Accessible Home Vitals Signs Monitoring System

Rob Croce, Mike Kapinos, & Jenna Sullivan

Client Contact: Dr. John Enderle ● University of Connecticut ● (860) 486-5521
Outline

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Background Information

- Project funded by the RERC-AMI National Student Design Competition
- Clients for this device have wide range of needs and disabilities
- Our objective is design a vital signs monitoring system for home use that is fully accessible to all persons
Current Models

**Welch Allyn Vital Signs Monitor 300 Series**
- 10” by 6” by 6.6”
- 5.4 lbs
- Approximate Cost: $3000

**DRE Philips SureSigns VS1 Vital Sign Monitor**
- 9.4” by 9.8” by 9.3”
- 8 lbs
- Approximate Cost: $2000
Accessible Home Vital Signs Monitoring System Overview

- Device will measure six (6) vital signs and transmit them via Bluetooth technology to the client’s PC
- Client will upload their vital signs to a secure, password protected website
- Physicians/care providers can access vital signs via the website through a personal password
Vital Signs

- Temperature, blood oxygen saturation, pulse, blood pressure, respiratory rate, and weight will be monitored.
Temperature and Respiratory Rate

- Temperature will be measured using a thermistor
- Respiratory rate will be measured by a thermocouple
- Both circuits will make use of a Wheatstone bridge
Blood Oxygen Saturation and Pulse

- Blood oxygen saturation and pulse will be measured using a pulse oximeter.
- A pulse oximeter probe will be built from two LEDs and a photodiode.
Blood pressure

- Measured by automated system
- Blood pressure system includes air pump/valve/sensor assembly
- For safety, “kill switch” designed to cut power to cuff system
Blackfin ADSP-BF534 Digital Signal Processor

- 48 I/O ports
- Programmable through LabVIEW™
- Can function both as microcontroller and DSP
- Uses FIR and IIR filters to digitally process signals
Accessibility

- 6 large, backlit LCD screens to display readings
- Text-to-speech module with speaker to audibly output vital signs
- Large buttons printed with Braille
Secure Web Site

- Maximizes patient privacy
- Allows patients to transmit vital signs from any internet connected PC
- Removes 3rd party from monitoring system
# Current Budget

<table>
<thead>
<tr>
<th>Part</th>
<th>Cost</th>
<th>Shipping and Handling</th>
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<tbody>
<tr>
<td>Snap-in Style Pushbutton (Mouser)</td>
<td>$103.20 for 3 ($34.40 each)</td>
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<td>AC/DC Power Converter (shop.com)</td>
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<td>9V Rechargeable Battery</td>
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<td>Linear Voltage Regulator</td>
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<td>Digital Thermometer (Vicks)</td>
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<td>CTS Single Head Micro Air Pump</td>
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<td>MPX2200 Pressure Sensor (Digikey)</td>
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Timeline

- First parts order, early Jan.
- Blackfin development, thru Feb. 1st
- Transducer circuitry, Jan. to end of Feb.
- Accessibility components (speaker, screens, etc.) by early March
- Remaining parts (Bluetooth, website, power source, etc.) by early March
- Device completed and tested, by mid April
Conclusion

- Current products are very expensive so our aim is to design an affordable device.
- Accessibility components will allow us to meet the needs of our clients.
- The device and computer system will be very easy for anyone to use.
- With our device, we plan to increase our clients’ quality of life while continuing to closely monitor their health.
Questions?