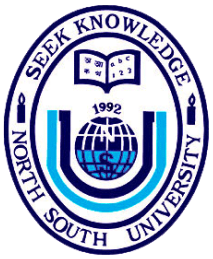
NORTH SOUTH UNIVERSITY



Design of a portable noninvasive Glucometer with clinical accuracy

A DISSERTATION
SUBMITTED TO THE DEPARTMENT OF
ELECTRICAL AND COMPUTER ENGINEERING
OF NORTH SOUTH UNIVERSITY
IN THE PARTIAL FULFILMENT OT THE REQUIREMENTS
FOR THE DEGREE OF
BACHELOR OF SCIENCE IN
COMPUTER SCIENCE AND ENGINEERING

CSE 499B, SPRING 2022
SENIOR DESIGN PROJECT

Letter of transmittal

June, 2022

To
Dr. Rajesh Palit
Professor and Chairman (Acting),
Department of Electrical and Computer Engineering
North South University, Dhaka

Subject: Submission of Capstone Project on "Design of a portable noninvasive Glucometer with clinical accuracy".

Dear Sir,
With due respect, we would like to submit Our **Capstone Project Report** on "Design of a portable noninvasive Glucometer with clinical accuracy" as a part of our BSCSE program. The report deals with a portable noninvasive Glucometer which enables users to check and monitor their blood sugar level. We tried our level best to make the report meaningful and informative.

The Capstone project was very much valuable to us as it helped us to gain experience from practical field. It was a great learning experience for us. We tried to the maximum competence to meet all the dimensions required from this report.

We will be highly obliged if you are kind enough to receive this report and provide your valuable judgment. It would be our immense pleasure if you find this report useful and informative to have an apparent perspective on the issue.

Sincerely Yours,

.....

Kazi Mosaddequr
ID# 1831543042
ECE Department
North South University, Bangladesh

Declaration

It is hereby acknowledged that:

- No illegitimate procedure has been practiced during the preparation of this document.
- This document does not contain any previously published material without proper citation.
- This document represents our own accomplishment while being Undergraduate Students in the North South University.

Sincerely,

Kazi Mosaddequr
ID# 1831543042

Approval

I certify that I have read this dissertation and that, in my opinion, it is fully adequate in scope and quality as a dissertation.

Dr. Tanzilur Rahman
Associate Professor
Department of Electrical and Computer Engineering
North South University
Dhaka, Bangladesh

I certify that I have read this dissertation and that, in my opinion, it is fully adequate in scope and quality as a dissertation.

Dr. Rajesh Palit
Professor & Chair (Acting)
Department of Electrical and Computer Engineering
North South University
Dhaka, Bangladesh

Abstract

We propose a painless Blood-Sugar level detector which is minimalistic hardware that individuals can operate regardless of their skill and knowledge. This device uses a dedicated sensor (OPT101) and light source (infra-red LED light) to collect Photoplethysmography (PPG) data from the fingertip of the subject. This data is cleaned before various features are extracted from it. Principal Component Regression and Partial Least Square Regression model are then applied to this data to find a correlation between PPG and actual Glucose level which is simultaneously collected from the subject through a commercial glucometer. The trained model is then used to test on subjects for predicting actual glucose levels using only PPG collected through the device. The results show the accuracy is on the clinical level. This device will eliminate the expensive cost of strips and needles that need to be purchased with the hardware in the traditional method. The user using this device only needs to buy the hardware, and there is no additional cost after that. Users can get an instant reading from the hardware.