**Proposal for an Automated EMS Vital Signs Collection and Distribution System (AVEMS)**

An Interactive Qualifying Project submitted to the Faculty of Worcester Polytechnic

Institute in partial fulfillment of the requirements for the Degree of Bachelor of Science

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**Abstract**

* What was the project about?
* What are the objectives of this project?
* What were the methods used?
* What were the results?
* What were the main deductions from the results?
* What was the conclusion?

*Keywords:* EMS, vitals collection device, triage

**Table of Contents**

**1. Introduction**

***1.1 Problem statement***

***1.2 Market research***

**2. Product Requirements**

***2.1 Customer requirements***

***2.2 Product specifications***

***2.3 Competitive value analysis***

**3. Design Approach**

***3.1 System Architecture***

**4. Project Milestones**

**5. Cost Analysis**

***5.1 Initial Investment***

***5.2 Return on Investment***

**6. Recommendations & Future Work**

***6.1 Recommendations***

***6.2 Future work***

**7. Conclusions**

**1. Introduction**

***1.1 Problem Statement***

In the renaissance of the 21st century, the technological sphere has undergone a shift from specialization into interdisciplinarity. As a result, different technologies are becoming more integrated and interconnected resulting the formation of the internet of things (IoT). Different sensors and devices are working as one to gather and process data, communicate information, and create knowledge. Though, due to vast size of IoT and technological boundaries, there are many challenges that must be confronted to build an efficient, secure, and effective data communication system. Those challenges include energy usage, communication mechanisms, scalability, security, and heterogeneous interconnectivity (Kranenburg & Bassi, 2012). Research in the respective areas will improve the collection and flow of data which allows IoT communication systems to move from the research phase to the market phase. But in order to make this leap successfully, the way the data is *displayed* and *communicated* must be taken into consideration. This is particularly true of medical IoT where the goal is to improve the mental and physical capacity of overburdened medical staff. To address this, we propose AVEMS, a medical IoT communication system used to collect, organize, and transmit patient vitals and information to emergency medical services (EMS) and hospitals.

***1.2 Market research***

* Who is our market(s)?
  + Military
  + Hospitals
  + Public
* Why does our product interest this market?

**2. Product Requirements**

***2.1 Customer requirements***

* What do our customers explicitly want?
* What do our customers implicitly expect?

***2.2 Product requirements and specifications***

* What are the product requirements – the main things the product must do or have?
* Why are those requirements important?
* How are those requirements effected by the customer requirements?
* What are the product specifications – the system specifics derived from the general requirements?
* How are the specifications mapped to the requirements?

***2.3 Competitive value analysis***

* What are the criteria used to compare our product with competitors’ products?
* What are the weights of each criterion according to customer requirements?
* Who are our competitors? Why are they competitors?
* How is each competitor ranked with respect to the criteria?
* How do we rank with respect to the criteria?
* How do we compare to our competitors?

**3. Design Approach**

***3.1 System formulation***

* What was the value criteria used to evaluate the design options?
* What are the weights that were used in the value analysis?
* What were all of the system designs?
* How does each design satisfy product requirements?
* What are the advantages and disadvantages of each design?
* What was the results of the value analysis?
* Why was the chosen design the best?

***3.2 System Architecture***

* What is the functional block diagram of the functional parts (modules) of the system?
  + What are the preferred means of implementation of each module?
  + What is the module description?
  + What are the module inputs?
  + What are the module outputs?
  + How will the module be tested and verified? What are the test inputs? What are the expected outputs? How are the test inputs generated?
  + How are the hardware modules integrated?
  + How are the software modules integrated?
  + How are the hardware and software modules integrated?
  + How will the system be tested and verified? What are the test inputs? What are the expected outputs? How are the test inputs generated?

**4. Project Milestones**

* What does a milestone-based Gantt chart look like for this project?
* What are major milestones? What are the milestone descriptions? What are the associated tasks? When are the milestones due? Where are delays expected? How will delays be handled?
* What does a detailed task-based Gantt chart look like for this project?
* What are all of the tasks that need to be complete? What are the tasks descriptions? Who is responsible for the tasks? Who is involved in the tasks? Why were the people involved chosen? How long will the tasks take? When will the tasks occur?
  + What are all of the research tasks?
  + What are all of the design tasks (hardware and software)?
  + What are all of the experimental tasks?
  + What are all of the building and troubleshooting tasks?
  + What are all of the test and verification tasks?
  + What are all of the presentation and report tasks?

**5. Cost Analysis**

***7.1 Initial Investment***

* How much will labor cost?
* How much will supporting equipment cost?
* How much will the product cost experimentally?

***7.2 Return on Investment***

* How much will the product cost ideally?
* How much money will this save customers annually?
* How many lives will this save annually?

**6. Recommendations & Future Work**

***6.1 Recommendations***

* How can the product be improved according to our perspective?
* How can the product be improved according to customers perspectives?

***6.2 Future work***

* Where else can the product be used?

**7. Conclusions**

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