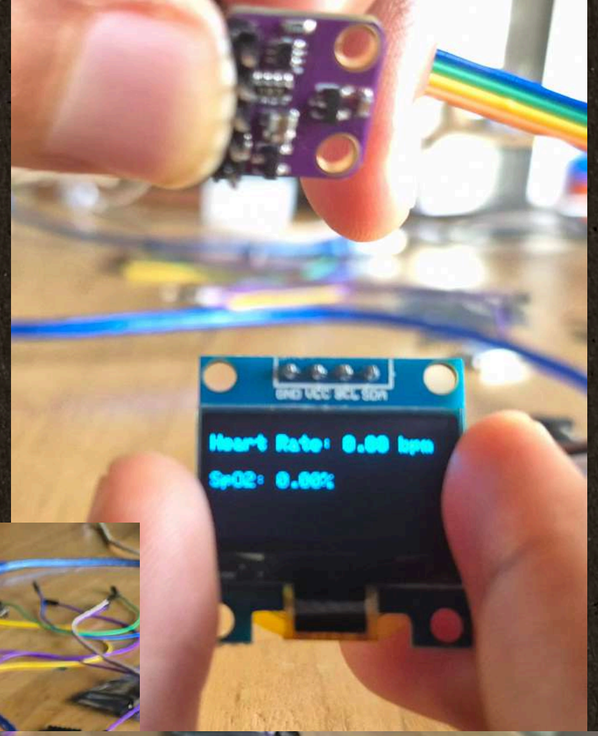
TECHNICAL REASEARCH

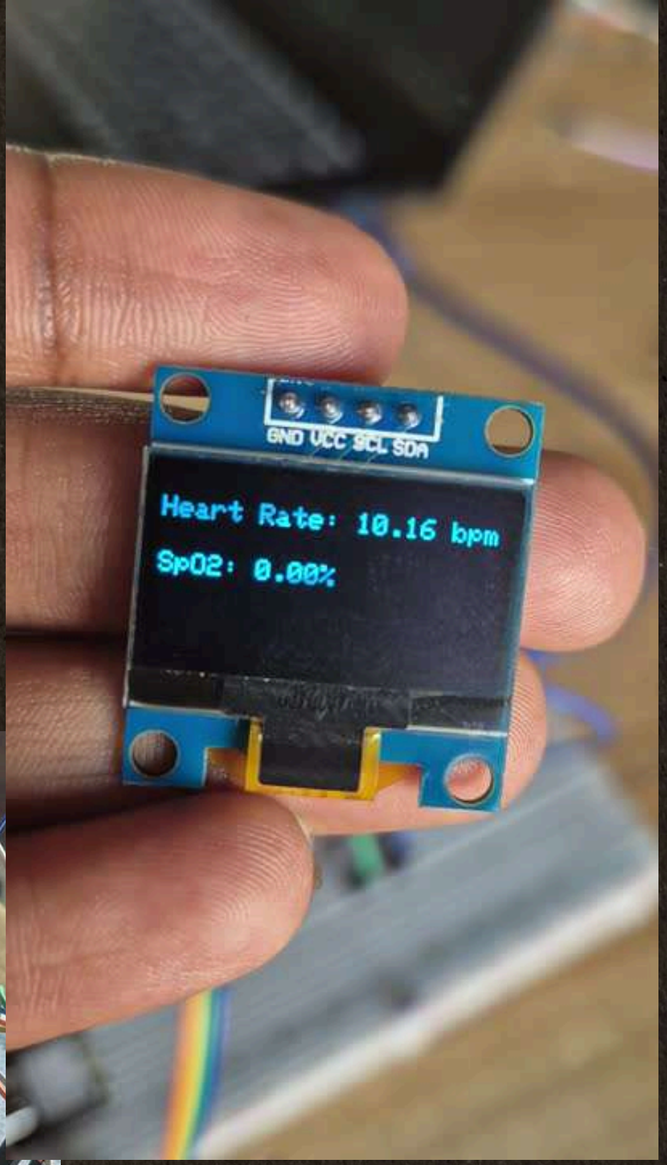
- INITIAL PROTOTYPE INTEGRATES SENSORS FOR GLUCOSE, HEART RATE, BLOOD OXIGEN
- USE **XIAO ESP32-C3** FOR DATA COLLECTION
- SENSORS CONSIDERED; OPTICAL SENSOR(PPC,NIR). BIOIMPENDACE-BASED SENSORS, SWEAT-BASED SENSORS
- REAL-TIME TRACKING
- FOCUS ON ERGONOMIC, USER-FRIENDLY WEARABLE DESIGN.
- MATERIALS & FORM FACTOR : TINY, DISCREET DESIGN, INTERGRATION OF FLEXIBLE ELEMENTS

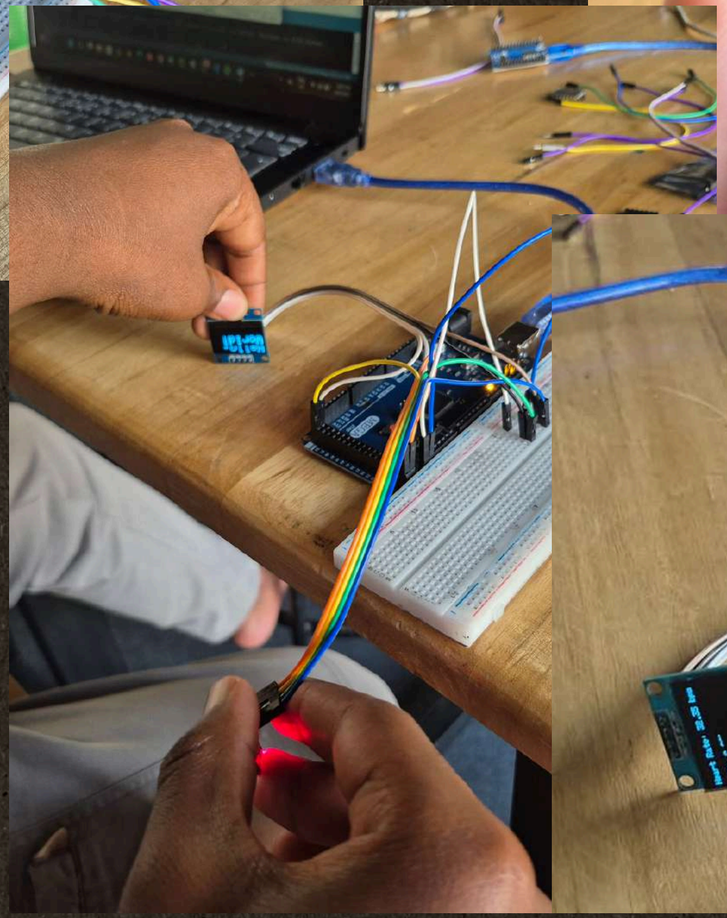
AI GENERATED IDEA

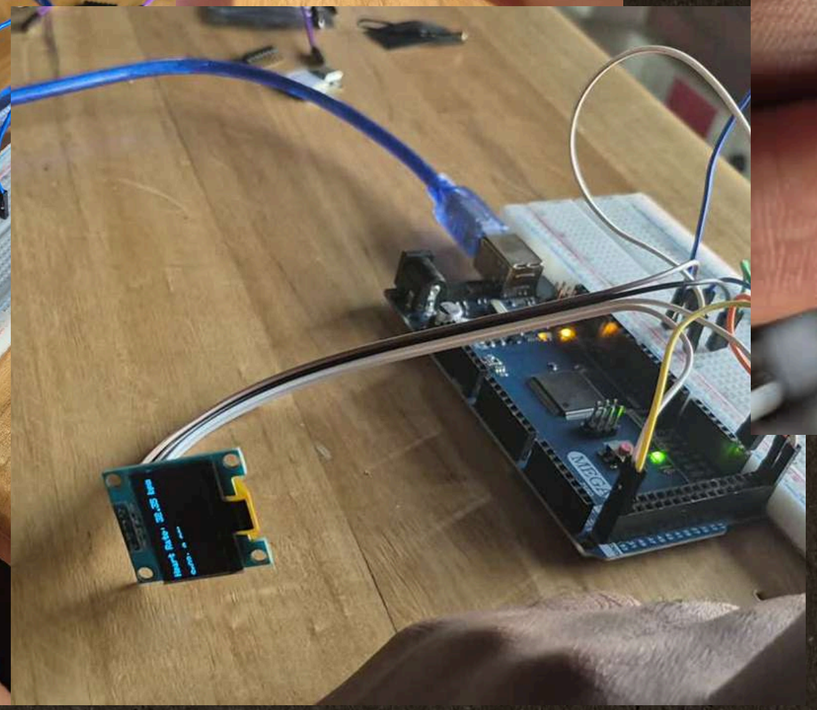
ELECTRONICS



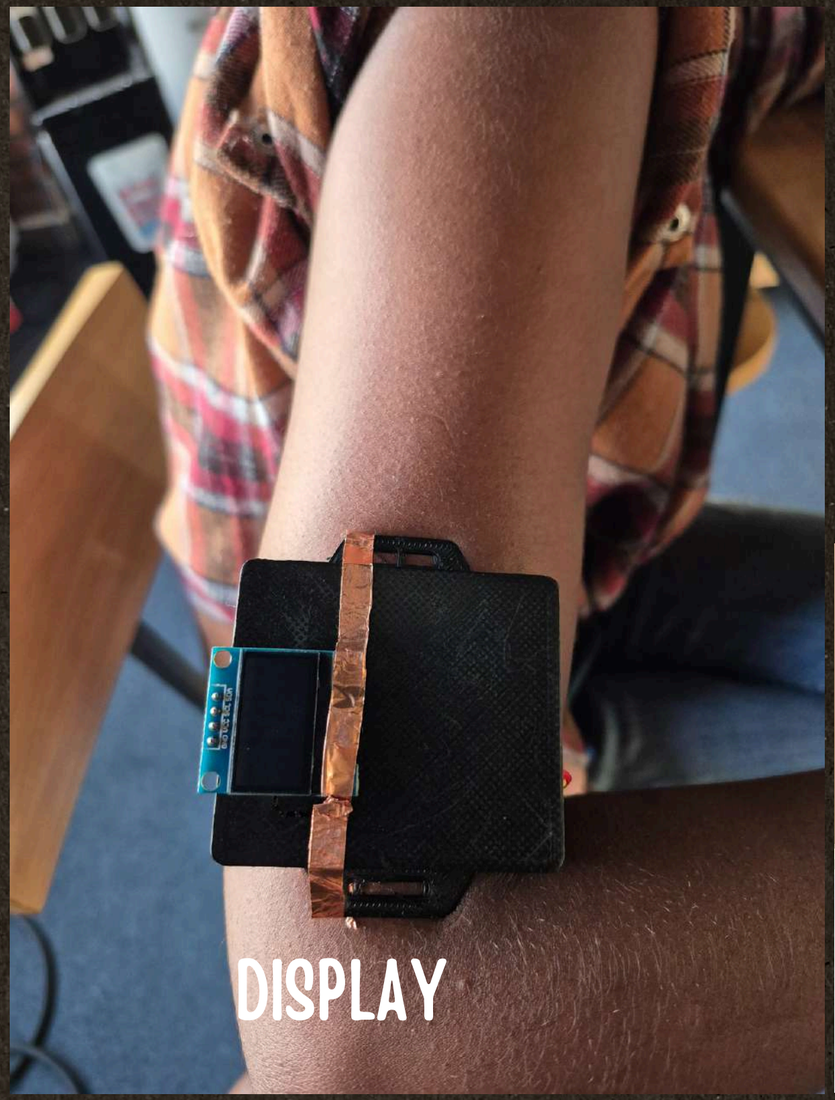








PROTO 1



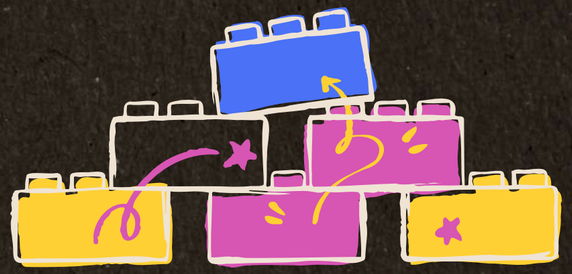
DISPLAY

INTEGRATION ISSUES: STRUGGLED WITH INTEGRATING THE MAX30100 SENSOR ACCURATE MONITORING. THE PLACEMENT AND CONNECTIVITY NEEDED CAREFUL CALIBRATION TO ENSURE PROPER READINGS.

OLED DISPLAY SETUP: ENCOUNTERED DIFFICULTIES GETTING THE 0.96″ OLED DISPLAY TO PROPERLY DISPLAY REAL-TIME DATA FROM THE MICROCONTROLLER. SOME WIRING AND CODING ISSUES CAUSED INCONSISTENT RESULTS.

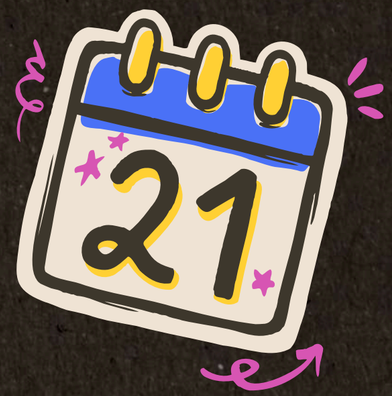
SENSOR

NEXT STEPS



- FINAL PROTOTYPING: DEVELOP FINAL PROTOTYPE AND INTEGRATE A SENSOR THAT WILL ACTAULLY READ THE GLUCOSE
- MINITURISE DESIGN: MAKE THE WEARABLE ERGONOMIC, LIGHTWEIGHT, AND COMFORTABLE.

PROJECT PROCESS & TIMELINE



1

PHASE 1 (JAN)

- Research
- Concept development
- CGM study
- Sketch Ideas
- Learn electronics

2

PHASE 2 (FEB)

- Make circuits
- Prototype 1
- 3D print proto
- Mid term
- Prototype 2

3

PHASE 3 (MARCH)

- Final prototype
- 3D print final
- Assemble
- Create story
- Presentation

THANK YOU

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http://class.textile-academy.org/2025/magali-uwimana/assignments/week13/

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