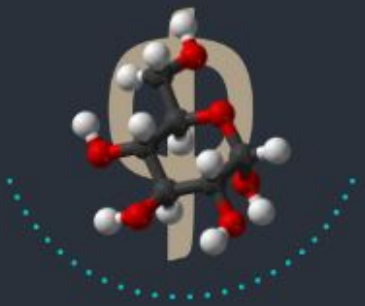
GLUCO-PHY



Physiological sensor

UNIVERSIDAD YACHAY TECH

Measure Blood Glucose Levels using GSR Signal , PPG signal and Body Temperature- Non invasive method

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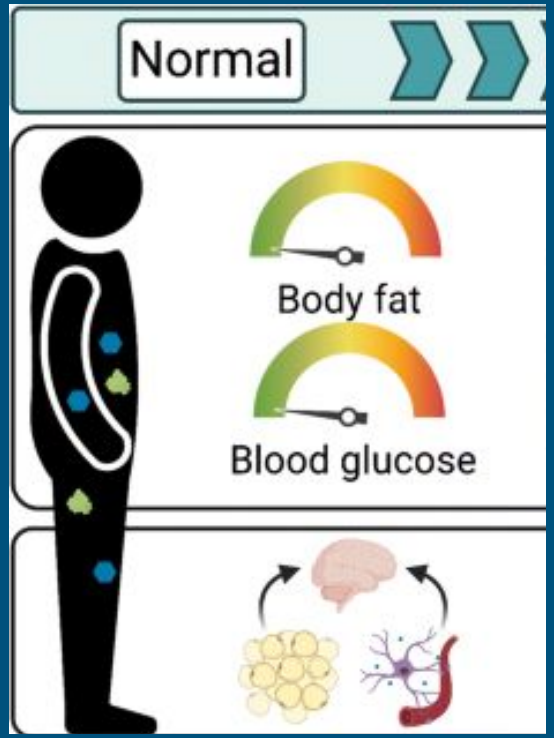
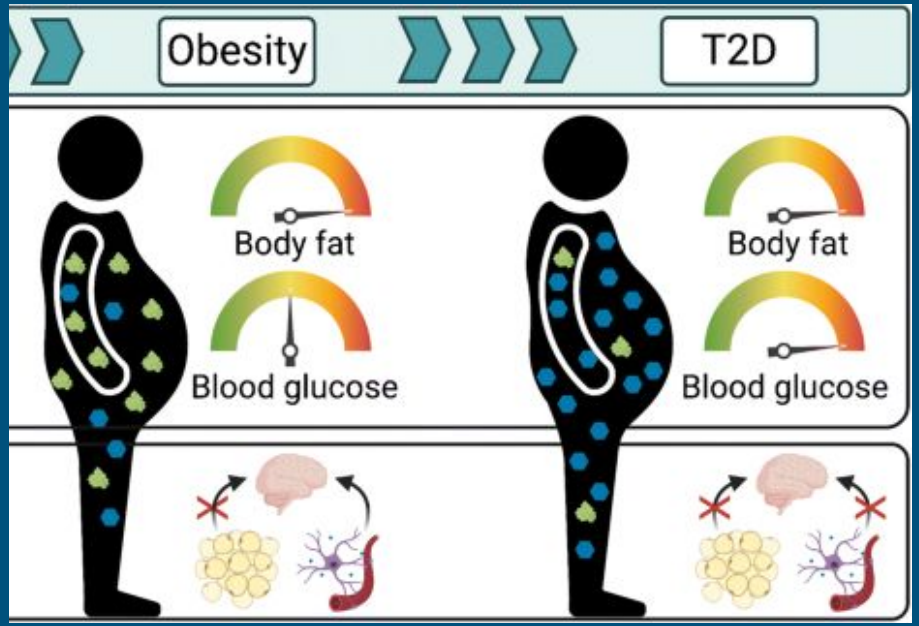
Introduction

Blood Glucose Measurements

- ➔ In healthy patients, blood glucose levels are automatically monitored and **controlled by the body.**
- ➔ After eating, the body releases enough insulin to **keep the plasma glucose within a normal range** and usually returns to pre-meal levels within two to three hours.





➔ In people with impaired glucose tolerance or diabetes, **the body has little or no automatic control of blood glucose levels.** After eating, they often experience extended periods of elevated blood glucose levels.

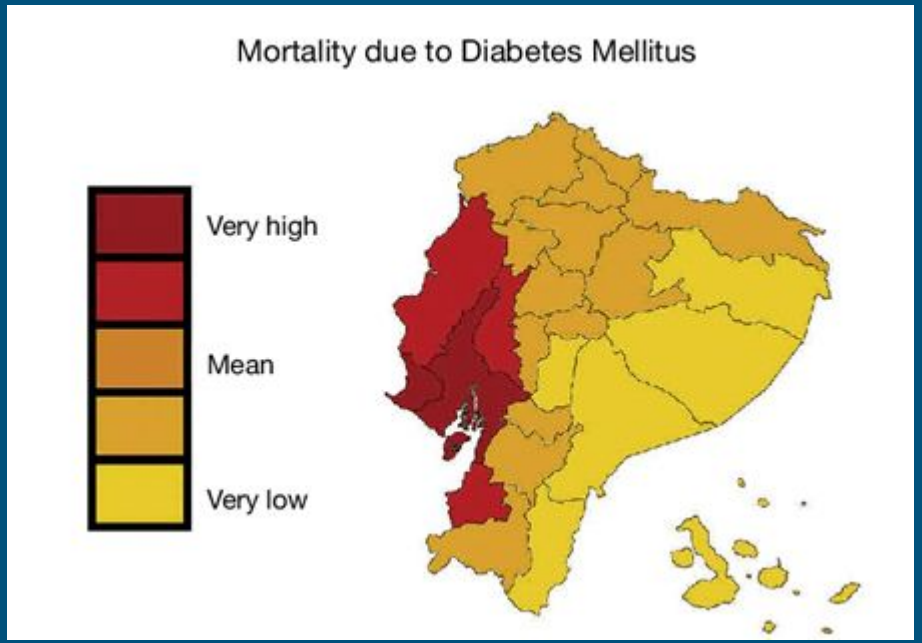
Self-monitoring of blood glucose (SMBG)

- Adjust to therapy and assess the responses to therapy.
- Assess the impact of an action on blood glucose levels and consequently undertake prompt interventions designed to counter the high or low blood glucose concentration.

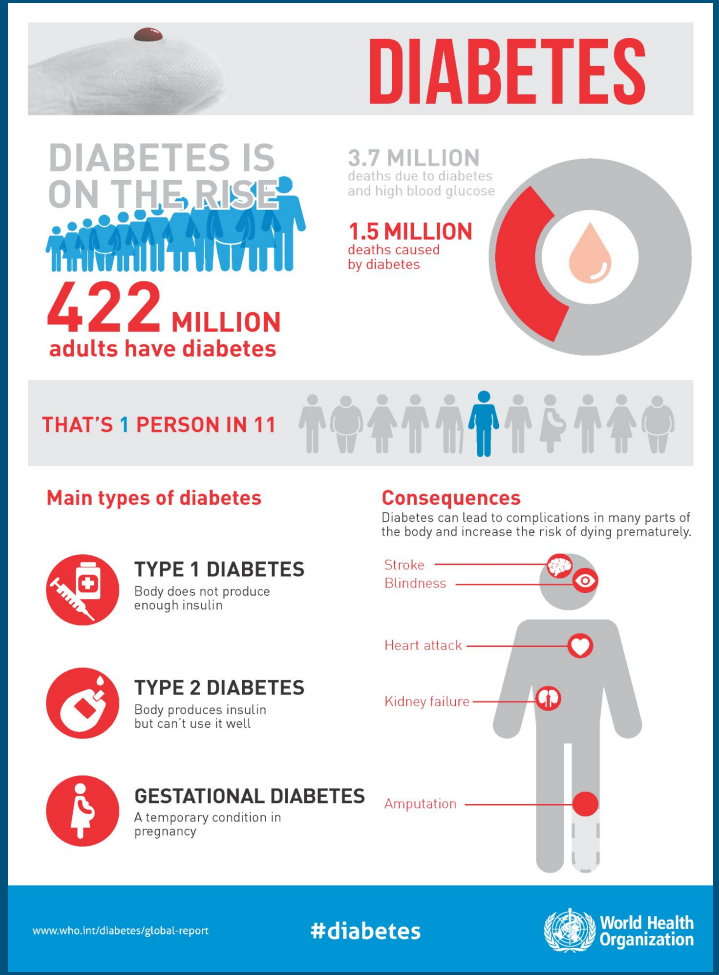
Problem Statement

In Ecuador, 414,414 people are affected by T2DM, however only 100,000 are receiving treatment.

Moreover, diabetes is the leading cause of death in Ecuador and according to INEC.

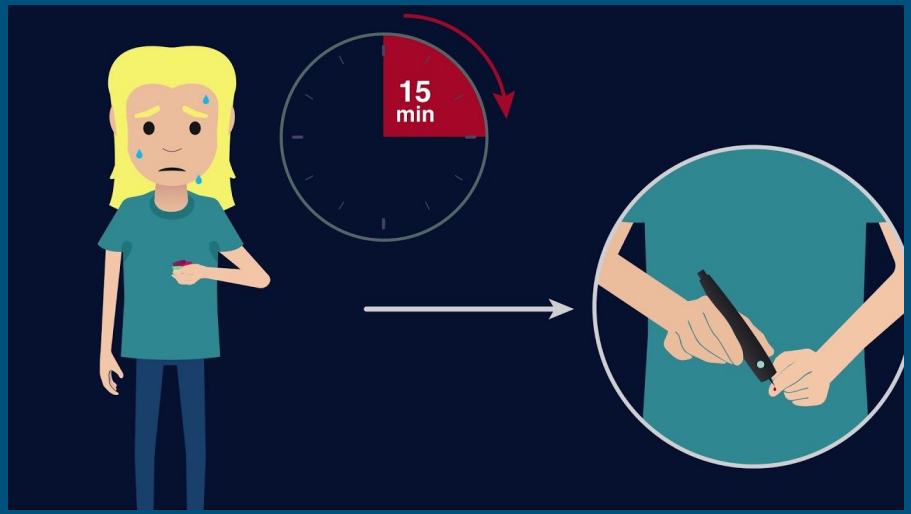


Early identification and intervention have been identified as critical components of programs seeking to prevent or delay the onset of type 2 diabetes.



Methods to Determine Blood Glucose levels

Invasive devices may lead to bacterial infection or nerve damage to the patient.



Goals, Hypothesis and Research questions

Research Questions

- ➔ Can blood glucose levels be measured using non invasive methods?
- ➔ What signals should a sensor measure to determine blood glucose levels?
- ➔ Can a physiological sensor (Skin temperature, GSR, PPG measurements) determine accurately BGL?

Hypothesis

Blood Glucose Levels can be determine by using signals from skin such as:

- Galvanic Skin Response
- Temperature
- Photoplethysmogram Signal

Goals

Develop a physiological sensor that can be used to measure BGL easily and can be used safely by any diabetic patient at home.

Materials and methods

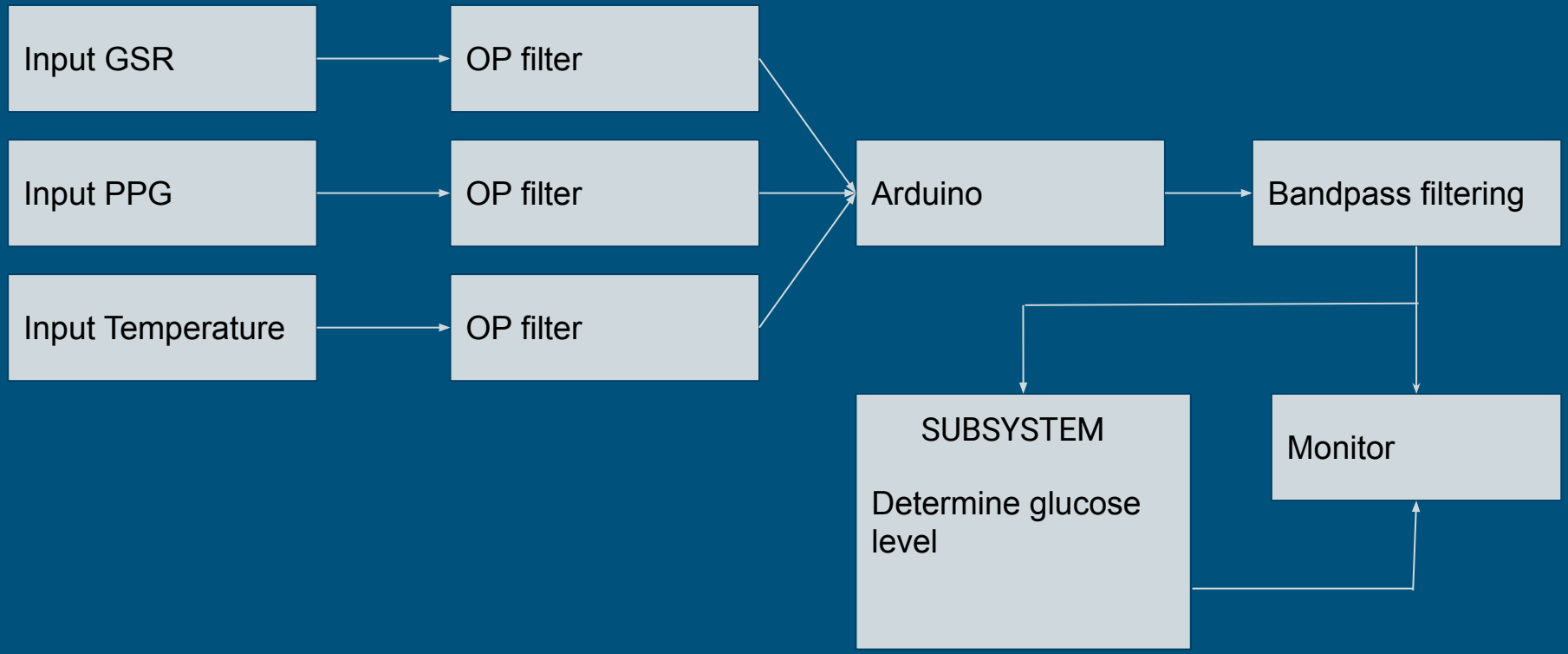
Materials and Methods

Materials :

- Electrodes
- Sensor Ritmo Cardiaco Latidos Corazón Pulso Arduino
- Sensor LM35 (Temperature sensor)
- ICs
- Resistances
- Jumper wires
- Arduino board

Methods:

- Matlab Simulation
- Digital to Voltage conversion
- GSR measurement
- Photoplethysmogram Analysis
- Temperature measurement
- Correlation to BGL


Input GSR
Input PPG
Input Temperature
OP filter
OP filter
OP filter
Arduino
Bandpass filtering
SUBSYSTEM
Determine glucose level
Monitor

Conclusions

- BGLs can be measured by using biosignals non-invasively
- A non-invasive blood glucose monitoring system based on physiological signals builds up a good basis for real-time monitoring of human physiological parameters in the home environment.

Bibliography

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