

ERROR

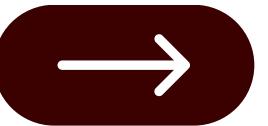
X



ERROR: Sensor Cannot Read

Ignore

Fix



MelanoMetrics

● EQUITABLE OPTICAL SENSING FOR ALL SKIN TONES

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PITCH DECK PRESENTATION

01 What We Believe

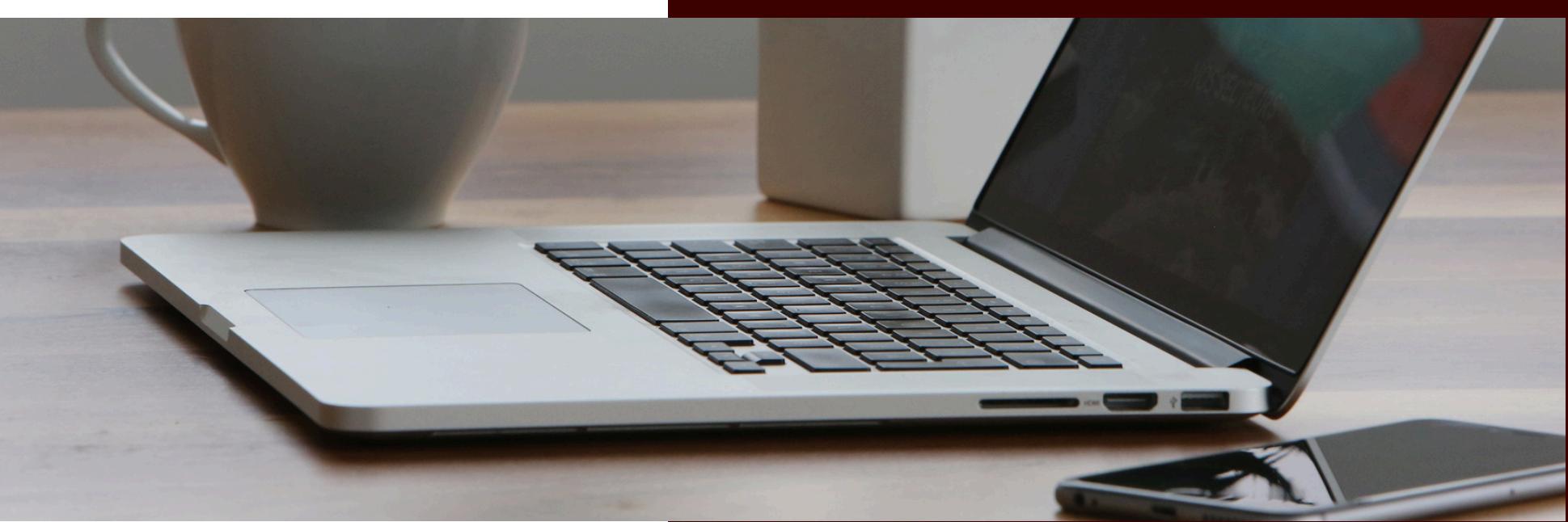
02 Problems & Impact

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WHAT WE BELIEVE

ABOUT OUR VISION AND MISSION

VISION



Our vision is to create a world where every individual receives accurate, accessible, and equitable health monitoring, no matter their skin tone. We envision technology that recognizes and respects human diversity, setting a new global standard for fairness in healthcare.

MISSION

Our mission is to develop groundbreaking sensing technologies that eliminate bias in medical and wearable devices, ensuring precision and trust for everyone. Through innovation, validation, and advocacy, we aim to make inclusive accessible healthcare the norm, not the exception.

PROBLEM & IMPACT

INVISIBLE BIAS, VISIBLE HARM

01 The Gap

Medical and consumer devices that rely on light, like pulse oximeters and wearables, often perform worse on darker skin tones. Today, there is no widely adopted, standardized method to correct for melanin's optical effects.

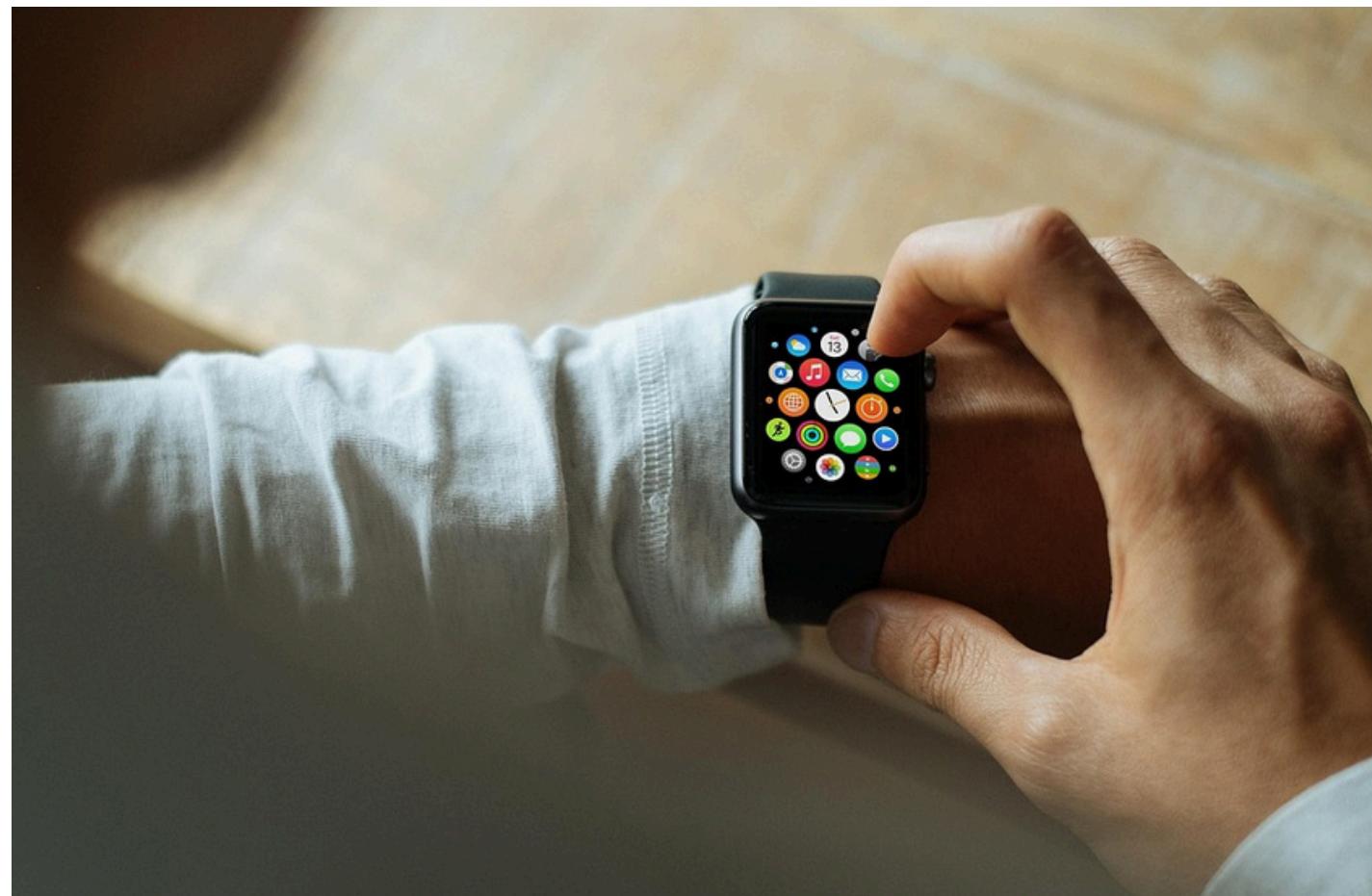
02 The Consequence

Millions of Black, Brown, and underrepresented individuals are at greater risk of misdiagnosis, device error, and exclusion from reliable health monitoring. For example, pulse oximeters have been shown to overestimate blood oxygen levels up to 3X more often in Black patients.



03 The Opportunity

Solving this bias is more than a technical fix, it unlocks massive market expansion, ensures regulatory compliance, builds consumer trust, and delivers truly inclusive healthcare technologies for a global market.



OUR SOLUTION

REAL-TIME SKIN-TONE CALIBRATION FOR INCLUSIVE ACCURACY



01

Real-Time Melanin Measurement

MelanoMetrics captures spectral reflectance data via standard RGB sensors. Using calibrated models, we compute the Individual Typology Angle (ITA), a continuous variable that correlates directly with melanin content and optical absorption properties.

02

Machine Learning Correction Models

We apply a machine learning correction layer to standard photoplethysmography (PPG) signals, adjusting oxygen saturation (SpO_2) readings by learning the nonlinear optical effects of melanin across varying wavelengths.

03

Easy Integration with Devices

Our lightweight, modular software solution operates on-device or in firmware, allowing real-time calibration without major hardware redesigns. Compatible across a range of consumer and clinical optical devices.

04

Continuous Monitoring, Adaptive Accuracy

Instead of static one-time calibration, our system updates skin tone baselines dynamically to account for changes over time (e.g., tanning, ambient lighting, environmental factors), ensuring persistent reproducibility and precision.

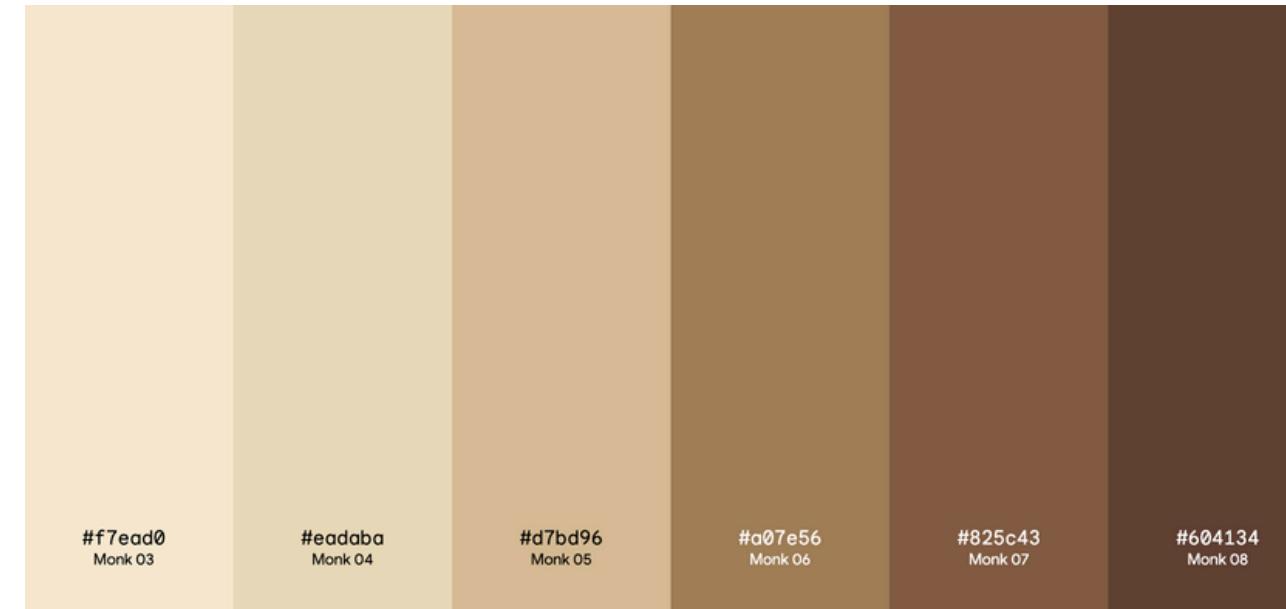
TECHNICAL APPROACH

QUANTITATIVE MELANIN-AWARE SIGNAL CORRECTION



Optical Signal Capture

- Multi-Spectral Sensing
 - Deploy RGB + IR photodiodes to capture reflected light from skin surfaces, enhancing signal robustness beyond traditional pulse oximetry
 - Pre-processing Pipeline:
 - Normalize raw sensor outputs for ambient light variability using dynamic baseline correction
 - Compensate for sensor drift via real-time calibration routines



Skin Tone Quantification (ITA Standard)

- Color Space Transformation:
 - Convert RGB values to CIELAB (device-independent color space) using matrix operations and gamma correction
 - Compute Individual Typology Angle (ITA) to quantify melanin impact
- Skin Tone Classification:
 - ITA ranges map to the Monk Skin Tone (MST) Scale, enabling adaptive calibration



Machine Learning-Driven Calibration

- Bias Correction Model:
 - Train XGBoost/CNN models on curated datasets of SpO2 measurements across diverse skin tones (70-100% saturation range).
 - Inputs: ITA values, raw PPG ratios (red/IR ac/dc components)
 - Outputs: Dynamic adjustment coefficients for SpO2 calculation
- Key Innovation:
 - Multilinear regression (MLR) reduces SpO2 error from 5.44% to 0.82% for dark skin tones (validated per FDA/ISO 80601-2-61:2017)

TECHNICAL APPROACH

QUANTITATIVE MELANIN-AWARE SIGNAL CORRECTION



Compliance & Scalability

- Standards-Aligned:
 - Meets FDA guidance and ISO 80601-2-61:2017 for reflective oximeters
- Manufacturer-Friendly
 - Modular design integrates with existing PPG hardware (e.g. MAX30101, TCS34725 sensors)
 - Eliminates need for costly subgroup clinical trials via pre-modeled ITA calibration curves.

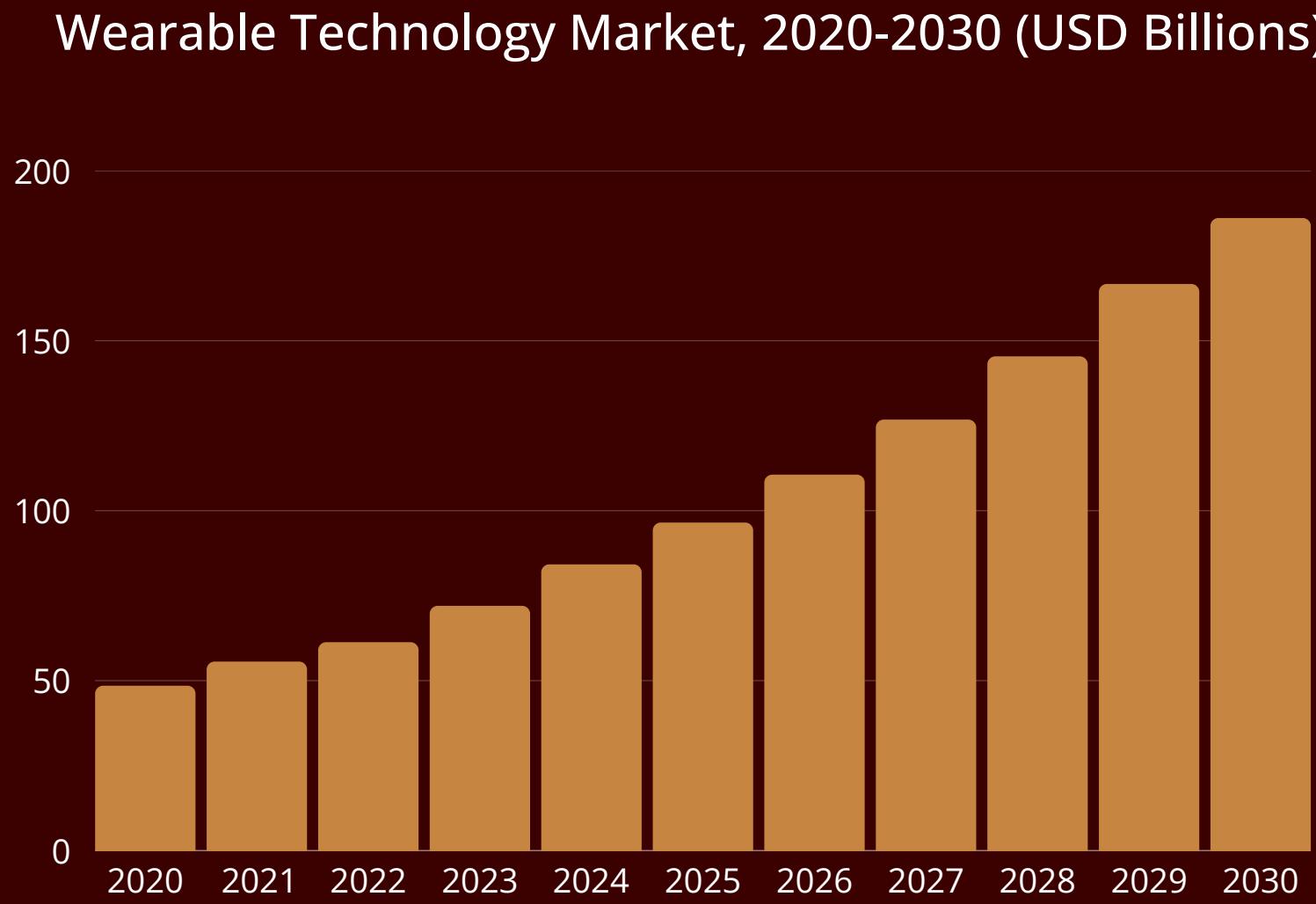


Real-Time Integration

- Edge Computing:
 - Optimized for low-power microcontrollers (e.g., ARM Cortex-M4)
 - Memory footprint <1 MB enables real-time processing (latency <50 ms)
- Closed-Loop Calibration:
 - Continuous feedback from color sensor ensures accuracy during motion or environmental changes.

MARKET POTENTIAL

GLOBAL DEMAND FOR EQUITABLE SOLUTIONS



There is a strong global demand for equitable pulse oximeters as the wearable technology market grows

Global Pulse Oximeter Market

- With a market size of **\$3.3B in 2023**, the market is projected to reach **\$5.3B by 2030**, with growth primarily driven by rising cardio-respiratory illness and home health adoption

U.S. Pulse Oximeter Market

- Within the United States, the market size was **\$973M in 2023**, and is anticipated to reach a national market size of **\$1.47B by 2030**

Wearable Technology Market

- The broader wearable technology market was valued at **\$61.3B in 2022**, and is expected to reach **\$186.1B by 2030** with a **CAGR of 14.6%** given the increased demand for smartwatches & biometric sensors, and more health-conscious consumers

COMPETITION & DIFFERENTIATION

FEATURE/COMPANY	MEDICAL CO.	APPLE/SAMSUNG	OTHER WEARABLES	MELANOMETRICS
BIAS ACKNOWLEDGED	YES	YES, LIMITED PAPERS	NOT ADDRESSED	CORE TO MISSION
REAL-TIME SKIN TONE CORRECTION	NO	NO	NO	YES
CONTINUOUS SKIN TONE MONITORING	NO	NO	NO	WITH ITA + RGB SENSING
WORKS ACROSS DEVICES	PROPRIETARY	ECOSYSTEM- LOCKED	PROPRIETARY	ANY LIGHT-BASED PLATFORM

MILESTONES & USE OF FUNDS

ALLOCATING CAPITAL TO BUILD,
VALIDATE, AND GROW



\$600 - \$1,200

\$1,000 - \$5,000

\$20,000 - \$150,000

\$100,000 - \$500,000

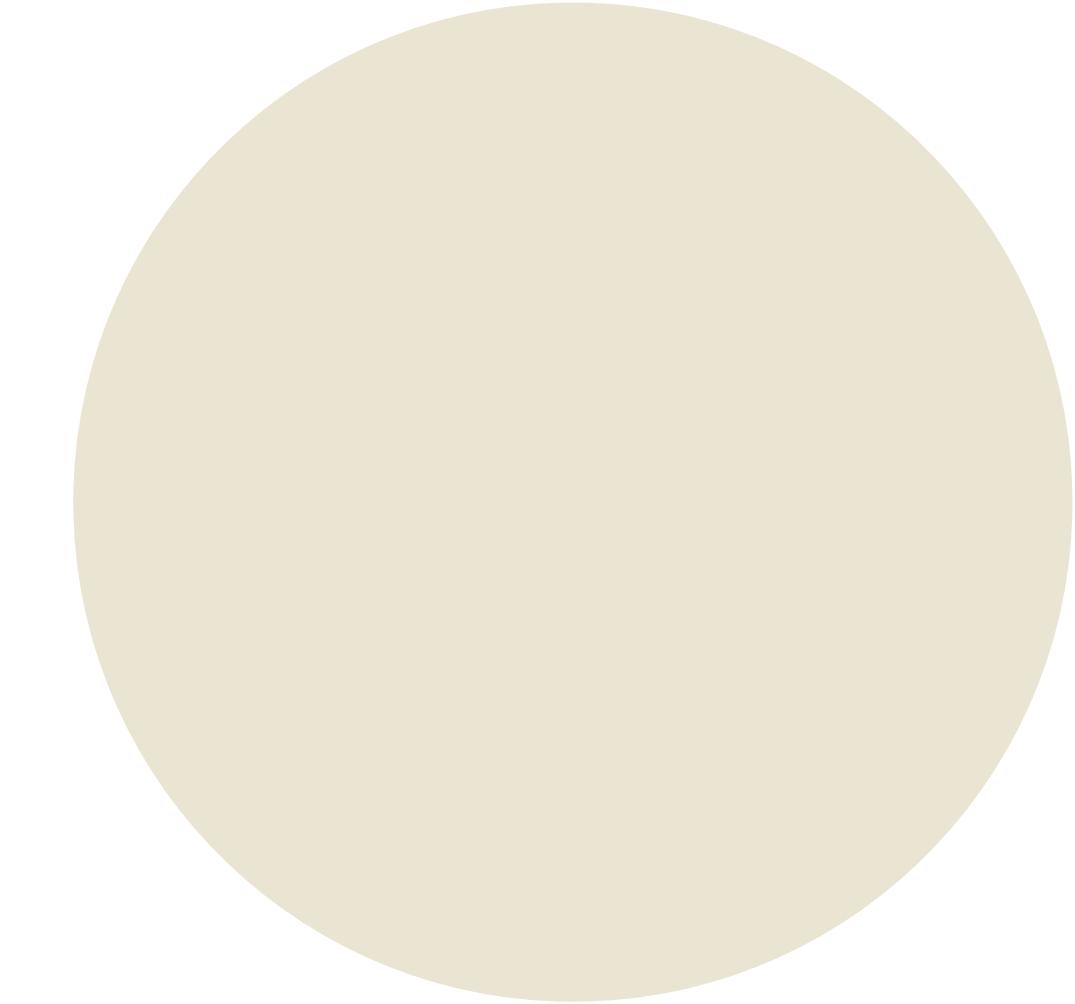
Prototype a simple **ML-integrated pulse oximeter** using a breadboard setup to validate algorithm performance.

Develop a **minimum viable product** (MVP) that effectively demonstrates the product's accuracy, adaptability, and core functionality

Extend the technique to wearables, working alongside brands to provide solutions across **various devices**

Expand the company into **optical sensing** by creating non-invasive, affordable devices that can be used to monitor health easily

THANK YOU



● SEEKING PARTNERS TO BUILD EQUITABLE TECHNOLOGIES

April 2025