IPRO 308 PROJECT PLAN

Professor: Dr. Emmanuel Opara
Consultants: Mr. Ray DeBoth

Team Members: Elena Davis, Jennifer Miller, Mehjabeen (Maje) Nazim, Sapna Patel, Shital C. Patel, Yagna Pathak, Venkata Ravuri, Kirthi Reddy, Vidya Shivakumar, Ryan Tanner, Aurimes Vinckevicious

Objectives: The objective of this IPRO is to develop a system that will function as an artificial pancreas and will incorporate an insulin delivery system with a non invasive glucose monitor.

Background:

Diabetes mellitus is one of the most common diseases in contemporary society. Treatment for Type 1 diabetes involves daily insulin injections with frequent blood glucose measurements. An artificial pancreas is a mechanical device for insulin delivery and a few are currently available in the market. However, they are highly invasive and cause significant discomfort to the user. A non invasive version of the artificial pancreas would be much more sanitary and convenient to the user. The goal of this IPRO is to develop an automated, non-invasive artificial pancreas that will be capable of determining and administering an appropriate amount of insulin into the blood stream without puncturing the skin. This product will be evaluated in terms of its functionality, ease of use, reliability, and cost. In the process of development, the basic biological mechanisms of the endocrine pancreas, glucose chemistry and metabolism, physicochemical and biophysical processes, design and implementation, economics, and psychosocial factors will be reviewed.

Methodology:

- Market analysis of available insulin pumps
- Look into previous IPRO design of non invasive glucose monitor and possible incorporation
- Assessment of product's functionality, ease of use, reliability and cost
- Develop a procedure to administer necessary amount of insulin
- Research and improve on different device designs
- Design and test prototype of insulin pump along with non invasive glucose monitor

Expected Results:

A compact device/ prototype that will encapsulate a glucose monitoring and an insulin delivery system using iontophorosis. The possibility of a built -in sensor that will detect the glucose levels and administer the required level of insulin will also be researched.

Schedule of tasks / Timeline

WEEK OF:	TENTATIVE TASKS
8/28	o Introduction by Dr. Opara. o Discuss various objectives of the semester. o Review IPRO on glucose monitoring.
9/4	o Set goal for the semester. o Sub-Group assignments. o Brainstorm/gather ideas. o Work on Project Plan.
9/11	o Submit Project Plan. o Work on web site layout. o Research market analysis/ Devices. o Research technology. o Administer rough model.
9/18	o Continue researching devices/ technology. o Discuss how to improve model.
9/25	o Determine mode of delivery. o Continue improvement of model.
10/2	o Work on mid-term report. o Discuss expectation of prototype.
10/9	o Edit and submit Mid-term report.
10/16	o Update website. o Decide on final prototype. o Get approval on room/equipment for testing.
10/23	o Start testing. o Look into patents.
10/30	o View complications/results of test 1. o Research on other options.
11/6	o Work on Exhibit/Poster. o Start work on final report. o Do test 2.
11/13	o Submit Exhibit/Poster. o Edit/Review final report. o Review on results of prototype. o Work on final presentation. o Select team member tasks for IPRO day.
11/20	o Submit brochure, presentation, final report, team minutes, and CD deliverables. o Update website entirely. o Rehearse presentation.
12/1	o IPRO DAY.

Assignments:

Research

Venkata Ravuri
Elena Davis
Maje Nazim
Jennifer Miller

Market Analysis

Elena Davis
Kirthi Reddy
Vidya Shivakumar
Sapna Patel

Device Design

Yagna Pathak
Ryan Tanner
Aurimas Vinckevicius
Shital Patel

Project Plan report:

Shital Patel
Kirthi Reddy
Aurimas Vinckevicius

Mid term report

Aurimas Vinckevicius
Yagna Pathak

Website

Ryan Tanner
Aurimas Vinckevicius
Venkata Ravuri

Exhibit/Poster

Vidya Shivakumar
Sapna Patel
Elena Davis

Abstract

Maje Nazim
Vidya Shivakumar
Elena Davis

Final Report

Venkata Ravuri
Kirthi Reddy
Jennifer Miller
Maje Nazim