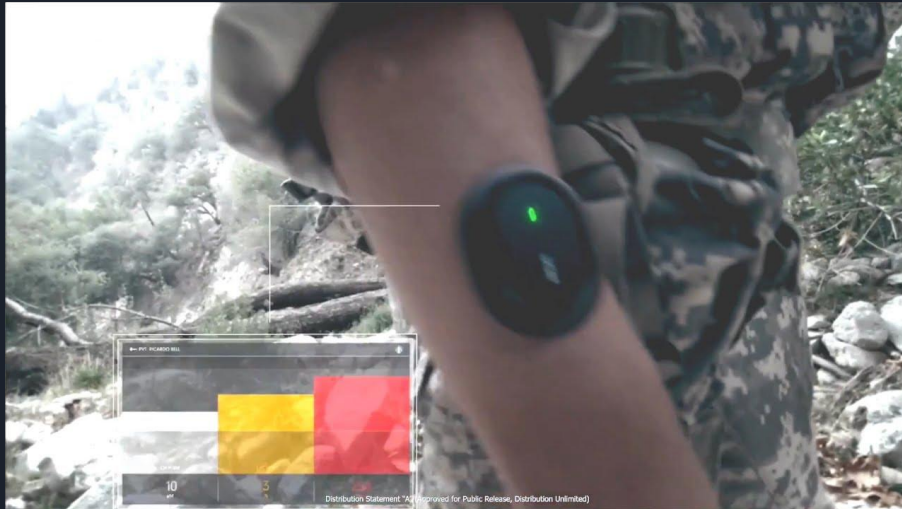
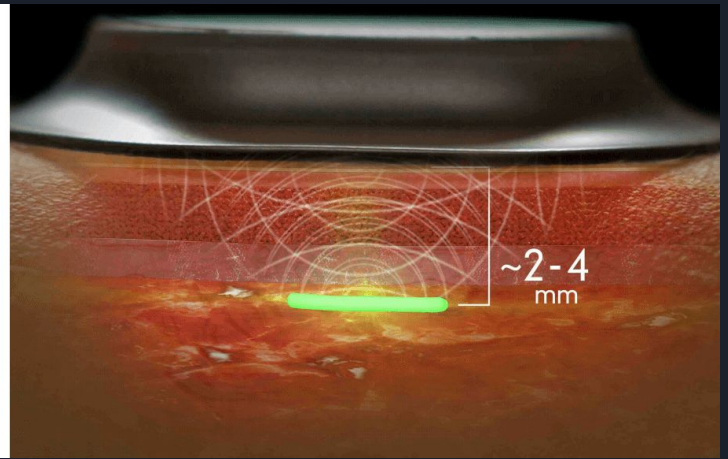
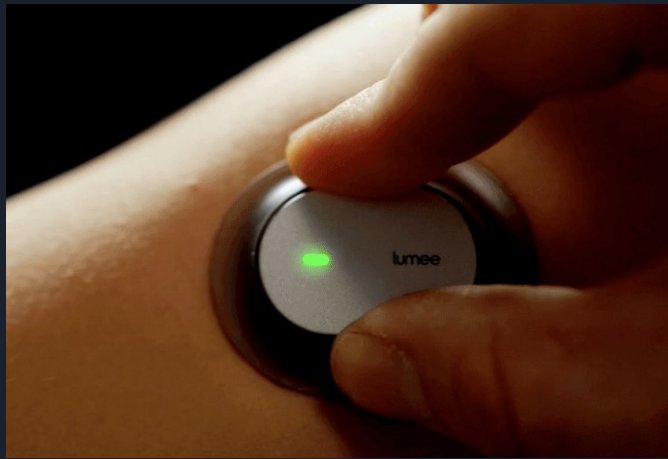


# Profusa's Tissue Integrated Biosensors

Presenter: Kyle Reed





## Who is Profusa?

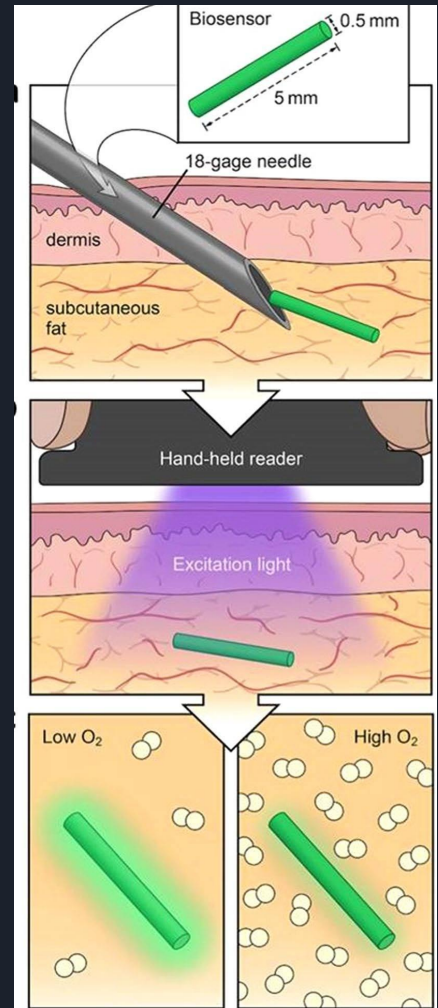
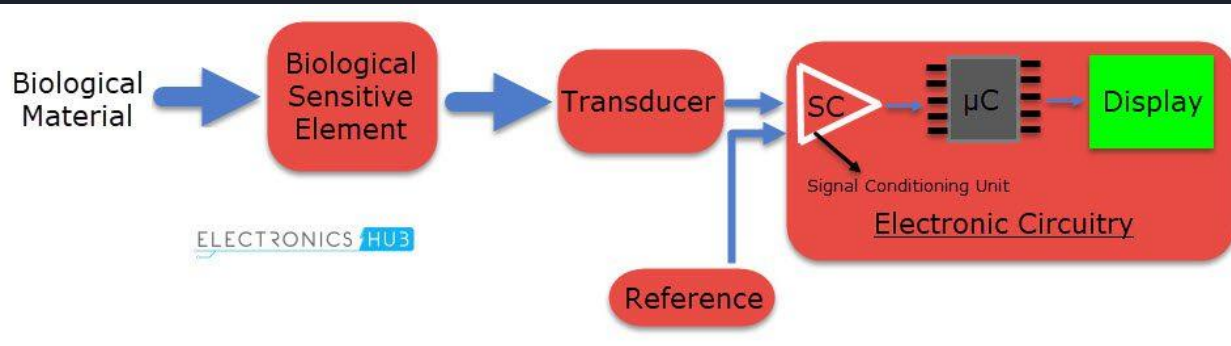
Profusa is a biotechnology company focused on the goal of creating new solutions for health monitoring. The company is researching biosensors that are implantable on the body to continuously monitor and track health data.



# Concept and Idea

Profusa's biosensor technology (Lumee) is centered around the concept of continuous monitoring of the body's vital signs through a minimally invasive device that is placed on the skin. The biosensor is designed to detect specific biomarkers in the body and then transmit the data received remotely for live and real-time analysis.

The core idea behind the biosensor is Profusa's mission to provide healthcare providers and their patients with data that can be used to inform them of needed treatments or health decisions to come, thus improving patient health outcomes and quality of life.



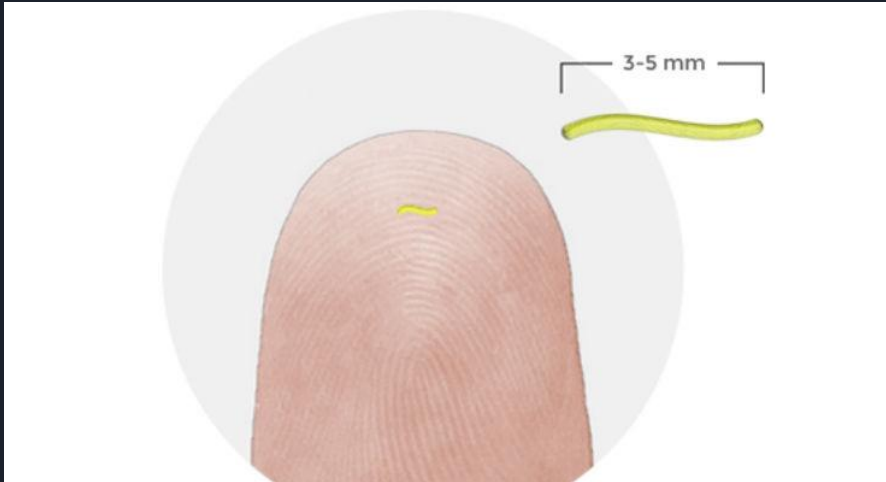


# Main Features

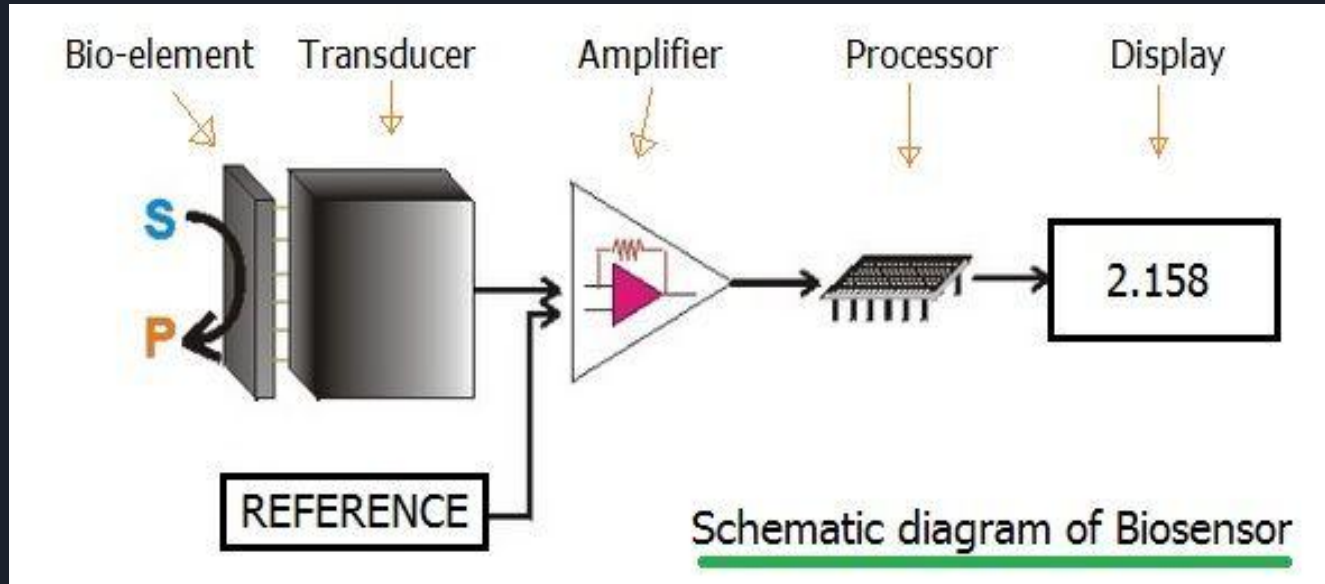
1. **Minimally Invasive Design:**  
Injectable and require only a single dose. This eliminates the need for frequent blood draws and other invasive procedures.
2. **Real-Time Data Collection and Transmission:**  
Collects and transmits data with an external device on the body via wireless communication. This grants immediate access to health data by both a patient and their provider.
3. **Bio-Compatibility:**  
Made from safe materials tested and studied for long-term use on the human body. This reduces risk of adverse reactions in the body.
4. **Long-Term Reliability:**  
Functions efficiently for up to seven years. This eliminates the need for frequent device replacements.
5. **High Accuracy:**  
Detects low concentrations of target biomarkers (ie. oxygen, glucose).
6. **Digital Health Platform:**  
Collected data can be sent to a digital health platform that your hospital, provider, or clinic uses for better health monitoring and management

## Fun Fact:

Profusa's injectable biosensor is only 3-5 millimeters in length and 500 microns in diameter



# Block Diagram of a Biosensor







## Block Diagram of a Biosensor cont.

1. **Bio-Element:** Biomarkers in the blood or other bodily fluids such as glucose, oxygen, and others. Typically need monitoring for health reasons.
2. **Transducer:** Tissue like hydrogel substances injected under skin into fat. Can read health data from the body and then send biochemical signals as electrical to an external device.
3. **Processor:** Collects and processes the electrical signal from the transducer.
4. **Amplifier:** Allows transmission of data to external devices using bluetooth or wireless signal.
5. **Display:** Allows patients or providers to view data on external devices.



# Hardware Implementation

1. **Sensor Chip:** Contains chip with microelectrodes capable of biorecognition of elements specifically binded to targeted biomarkers (ie. glucose, oxygen).
2. **Microcontroller Unit (MCU):** Manages the biosensor operations including processing signals and conveying communication procedures.
3. **Power Management Circuitry:** Ensures efficient power supply and battery life.
4. **Wireless Module (Bluetooth):** Enables user to communicate with external device (ie. device on skin or healthcare).
5. **Enclosure Material:** Made from biocompatible materials that protect components of device but also allowing bodily fluids such as sweat to pass through easily.
6. **Calibration Mechanism:** Built in calibration features designed to read user input or adjust adequate health reading standards.
7. **Data Storage Component:** Memory for storing data locally before transmitting to an external device.
8. **User Interface Component:** LED indicators for users on device.



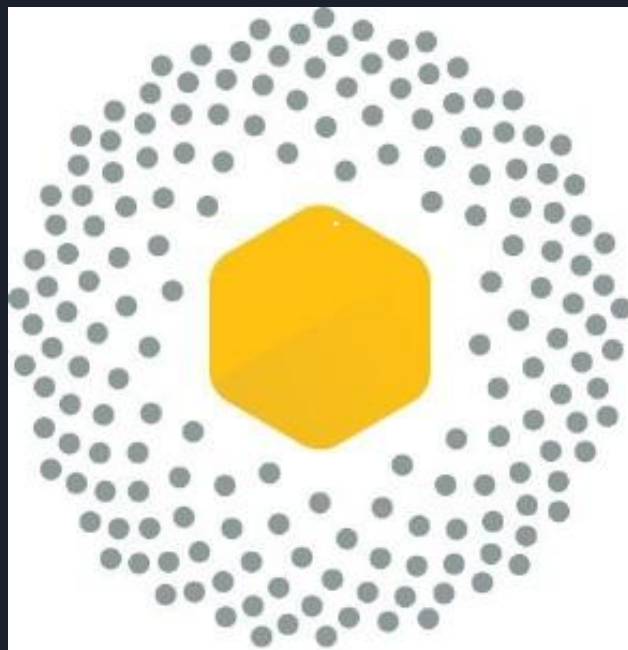
# Thanks!

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COS-231-300

Professor Wu.



profusa



# Glossary of Terms (Merriam-Webster)

**Biotechnology-** “The manipulation (as through genetic engineering) of living organisms or their components to produce useful usually commercial products (such as pest resistant crops, new bacterial strains, or novel pharmaceuticals)”.

**Biomarker-** “a distinctive biological or biologically derived indicator (such as a metabolite) of a process, event, or condition (such as aging, disease, or oil formation)”.

**Biocompatibility-** “compatibility with living tissue or a living system by not being toxic, injurious, or physiologically reactive and not causing immunological rejection”.

**Hydrogel-** “a gel composed usually of one or more polymers suspended in water”.

**Biorecognition-** “the action of recognizing in the body: the state of being recognized in the body”.



# References/Source Materials

## URL's:

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Nature Biotechnology. (2024, November 4). Nature. <https://www.nature.com/nbt/>

IEEE Xplore. (n.d.-b). <https://ieeexplore.ieee.org/>

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Sawhney, G. S. (2007). Fundamentals of Biomedical Engineering. New Delhi: New Age International