

# Non-Invasive Glucometer

## **Team Members:**

Disip Chaturvedi  
Devansh Chourasiya  
Piyush Kabra  
Aman Mehta

## **Introduction:**

Non-invasive glucose refers to the measurement of blood glucose levels (required by people with diabetes to prevent both chronic and acute complications from the disease) without drawing blood, puncturing the skin, or causing pain or trauma. The search for a successful technique began about 1975 and has continued to the present without a clinically or commercially viable product. However, none of the product is FDA approved.

Conventional glucometers use test strips containing glucose oxidase, an enzyme that reacts to glucose in the blood droplet, and an interface to an electrode inside the meter. When the strip is inserted into the meter, the flux of the glucose reaction generates an electrical signal. The glucometer is calibrated so the number appearing in its digital readout corresponds to the strength of the electrical current: The more glucose in the sample, the higher the number.

## **PROBLEM: It's 21st century and yet we have to extract blood to measure Glucose! Why?**

Now we aim at constructing a Glucometer that measures Glucose by Spectroscopy. It's a method in which Near Infrared transmittance spectroscopy is used across the earlobe to measure glucose. Ear lobe is chosen because of the absence of bone in it. The amount of near infrared light passing through the ear lobe depends on :

1. The amount of blood in that region.
2. The thickness of ear lobe.

The light is transmitted through one side of the earlobe using LED as light sources and received on the other. This attenuated signal is then sampled and processed. The processed signal and data is displayed on a LCD display.

## **What we expect to learn?**

1. Working of a spectrometer.
2. Working of Pulse Oximeter.
3. Basic Electronics.
4. Teamwork and Financial Management

**TIMELINE:** We aim at completing the project in 6 Weeks.

Week 1: Study basic circuits, diodes and sensors. Consult seniors and gather raw materials.

Week 2: Start working on NIR Spectrometer and Pulse Oximeter.

Week 3: Complete Spectrometer and develop the Pulse Oximeter to a good level.

Week 4: Complete Pulse Oximeter.

Week 5: Start working on processors and data processing.

Week 6: Complete processor and assemble. Make it presentable. Ready to test. :)

**Budget:** All the sensors, diodes, other circuit elements and some miscellaneous are expected to fall within a price of INR 7000.

**References:**

<http://www.edn.com/design/systems-design/4422840/Non-invasive-blood-glucose-monitoring-using-near-infrared-spectroscopy>  
[https://en.wikipedia.org/wiki/Noninvasive\\_glucose\\_monitor](https://en.wikipedia.org/wiki/Noninvasive_glucose_monitor)