Project Statement

Medicine Reminder Device & Shampoo/Conditioner Identification Device

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Project for Clients in the Ohio Respite Volunteer Program

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Medicine Reminder

Statement of Need

A medicine reminder for an independent, forgetful woman has been requested by the Ohio Respite Volunteer Program. Mrs. Smith, an 80-year-old woman, is required to take medicine twice a day for a number of medical conditions. Although she lives with her husband who has been overseeing her medication schedule, she strives for independence with her treatment schedule. Mrs. Smith is bright and sociable, but has frequent states of confusion that impair her ability to reliably stick to her medication schedule. Missing doses of her medication poses serious consequences for her health and increases her states of confusion. Mrs. Smith is unhappy that her husband is taking such responsibility for her medication because she is able to perform everything else in her daily routine independently. Mrs. Smith denies that she has states of confusion that lead to her forgetfulness with respect to her medicine schedule.

Mrs. Smith does not have trouble manipulating containers, liquids, or pills. She is physically capable of taking her medication independently once reminded or prompted to do so. However, she must be reminded when it is time to take her medications and which ones to take. Because of Mrs. Smith’s states of confusion, it is also hard to receive reliable responses to whether or not she has taken her medication, at what time it was taken, and more specifically which medications were taken. Mrs. Smith would like to regain full independence in her daily routine, but without a reliable reminder to take her medication she remains unable.

Basic Preliminary Requirements

Mrs. Smith needs a device that is capable of reminding her to take her medications. Mrs. Smith has frequent states of confusion, but once prompted is able to carry out taking the medication. The device must be able to alert Mrs. Smith that it is time to take her medication. As confusion might arise with different sets of medications to be taken at different times throughout the day, the device must be able to prompt Mrs. Smith to take specified medications and doses at the desired times.

The medications prescribed to an individual are always changing. Therefore, the device must allow input of times and medications by the user. Inputs may include specifications such as time, medication name, and dosage amount.

In order to provide guidance for Mrs. Smith after prompting her to take a specific medication, the device should require input from Mrs. Smith by asking her if she has taken the medication. If Mrs. Smith is able to input an answer of “Yes” or “No” for each medication she has/has not taken, then a log of time and medication could be stored by the device for later review. Another option that
would require input from Mrs. Smith would be to have the device prompt her to mark off on a list that she has taken the medication.

**Basic Limitations**

Mrs. Smith is physically capable of taking the individual medications when prompted to do so. Therefore, the device need not and should not dispense the medication to be taken. The device should be built with respect to convenience. Mrs. Smith will need to have the device with her at all times. In the case the Mrs. Smith will be traveling or out of the house for an entire day, the device should be able to be easily transportable.

With respect to design and input/output options, the device should be simple. To avoid adding confusion to Mrs. Smith’s medications sets, questions and prompts should be direct and simple.

**Other Data:**

The client’s name is Mrs. Smith. Mrs. Smith's request has been brought to the attention of the University of Connecticut Biomedical Engineering Department through the Ohio Respite Volunteer Program. Because Mrs. Smith resides in Ohio, it will be difficult to physically allow her to test the device in our various stages of development. Alternate ways to communicate with Mrs. Smith, through email and by telephone will be used to keep her updated with the progress of the design.

One concern is Mrs. Smith’s vision. If the device needs to be used in poor conditions (without her glasses) then a large digit display must be used for medication prompts, dosage amounts, and time. The large digit display will hopefully eliminate or at least reduce confusion while using the device.

The addition of games to make the device more “friendly” has been brought to our attention. If games are to be added to the device, the device may need to be designed differently from the start. There is the option of modifying an already existing device to make the device more compatible to games.

**Questions**

- Should the device alert system have a vibrate, as well as an alarm, option?
- Should the device screen use extra large writing?
- Should extra buttons used for manual input of medications be separated or enclosed within the device when in use? (To keep the device simple and easy to use for states of confusion.)
□ Should buttons on the device be kept to a minimum?
□ Should the device be programmed for inventory management of her medications? (How many pills to start minus how many she’s taken, with an alarm to tell her its time to go to the pharmacy.)
□ Should the device be small enough to store within a purse or small enough to fit into a pocket?
□ Should the device include a clip (belt) or neck-strap to keep from being misplaced?
□ Should the device have a time display on the front screen?
□ Should the device have an extra, louder, and more intense alarm when taking of medications has been delayed past a specific time period?
□ Should the device provide a list of medications that need to be taken or display medications and doses one at a time, asking for input each time a medication is taken, before displaying the next?
□ Should the device have a “hold” mechanism to keep from buttons being pressed accidentally?
□ Should the “hold” mechanism be turned on automatically once a medicine set has been completed or should it have to be manually turned on?
□ Should the device have a password mode of entry?
□ Should the device have multiple powering options or only one method? (i.e. Battery and/or power cord)
□ How should the summary of dates and times be displayed so that caretakers can monitor her progress? Should it prompt her to mark a printed sheet or should it be displayed on the monitor as an option menu?
□ Would having gaming options as suggested be realistic to this device or would it be distracting the patient with the purpose of the device?
□ If a gaming option is realistic, what type of game would you have on it?
Shampoo/Conditioner Identification

Statement of Need:

A device is needed to help Mrs. Smith, an elderly patient with visual acuity problems discern the shampoo from the conditioner bottles while in the shower. Mrs. Smith is an 80-year-old woman who wears glasses due to her visual handicap. She also has a mild-to-moderate progressive cognitive impairment. Because she takes a shower daily, she complains almost every day of how confused she gets about which bottle is shampoo and which is conditioner. Changing the physical shape, color and size of the bottles do not help Mrs. Smith because she tends to forget which is which. Labeling the bottles in large letters do not help either because of the magnitude of her poor vision.

Basic Preliminary Requirements:

Mrs. Smith found that using color, large lettering or size/shape markers to identify the shampoo/conditioner bottles in the shower were ineffective because of her reduced vision and memory. Her glasses cannot effectively be worn in the shower, therefore a device is needed that will make use of Mrs. Smith’s auditory capability to make up for her lack of reliable vision in the shower.

A device is required that has the following properties:
- Safely works underwater
- Lightweight
- Compatible with the size and shape of the shampoo and conditioner bottles
- Emits an audible reminder of which bottle Mrs. Smith is using
- Corrosion resistant
- Easy of use

Basic Limitations:

Because safety is the number one concern when dealing with electronic devices that are meant to be used under water, we must ensure that the currents within our device stay within the device. The outer casing of the device should be airtight to avoid a short circuit. The device should be powered by a low voltage battery source, and not the 120VAC source from the bathroom wall.

This device should be as easy for Mrs. Smith to use as possible to help maximize her satisfaction with our device. Because of the relatively simple nature of the problem, there should be as few buttons to operate the device as possible. The device should be low maintenance. The device should not require a lot of user manipulation to operate or clean the device. Battery life should be optimized as well.
The device should be compatible with the shape and size of various shampoo and conditioner bottles on the market.

**Other Data:**

Because Mrs. Smith is located in Ohio, alternate ways to test our device at various stages of development will have to be found. The size, shape and contours of the shower area would be good to know about, as they may offer new possibilities for the design of our device.

The materials used for our design will have to be chosen to optimize our device’s ability to perform as it was intended. Sealing materials will have to be chosen that will best waterproof our device. Casing options will have to be considered that will help minimize the weight of the device.

Mounting options will have to be considered. The design may have to take Mrs. Smith’s reach capability into account, as she may have trouble reaching low for the shampoo/conditioner bottles if they are located on the rim of the bathtub, or up high on a shower rack.

**Questions:**

Building a device that emits an audible “Shampoo” or “Conditioner” when a bottle is picked up is straightforward, but where this device is placed in the shower is where much of the concern lies. Should the device be mounted directly on the shampoo/conditioner bottles, or should the device holster the bottles? If the device is mounted on the bottles themselves, how do we make it compatible to different bottle shapes and sizes? And if it holsters the bottles, where do we mount the holster? Do we mount it under the shower head, or on the shower curtain rod? Do we use a waterproof adhesive to mount it on the shower wall, or do we mount it by a hook?

These questions can be answered best after finding out what materials are available for the design of the device, and the features of the shower area.