Designing Global Monitoring System to Locate Missing Children and Alzheimer Patients

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Abstract

This paper presents a joint effort between engineering students from various majors, and their advisors to design a sophisticated global monitoring system to monitor location of children, Alzheimer patients and other valuable items. This project was part of a capstone design course developed to introduce engineering students to real world problems. This funded project was developed in response to growing problems with children abduction and wondering off Alzheimer patients. This invention has received extensive media coverage since its development. Over 30 million people worldwide heard about the project and its abilities through various media channels such as TV, Internet, radio, and newspapers. This paper discusses the development process from conception to finished product.

Introduction

Child abduction is a major problem at this time and the number being abducted is growing each year. In fact, as many as 150,000 children are reported missing in the United States alone each year. Many of the abductions occur under circumstances wherein the child is in the company of a parent, such as at a shopping mall, but the parent is preoccupied with shopping, and the child is abducted. In response to this problem, engineering students and their advisors at East Tennessee State University have been working on designing devices to combat this growing problem. The Lemelson Foundation provided the funding for this project[1].

In this paper we discuss the problem, provide a detail market research and introduce the earlier versions and final version of the product. Due to pending patent on this invention the detail descriptions of the product are omitted.

Background and Overview

The earlier version of "Guardian 2000" was designed and developed under name of "Safe Distance Locator Device" to mainly prevent child abduction. The product received extensive national and international media coverage because child abduction is a growing problem in this country and abroad[2,3,4]. However we realized that product have many other application such as monitoring elderly and Alzheimer patients. We received thousands of emails, phone calls, and letters from individuals and companies from all over the world, expressing interest in buying or

distributing the product. Due to this much inquiry and potential for a breakthrough discovery the Lemelson Foundation provided the needed funding to conduct market research and develop a more sophisticated product. In the next section the market potential for a such a product is discussed.

Market Potential

The current customer market demand is growing very rapidly. With the increasing potential of child abduction individuals are looking for a product to allow them a feeling of security in a world filled with chaos and crime. Because of the current need for a product like the Guardian 2000, it has received extensive media coverage since it's development. Over 30 million people have heard about the product and it's abilities through various media channels such as TV, Internet, newspapers, and radio.

The primary market for this product will be child protection, but we see a huge secondary market addressing the monitoring of other individuals needing constant supervision. This would include the hospitals, elderly community, individuals with Alzheimer's disease, and mentally or physically handicapped individuals. Over 14 million American adults care for a loved one with Alzheimer disease in their home. Over 1% of the population has some type of mental retardation and requires attention. When you look at the huge number of people that require the constant supervision of another individual you can quickly get an idea of the large potential of a secondary market.

The secondary market can also be broken down in areas of monitoring other items of personal value. This could include things such as luggage while traveling, expensive electronic devices like laptop computers, sporting equipment, or even your pets. The potential sales from the primary and large secondary markets in 1999 were estimated to be over 60 million units. This number represents an increase of 20% from 1998.

Market Research

Substantial data was collected pertaining to the design of the Guardian 2000 while field testing, using a detailed market research survey. By evaluating this data we feel we have a very good basis to make sound decisions that will be valuable to the marketing of the Guardian 2000. During the research we determined that 70% of American families showed strong interest in our product. The people were polled to determine their interest in certain applications for the device. Consistent to our original plans for the Guardian 2000 to be used to monitor our children, the survey showed the market place to be very strong for that application. But what we had not originally expected was the interest the consumers have shown in our secondary markets.

The secondary markets collectively showed almost as much interest as did our primary market. The secondary markets will include monitoring the elderly, people with Alzheimer's disease, mentally handicapped, pets, electronic devices, sporting goods, or luggage while traveling.

The overall market is not considered unusually high when we hear statistics quoted like we hear today. There are 4000 non-family abductions per year and 114,000 abduction attempts each year, which is equal to a child abduction every minute. More than 70% of Alzheimer's sufferers live at home and over 14 million American adults care for a loved one with Alzheimer's disease. Nursing homes are filled to capacity with a majority of patients that must be monitored to prevent their wandering away from the facility. One percent of the population has some form of mental retardation and 4000 children are born with Down syndrome each year.

Children that were surveyed have also expressed great interest in our product. They have shown their approval for the Guardian 2000 by stressing that they would feel much safer in a crowded place like a theme park if they were wearing the Guardian.

Details of the Guardian 2000

The Guardian 2000 will be offered in three models, the G2XA, G2XB, and G2XC.
The basic model will be the G2XA, which will consist of a 49MHZ transmitter and receiver with sensitivity control to change the range of the signal. The transmitter will be worn by the person or item being monitored. If the person wanders or is taken out of the range of the receiver an alarm will sound at the receiver that will be keep by the person responsible for monitoring. The unit will also be equipped with a vibrator alarm that can be used alone or with the audible alarm. The unit will also be equipped with a panic button that can be activated by the child when they feel they are in danger. The unit will be powered by a rechargeable battery pack. This basic unit will fit the needs of most individuals but other models will be offered with many more features for more critical monitoring.

The G2XB will have the same features as the G2XA but will also include a GPS locator device. This feature will allow the parent to not only be alerted when the child is taken out of range of the receiver but it will also help to locate the child. The G2XB will also have a much more attractive housing that is also used for the G2XC.

The G2XC will be the top of the line unit. It will be equipped with an alarm, a GPS locator device and a long-range camera, which will allow the parent to visually keep track of the location of the child. The camera will have a range of 15 miles.

A standard button type transmitter will be included with each model of receiver but optional transmitters will be available for other applications. We will offer a watch style that can easily be worn by a child. We will also offer a transmitter that will be incorporated into a locking device to attach to valuable items such as electronic equipment, sporting equipment or luggage while traveling.

Guardian 2000 Competitive Advantages

There are few similar products available on the market today such as Kid Bug, Kid Security,

personal locator and Wander Guard. However, they are either too bulky or they use too much bandwidth to be contained in a practically sized unit. Some like Kid security uses same 49MHZ frequency as Guardian 2000. The research shows that 49MHZ is the best and least expensive frequency to use. However, the problem with 49MHZ frequency is that it is a low and common frequency used by many electronic devices and they will interfere with signal from transmitter to the receiver and cause false alarms particularly in indoor places such as department stores and malls. Others use higher frequency which require FAA licenses or RFM technology which require hardware wiring, similar to the one available at some hospitals to monitor patients and they are much more complicated and expensive.

Several existing products were purchased for purpose of conducting reverse engineering on them. The process of performing reverse engineering of existing products on the market provided a valuable experience to our students. They studied these products in detail and gained valuable knowledge about their designs, strengths and shortcomings. Then the main breakthrough discovery of the Guardian 2000 was conceived. The breakthrough was the copyrighted design of an intelligent microchip that can identify the signal from transmitter to the receiver and will not give false alarm even in presence of other elctronic devices that used same frequency. It also offers more features such as adjustable range and one receiver can receive signals from several transmitters. So a person can monitor several subjects such as kids and objects such as laptops all at the same time. No other competitor's product offers the state-of-the-art features as does Guardian 2000. Also our retail pricing will be considerably lower than our competition. Total cost of manufacturing Guardian 2000 XA model is estimated to be $44 with retail price of $60, which according to market research is very attractive to customers.

Conclusion

In this paper we discussed the growing problem of child abduction in this country and presented a joint effort between various engineering students and their advisors to design and develop a sophisticated global monitoring system to solve the problem. This was part of a funded project to introduce students to real world problems. This invention, which has received extensive media coverage, will hopefully save many lives and gives engineering profession a favorable view in public eyes. Engineering students received valuable lessons on how a new product is developed from just an idea. They also learned that engineering profession like medical profession can have a substantial and meaningful impact on the society that we live in.

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