ENGI 301

Glucose Sensor Proposal

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Background Information

- 3.7 million people die from diabetes and high blood glucose levels
  - 422 million diabetics around the world
  - 1 in 11 people have diabetes
- To effectively treat diabetics, patients must monitor glucose levels using current methods:
  - Invasive procedures that require implantation of a device
  - Painful finger prick tests produce a lot of waste and are not reusable

These methods require patients to actively monitor their glucose, which is inconvenient and reduces patient compliance

Concept

Sensing Mechanism:
NIR Reflectance Spectroscopy

+

Embedded Sensor System

Sensor Holster

=

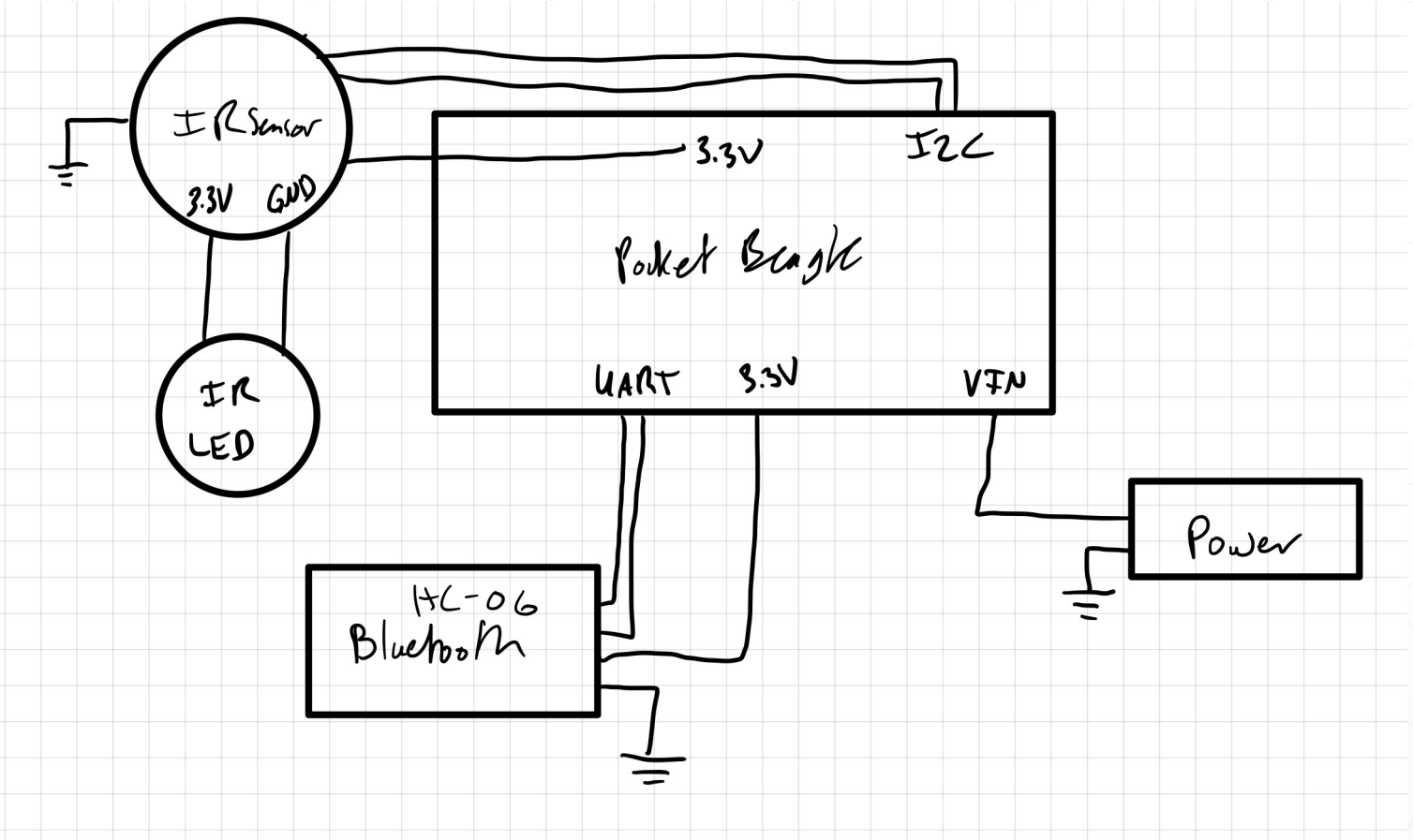
Noninvasive Continuous Glucose Sensor

Concept System

Clip bottom view
(surface touching skin)

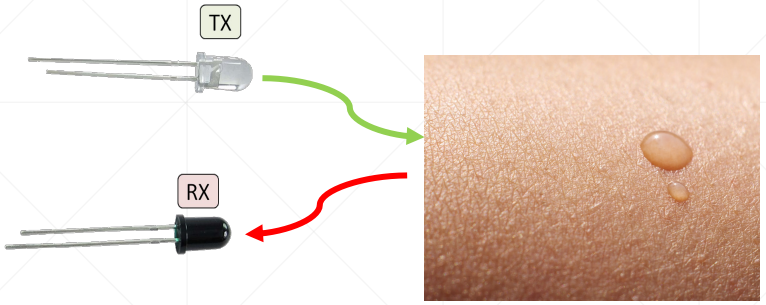
Clip top view
(surface touching garment)

System Block Diagram

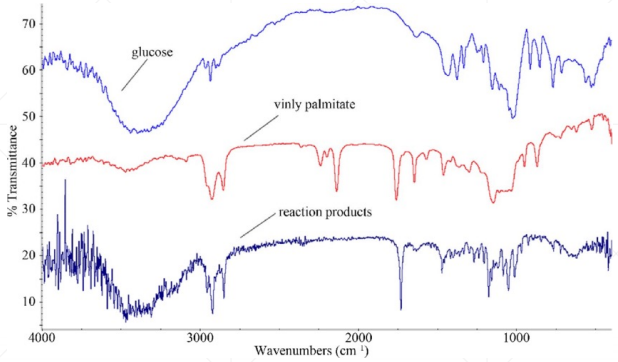


Flow Chart

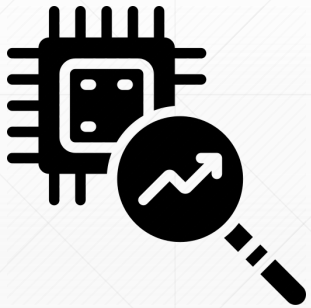
1 Data Acquisition



2 Data Processing



3 Calibration/Training Regression



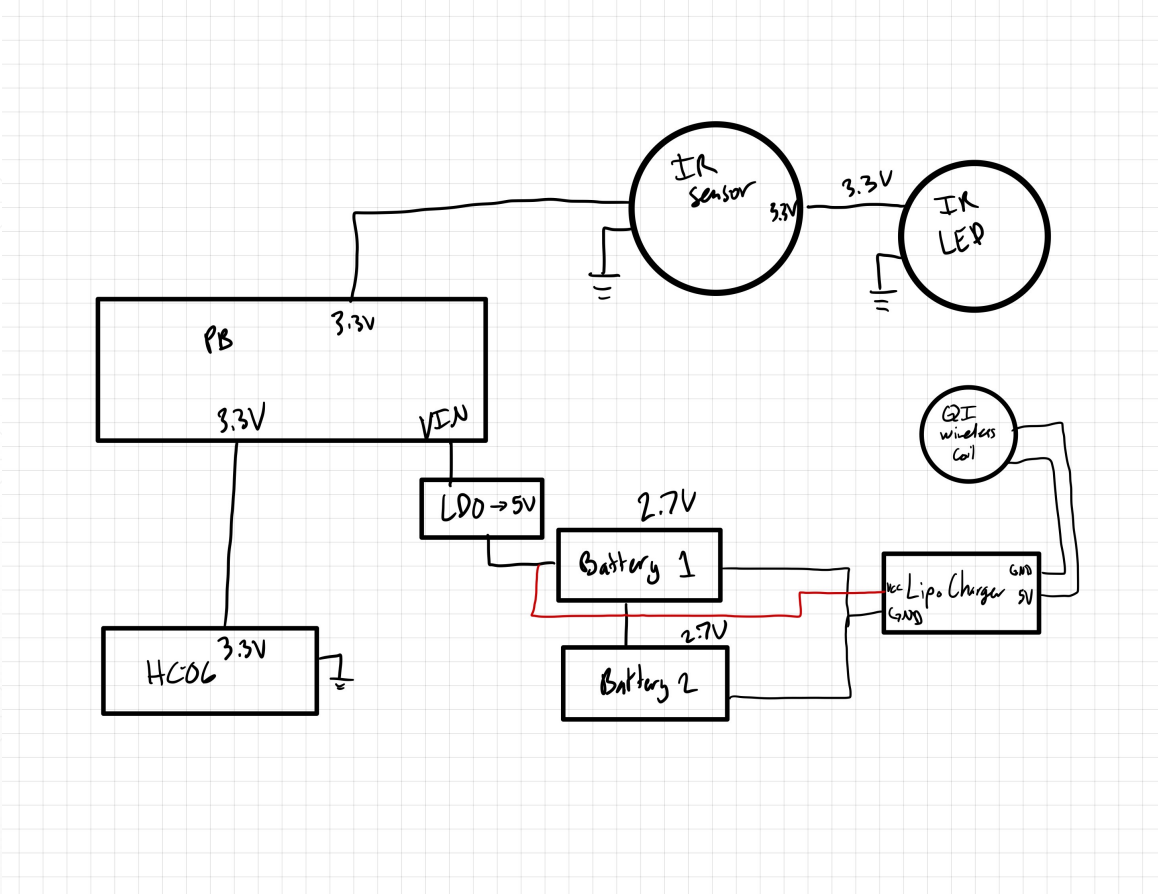
4 Classify BGL and Report Values

Glucose Dashboard

Healthy

140m g/dL

Power Block Diagram



I/O	Voltage	Current
QI Wireless	5V	500 mA
LiPo Charger	5V	1A
Batteries	7.4V	5.0 µA
Pocket Beagle	5V	140-230 mA
IR Sensor	3.3V	100 mA
IR LED	3.3V	50 mA
HC-06	5V	30mA

Roadmap

- NIR Sensor circuit integrated with PB
- Powered by basic USB
- Button to start sensing
- LEDs to indicate readings
- Screen to display numerical data

- Powered by USB battery

- Powered by LiPo batteries
- Include QI coils with charging circuit to recharge LiPo batteries

- Initiate sensing and transmit data to PC via Bluetooth

- Develop finished smartphone application with interface to initiate sensing and view data
- Store data over time
- View trends and send notifications highlighting progress

Components / Budget

Component	Need to Buy	Cost
QI Wireless Power Coils	1	$8.50
NIR LED 950nm (Mouser Part #755-SIR-34ST3F)	1	$0.87
NIR Sensor (SparkFun Spectral Sensor Breakout)	1	$27.95
LiPo Battery 3.7V	2	$12.50
Blackhawk Inside Waisteband Gun Holster	1	$14.99
HC-06 Bluetooth Module	1	$8.49
LiPo Battery Charger	1	$4.29
5V LDO (Mouser Part #511-LD29150PT50R)	1	$1.18
Total		$78.77