I. INTRODUCTION

Recent advances in medical technology now allow patients suffering from blindness, Parkinson’s disease, heart problems and other chronic illnesses to monitor their health in the convenience of their own home. The desire to move tasks normally performed in medical facilities into the home environment is increasing. This is due to a variety of factors, including cost effectiveness and convenience for the patient. Home vital sign monitoring benefits the patient and family by providing the security of knowing that a healthcare professional is monitoring the patient’s status everyday. By monitoring vital signs daily at home, patients can avoid admission to alternative living facilities such as transitional care units and nursing homes.

Since the majority of the monitoring is being performed by relatives, caregivers, or the patients themselves, it is important that the monitor be designed so that these home caregivers can use it. This includes a simple interface with minimal buttons and a compact design. It is our aim to design this product to blend in with other electronic appliances in the home, so that the patient does not look sick to visitors. Although similar devises currently exist, we aspire to provide a light-weight, cost effective, easy-to-operate alternative. Our home vital signs monitor will function as a noninvasive blood pressure, blood oxygen (SpO2) level, heart rate and body temperature monitor, the results of which will be displayed on a screen. It is our goal to make the installation of these biosignal collecting devices as trivial as possible, so that users of any age or disability will be able to assist the patient in taking measurements. Following the input of vital signs, the information will be stored on a USB flashdrive and sent to a healthcare facility via a secure, password protected site to ensure the privacy of the patient. Also integrated into the design will be an alarm, which will alert patients and caregivers of deadly or irregular vital signs, and a backup battery source incase of power failure.

II. REALISTIC CONSTRAINTS

Economic
- The total cost of the device must be less than $2000

Environmental
- Waterproof
- Dust, UV rays
- Everyday wear and tear

Manufacturability
- Most parts of the device are available on the market
- Cost must be less than $2000
- Appearance must be suitable for home environment

Safety
- Make sure it does not overheat
- All electrical components are safe
- No sharp edges or parts that are dangerous
Social
  • Must blend in with home environment

III. TECHNICAL SPECIFICATIONS

**Mechanical**
- Weight (unit without peripheries): <6 pounds
- Size: 10" x 10" x 10" max., handle for transport
- Button size: approx. 1" in diameter
- Durability: Withstand falls from up to 5’
- Water Resistance: Drip-proof
- Anchoring/Mounting: Rubber treads on bottom of device

**Electrical**
- AC Power Source: 6-10V
- Back-up battery: Rechargeable

**Display**
- Height: 8” max
- Width: 8’ max
- Illumination: Visible in all light levels

**Data Output**
- Standard USB port

**Temperature Measurements**
- Scale: °Fahrenheit (F)
- Range: 80-110°F
- Accuracy: ± .2°F
- Response Time: 10 seconds (oral)

**Pulse Oximetry**
- Saturation Range: 0-100%
- Accuracy: ± 3%
- Heart Rate Range: 20-250bpm
- Accuracy: ± 3bpm

**Non-invasive blood pressure (NIBP)**
- Cuff Pressure Range: 0-300mmHg
- Measurement Time: <60 seconds

**Hardware and Software Parameters**
Microprocessor
Programming

<table>
<thead>
<tr>
<th>Output parameters</th>
<th>Expect to program in C++</th>
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</thead>
<tbody>
<tr>
<td>Alarms</td>
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<td>Auditory</td>
<td>Results of vital sign measurements, prompts</td>
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<td>Visual</td>
<td>Display vital signs</td>
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Environmental
Location
Home (indoors)
Dust
Recommend preventing large amounts of dust from settling on the device
Operating Temperature
40-105°F
Storage Temperature
32-110°F