MMD: Project #1 Design Specifications

September 11, 2014

**Problem Statement:**

Our goal is to develop a patient temperature monitoring system that wirelessly pairs an underarm thermometer worn by the patient with a real-time iPad display to be used by medical personnel by October 2, 2014.

**Project Specifications:**

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|  |  | **Characteristic** | **Value** | **Comments** |
| **Customer Requirements** | *Temperature Measurement* | Temperature | 10 °C < T < 50 °C | The temperature probe should provide accurate readings within recorded human body temperatures. |
|  | *Sampling* | Sampling rate | 1000 ± 10 Hz | The measuring device should sample the temperature once every millisecond. |
|  | *User Interface* | Update rate | 1 ± 0.01 Hz | The iPad display should update once every second. |
|  | *Unit Display* | Temperature units | °F/°C | The user should be able to toggle between Fahrenheit and Celsius using iPad display. |
|  | *Alarm* | Sound level | 65 – 80 dB | The iPad should emit an audible alarm when the temperature exceeds 90°F or 32.24°C. |
|  | *User Interface* | Screen orientation | Landscape | The iPad display should only be viewable as landscape. |
| **Interconnection** | *Wireless Data Transmission* | Transmission protocol | IEEE 802.11 | Wireless transmission must be in accordance with IEEE 802.11 wireless local area network (WLAN) protocol. |
|  | *A/D Conversion* | Voltage level | ≤ 5 ± 0.0049 V | A/D converter converts incoming signal into 1024 quantization levels. |
|  | *Power* | Battery type | 9 V battery | The device should be capable of being powered by a standard 9V battery. |
|  | *Power* | Wall adapter | AC-to-DC power supply | The device should be capable of being powered by a standard 5V DC 1A 2.1mm center-positive plug. |
| **User Interface** | *Units* | Buttons | 1 | The application should have one button to switch between temperature units. |
|  | *Temperature Measurement* | Buttons | 1 | The application should have one button to initiate temperature measurement. |
|  | *Usability* | Display | - | The application should be intelligible to non-native English speakers. |
| **Tolerances** | *Power Saving* | Battery life | > 30 minutes | The device should be able to run standalone without charging. |
|  | *Real-time* | Delay time | < 45 seconds | The device should have a minimal “warm-up” time for accurate readings. |
|  | *Wearable* | Comfort assessment test (?) |  | The device should be comfortable for the patient as assessed by the provided tool [1]. |

[1] Knight, J. F., Baber, C., Shwirtz, A. and Bristow, H. W. The Comfort Assessment of Wearable Computers. In *Proceedings of the International Symposium of Wearable Computers (IEEE ISWC)* 2002, 65-72.