Project Specifications

MEDSense: An Accessible Pill Cap Dispensing/Cutting Device

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I. Introduction:

For many patients, taking medication can be an arduous task due to the timing of dosages and the requirement of fractional pills in some cases. These problems are compounded in persons with disabilities such as decreased hand motion and strength, poor vision and hearing, and memory loss. This device aims to facilitate the administering of medication, thus allowing patients with disabilities to receive the correct amount of medication at the correct time.

Due to the many different kinds of disabilities of those in the client list, this device has to be versatile. The first aim of the device is to create a multi-modal alert system that would notify the person when to take the medication. The multi-modal alert system would provide both visual and auditory alerts so that people who have vision or hearing loss would be informed to take their medication. At a programmed dosage time, the device will alert the person that it is time to take the medication. Once the person turns off these alarms the medication will be dispensed. The medication encapsulated within the device will not be released outside of the programmed times. The second aim of the device is to create a system that would notify someone off-site that the person missed a dosage. This would allow family members and medical professionals to monitor the patient so that all medication is taken. This provides an extra level of backup in case the person did not hear or see the alarms of the device. Another goal of the device is to create a recording system. This recording system would document which medications have been dispensed from the device. A possible addition to this system would be to notify the user and someone off-site that the medication is low or finished so that the prescription could be refilled.

Currently there are devices on the market that notify clients and dispense medication at pre-determined times. These devices however do not have the ability to cut a pill in half. This is what separates this device from those currently available. Some medications require that a person takes a half pill instead of a whole pill. For those persons without disabilities this is a difficult task because cutting a pill manually is an inexact science. For those persons with decreased hand strength and mobility or vision or hearing loss, this task is nearly impossible. This automated device would cut the pill into halves so that the person could take the correct amount of medication at every dosing period.

II. Realistic Constraints

One constraint of this project is the cost. While there is a budget of $2000.00, the final cost of the device should be much less than that. Many seniors are on a fixed income which limits their purchasing power. If the device is to ever be put on the market the cost would have to be significantly reduced from $2000.00. A goal of the project is to make a full functioning device for a price that would make it economically feasible if put into production. Another constraint in the project is size. The project description states that the final device can be bigger than an actual pill-cap; the goal of the project should be to reduce the size as much as possible.

Another constraint to the project would be the display on the device. The display should be easy to read so that those with vision impairment can clearly read the display. Volume control of the device would be another constraint. The volume should be loud enough that the person can be notified but not too loud so that it harms the hearing of others.

Portability is another concern of the device. Many clients would not merely stay at home all day to take their medication. The device has to be such that it can be carried around and not inhibit the person's daily activities. Also the device should have sufficient battery life so that it can be carried around without the person having to worry about the device turning off

Accuracy is another restriction for the device. The device must be accurate so that the patients receive the correct amount of medication. Inaccurate cutting of pills would result in an excess of medication being dispensed at one time and not enough medication at another time. Along with the accuracy of the cutting is the wide array of sizes and shapes of pills. The device should account for all types of pills and cut each accurately so that all types of medication can be used within the device.

A major constraint for the project would be the user interface. Some clients expressed concern that the device would be too complicated. If a device is too complicated it could either be used incorrectly or not at all. The device should allow for the use of all people regardless of technical ability.

III. Technical Specifications

Electrical Parameters

Battery life	6 months
Display	
Width	5”
Height	4”
Illumination	Bright enough for those with vision impairments to see
Voltages	12 V
Wireless Frequency	50 MHz- 300 MHz

Mechanical Parameters

Force provided by motor to propel blade	10 lbs.
Precision of cutting	Within 5% of weight of pill
Size	
Width	8”
Length	8”
Height	6”
Weight	< 5lbs.
Size of blade	1”
Durability of device	Able to withstand drop from 4 ft. counter
Waterproof	Waterproof seal around casing

Environmental

Location	Able to work in variety of locations because of portability
Operating Temperature	-30 to 150 F
Storage Temperature	-30 to 150 F

Materials

Inert	All surfaces in contact with medication
Non-corrosive	Metal for blade especially

Software

Microprocessor	Programmed in C++
Memory	50 Mb
User Dependent	
Alarm types	Visual and Auditory
Volume of Alarms	110 dB maximum
Colors of visual alarms	Red, green, blue
Machine Dependent	
Execution speed	30 seconds
Termination/ Restart	1 button
Interfaces to other software	DOS
Internal Clock	