



gPod

Blood Glucose Meter

Team 2

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Sponsored by the Rehabilitation Engineering
Research Center

Introduction

- gPod Blood Glucose Meter
 - Lower cost alternative to commercially available meters.
 - All-in-one package
 - For the visually impaired
 - For patients with motor control disabilities

Patient Need

- 18.2 million American diabetics
- 5th leading cause of death in U.S.
- No cure
- Leading cause in new blindness in adults 20-74 years old
- Annually 12,000-24,000 diabetics loose sight

Economic Costs

- 1 out of every 10 health care dollars spent
- Annual per capita health care expenditure \$13,243
- Diabetes market \$132 billion/year industry

Available Products

- Accu-Chek Advantage
 - Portable
 - 26 second results
 - 4 uL blood sample
 - No alternative site testing
 - Snap-in code key calibration
 - Large legible display
 - Cost: \$65



Available Products

- OneTouch Ultra by Lifescan
 - Portable
 - 5 second results
 - 1 uL blood sample
 - Multiple site testing
 - Large legible display
 - Cost: \$75



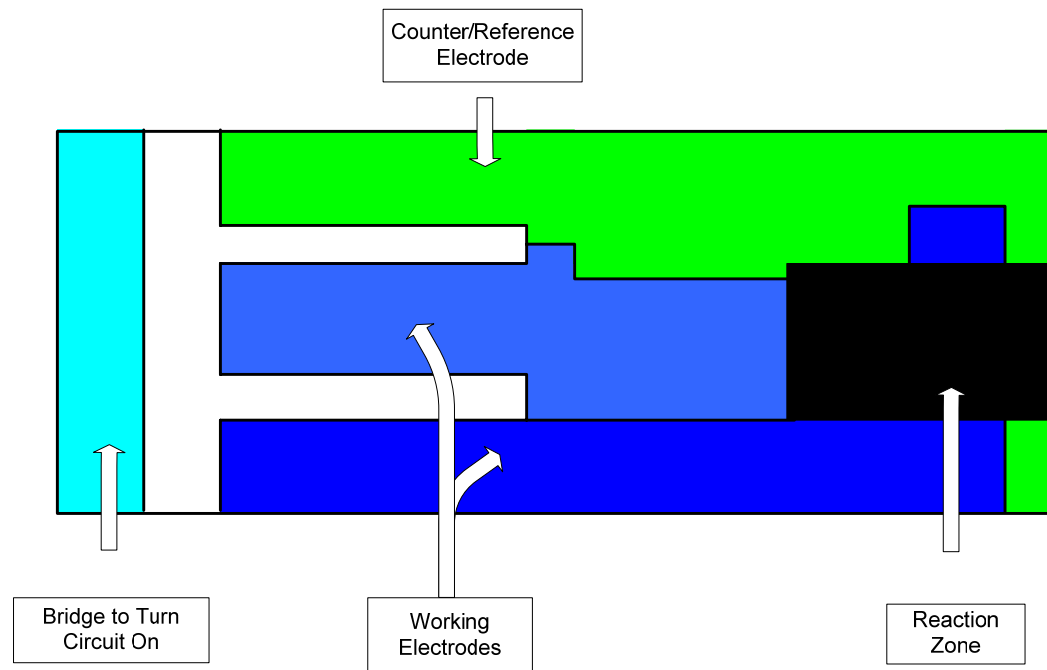
Available Products

- Voicemate by Accu-Chek
 - Portable
 - 26 second results
 - 4 uL blood sample
 - Snap-in code key calibration
 - Step-by-step voice instructions
 - Modular
 - Cost: **\$570**



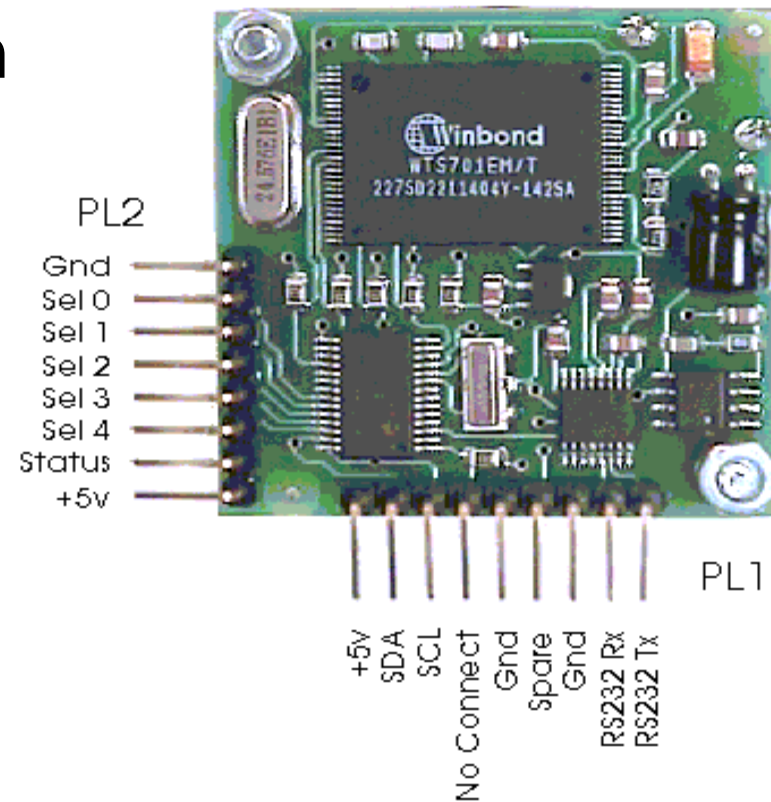
Patent Information

- #5997817 Electrochemical biosensor test strip – December 7, 1999 - Crismore, et al.
 - Electrochemical biosensor
 - Capillary test chamber



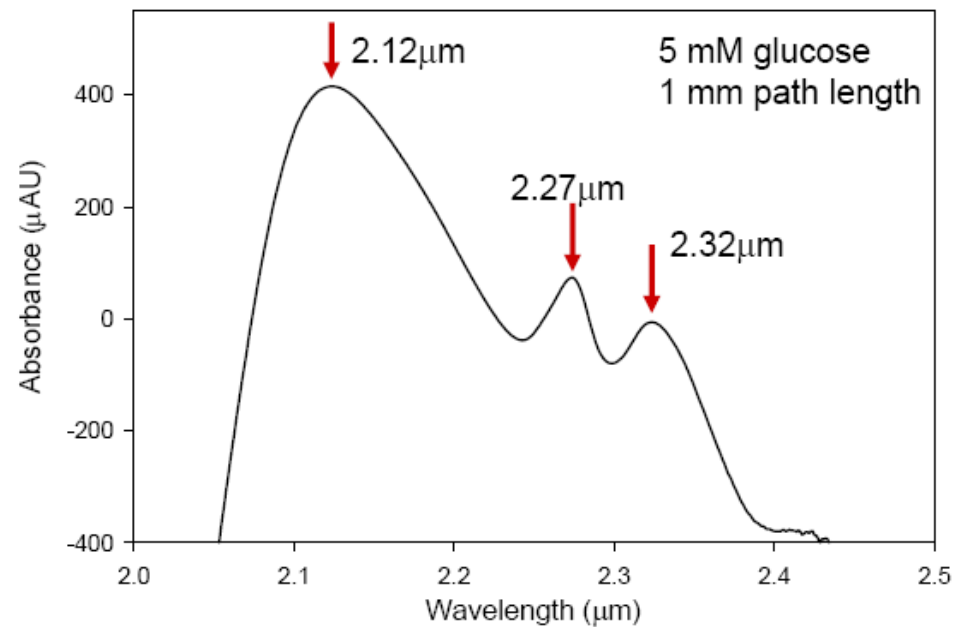
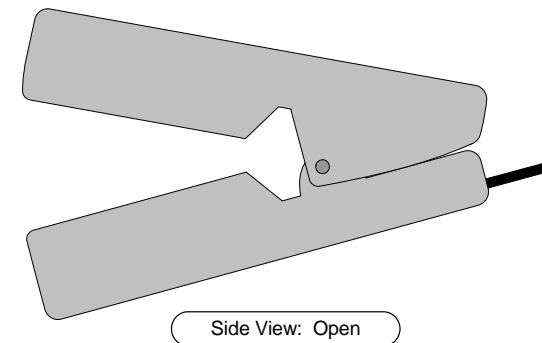
Design 1

- Amperometric Test Strips
- Speech Module
- Serial communication



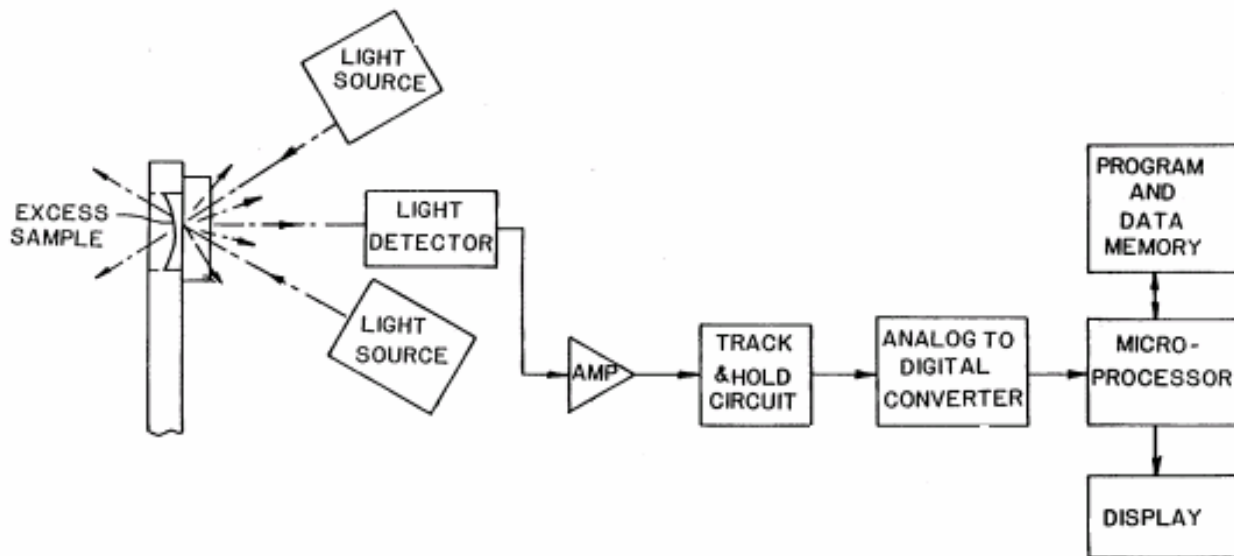
Design 2

- Near IR spectroscopy
- Speech Chip
- Vial Scanner
- USB communication



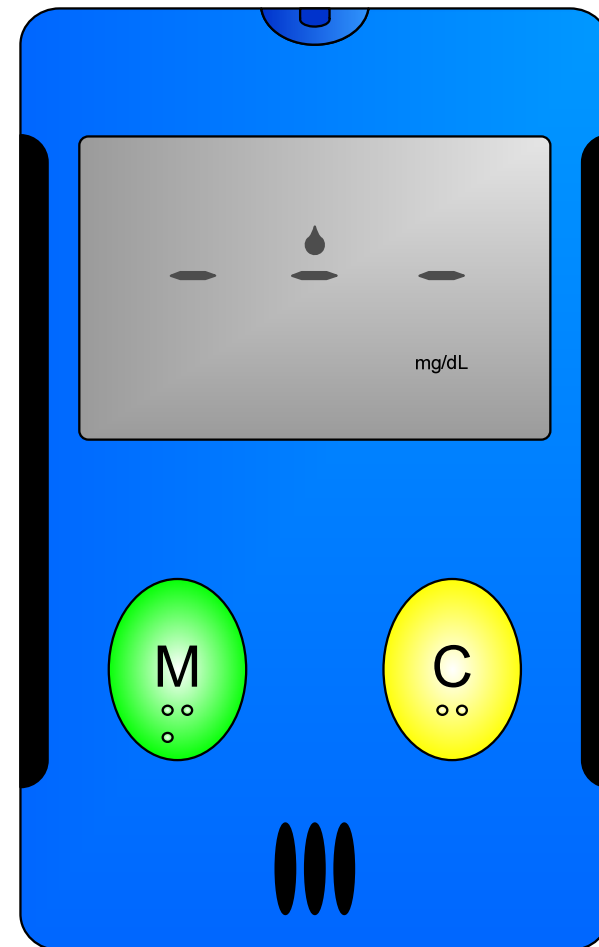
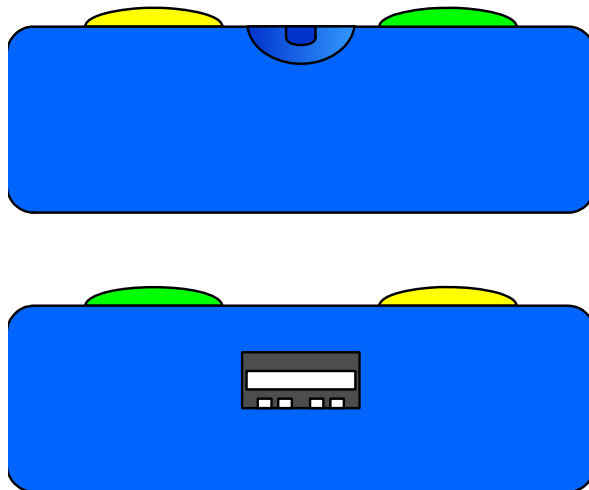
Design 3

- Colorimetric Test Strips
- Speech Chip
- USB communication
- Vial Scanner

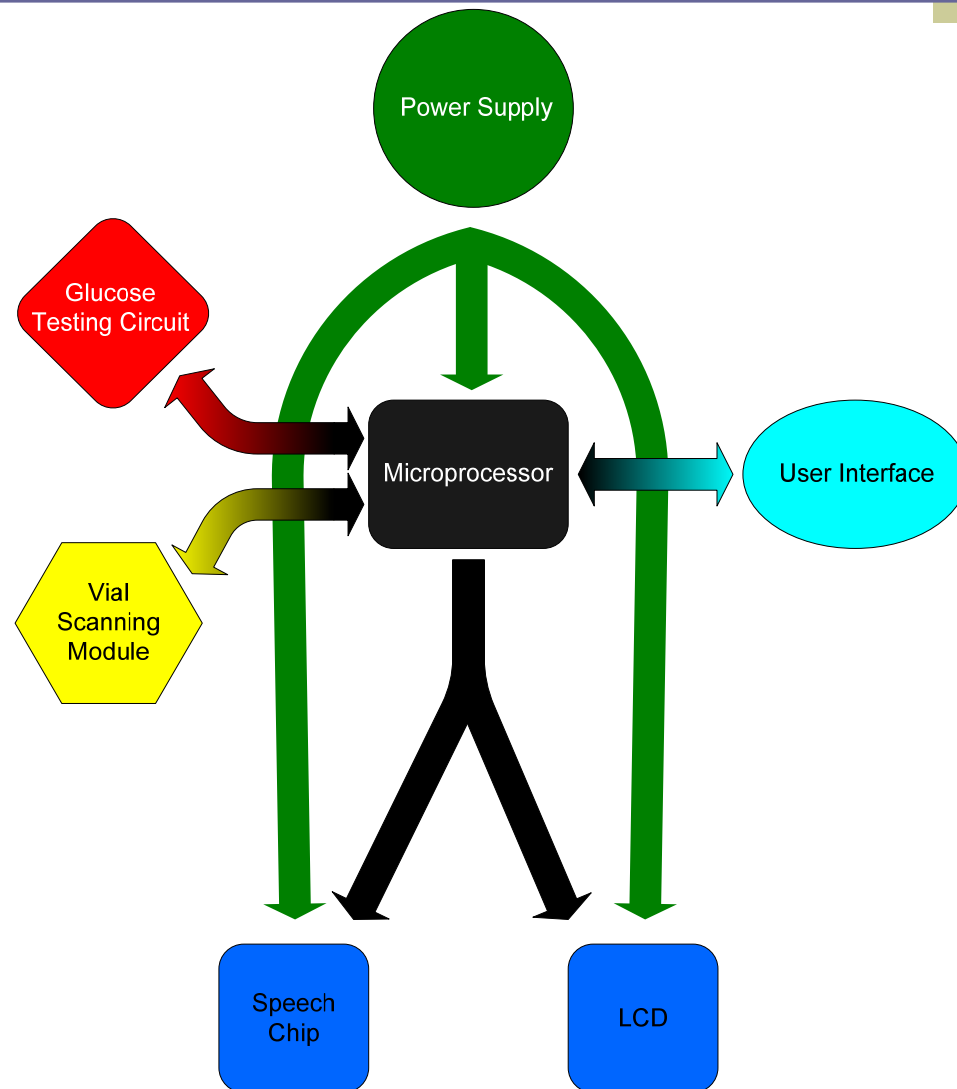


Optimal Design

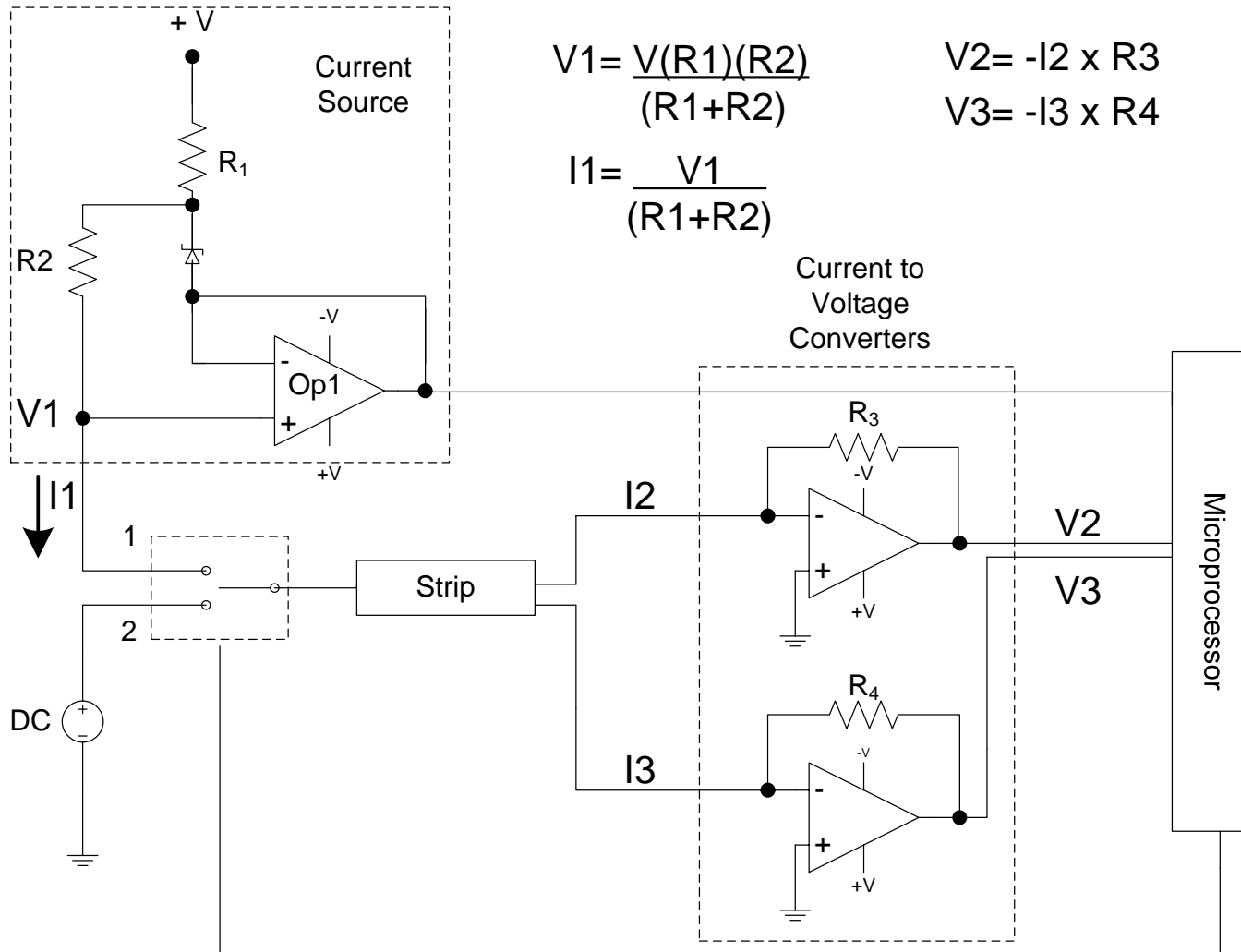
- OneTouch Ultra Test Strips
- Speech Chip
- USB communication
- Insulin Vial Scanner



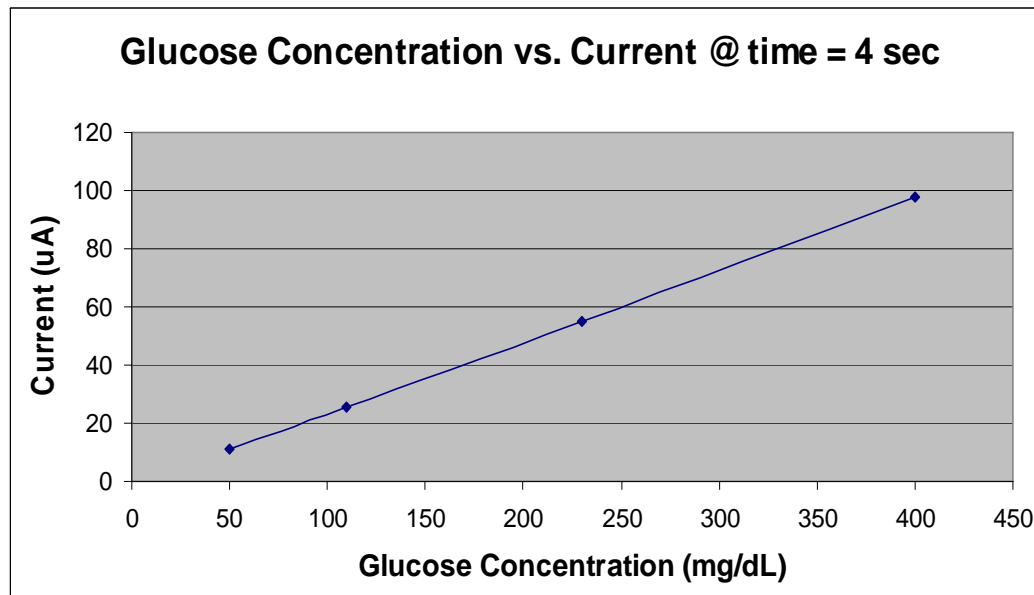
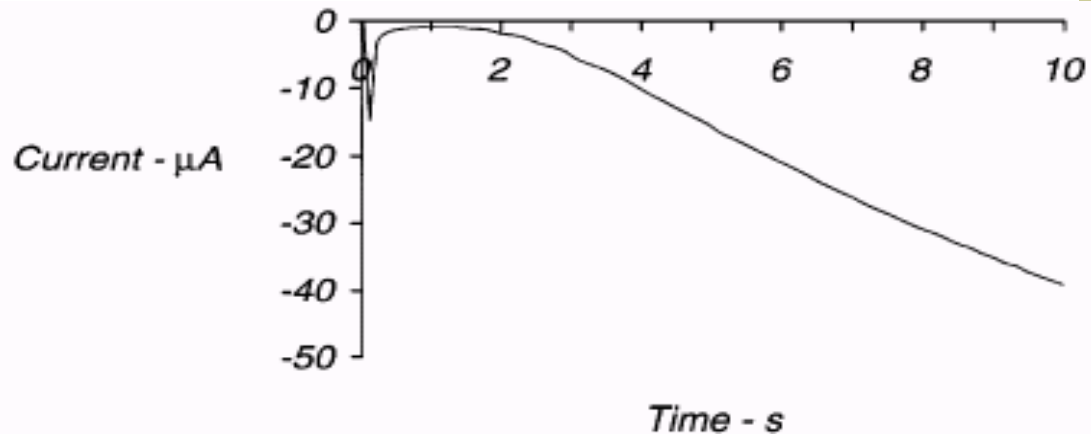
Block Diagram



Glucose Test Circuit

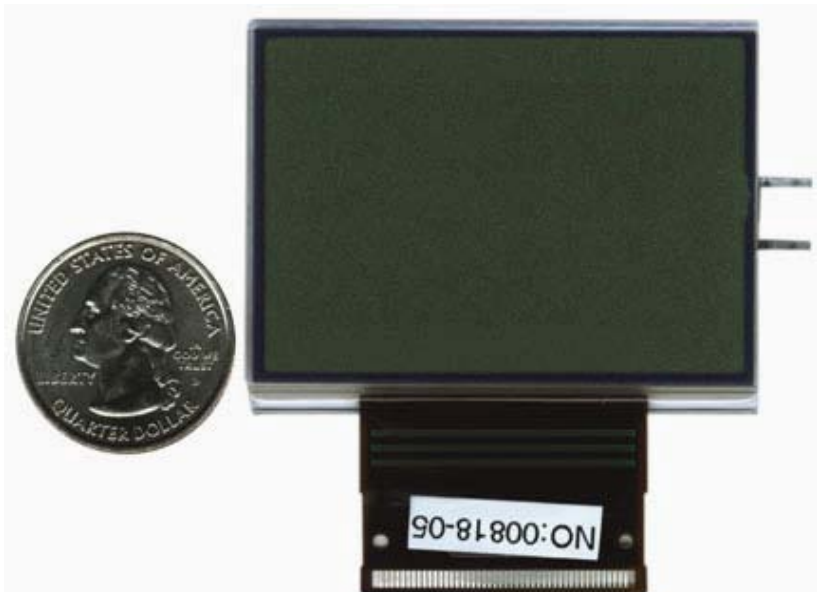


Glucose-Current Relationship



LCD Screen

- Viewing area: 52x33.5 mm
- Backlight: White EL
- Parallel Data



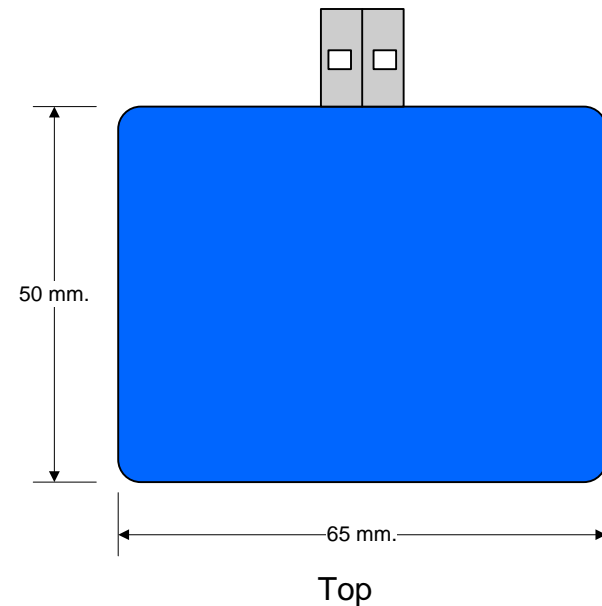
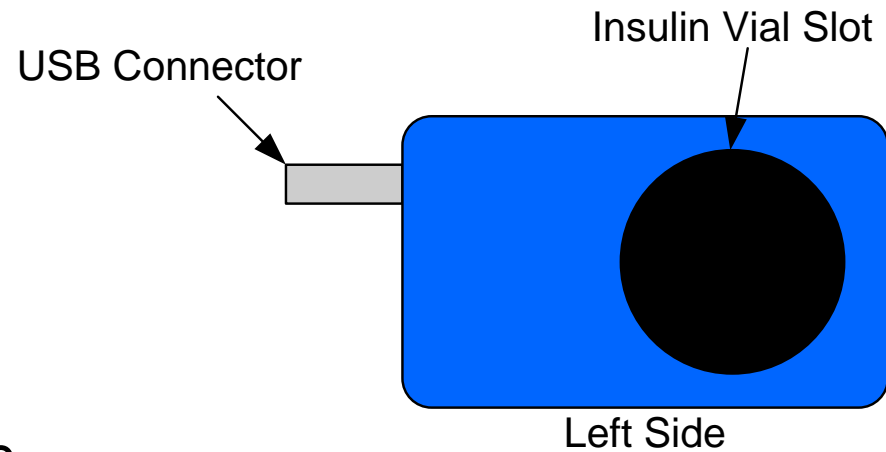
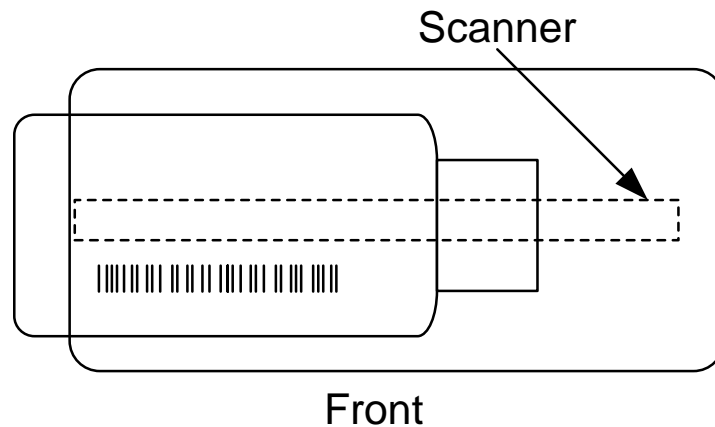
Speech Chip

- Text-to-Speech Synthesizer
- Natural sounding speech
- Variable pitch and speed



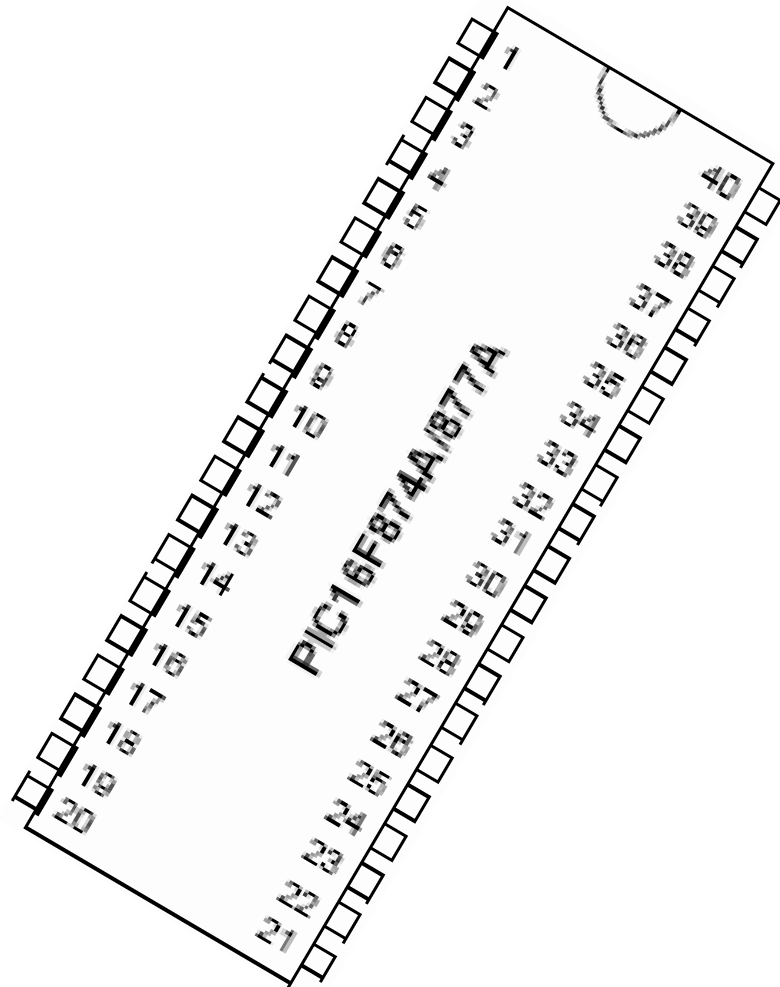
Vial Scanner

- FDA requires barcode of NDN on all insulin vials
- Connects to meter through USB port
- Identifies type of insulin and concentration



Microprocessor

- PIC16F874A by Microchip
- Controls LCD, speech chip, USB, glucose test circuit
- Programmed using Hi-Tech C and MPLabIDE



User Interface

- Insert test strip
- Add blood
- Testing
- Display results both visually and auditory
- Display errors (if occurs)
- Auto-shutoff after 1 minute

Estimated Costs

Part	Cost
Microprocessor	\$7.00
Winbond WTS701 (Speech Chip)	\$32.00
LCD Screen	\$26.00
Circuit Boards (2.8"x 3.5")	\$17.00 each \$51.00 for 3
Case(s)	\$20.00
Other components	\$50.00
Total	\$152.00

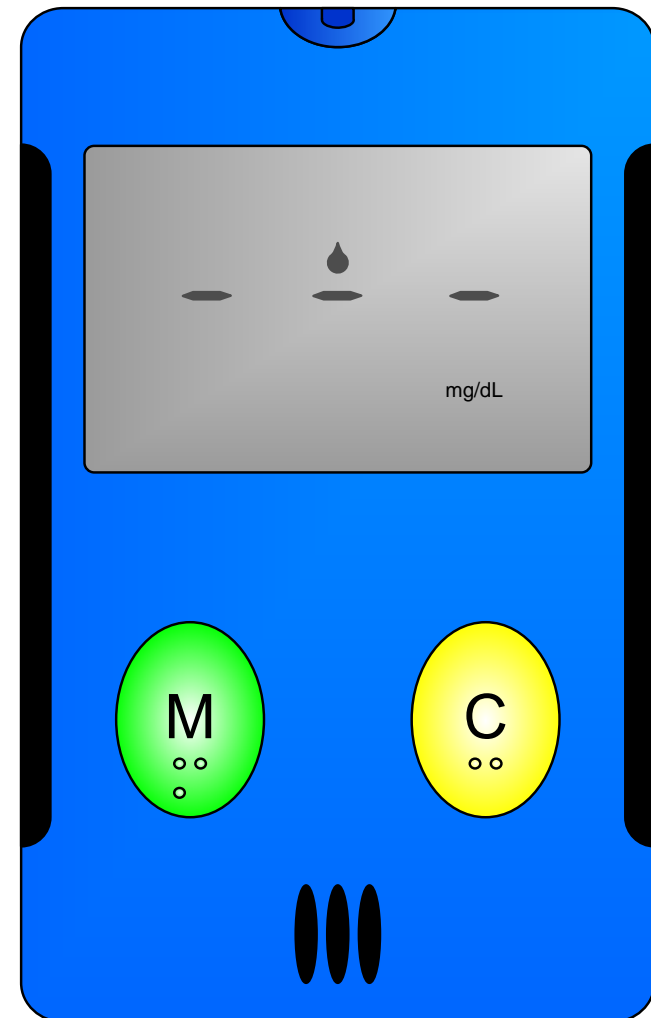
Part	Cost
Barcode Reader	\$80
Circuit Board	\$17
Case	\$20
Other Components	\$20.00
Total	\$119.00

Timeline

Prototype Glucose Circuit	2 weeks	Jan 17-31
Test Glucose Circuit	3 weeks	Feb 1-March 3
Prototype LCD Circuit	2 weeks	Jan 17-31
Test LCD Circuit	3 weeks	Feb 1-March 3
Prototype Speech Circuit	2 weeks	Jan 17-31
Test Speech Circuit	3 weeks	Feb 1-March 3
Prototype Vial Scanner	1 week	March 13-22
Test Vial Scanner	1 week	March 23-30
Systems Integration	4 weeks	March 3-April 3
Final testing	3 weeks	April 3-28

Conclusion

- Portable size
- Lower cost
- User-friendly interface
- Easy to read display
- Audible output
- Insulin Vial Identification



Any Questions?

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