Project Statement

Shampoo/Conditioner Identification Device

Project for Clients in the Ohio Respite Volunteer Program

Team #4
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**Statement of Need:**

A novel biomedical device is required to aid Mrs. Smith, an elderly woman with reduced visual perception. In addition, Mrs. Smith faces mild-to-moderate progressive cognitive impairment. This has caused difficulty in the shower, with respect to differentiating between shampoo and conditioner bottles. Various rudimentary methods have been attempted to resolve this issue, such as clearly demarcating bottles with large letters and using containers of varying dimensions. It has become apparent that Mrs. Smith will require another means of distinguishing between the bottles, thus eliminating the need to deal with shapes, colors, and sizes.

**Basic Preliminary Requirements:**

Since the use of various colors, large lettering or size/shape markers to identify the shampoo/conditioner bottles in the shower were ineffective; in addition, it is not practical for Mrs. Smith to wear her glasses in the shower. The family has requested a lightweight waterproof shock-proof device that utilizes her auditory abilities. The design should be able to attach to each bottle. When squeezed gently, it should emit an auditory voice signal - “shampoo” or “conditioner!”

Based on a preliminary assessment of Mrs. Smith’s need, we feel that our design should possess the following properties:

- Ability to work safely underwater (shock-proof)
- Light in weight and compact to eliminate cumbersomeness and the possibility of injury.
- Emission of an audible reminder to identify the particular
- Corrosion Resistance
- In case of unintentional damage, the device must have accessible electrical test points for checking or repairing its operation.

**Basic Limitations:**

Due to the nature of the environment in which our device will be utilized, and the unique requirements of our client, it is clear that safety is the primary concern. We must ensure that the electronic device does not short out due through contact with water. In addition to being airtight, the device should require a low-voltage power source with an optimized working life.

Mrs. Smith’s impaired visual acuity calls for relatively few buttons (and large in size) to operate the device. It would be helpful to create a low-maintenance device, requiring minimal upkeep.
**Other Data:**

At this stage, more information on Mrs. Smith’s requirements will be of prime importance. Since Mrs. Smith resides in Ohio, we will not be able to test our device at various stages in the product development process. It would be helpful to know the specifics of Mrs. Smith’s shower to gain an insight on the environment in which the device plans to be functional.

Choosing materials to optimize our devices capabilities and cater to Mrs. Smith’s physical needs will be vital considerations. Safety will be incorporated through appropriate sealing materials. The design will account for Mrs. Smith’s ability to reach, as obtaining low –height shampoo/conditioner bottles (if they are located on the rim of the bathtub) or a high shower rack will prove difficult.

**Questions:**

- Will another individual periodically visit Mrs. Smith to refill the shampoo and conditioner bottles, or should the device be detachable to fit various bottles?

- What are the shower dimensions, and where does Mrs. Smith intend on placing the device?

- If the device is mounted on the bottles themselves, how do we make it compatible to different bottle shapes and sizes? Example: Is there range for the bottle’s diameter?

- How will the device be mounted to the wall?

- Where on the bottle would Mrs. Smith like the holster?

- Is a waterproof adhesive necessary to mount it on the shower wall, or do we mount it using a hook?
Project Statement

Backpack Lever Arm System

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Statement of Need:

A novel biomedical device is required to aid Mason McClement, an eight-year old suffering from cerebral palsy, a non-contagious disease that causes physical disability in human development. Typically, this disorder is characterized by abnormal muscle tone, posture, reflexes, or motor development and coordination. In addition, there can be joint and bone deformities and contractures. This condition generally leads to spasms and other involuntary movements. This has caused increased dependency on others, even to carry out minor tasks. Thus, Mason has a strong desire to be independent and wishes for the capability to access his possessions without outside assistance. Specifically, this refers to being able to remove objects from his back pack, which is usually attached to the back of the wheelchair.

Basic Preliminary Requirements:

Since extending reach to his possessions is not practical for Mason McClement, a design will be required to move his backpack to his left side and preferably as close to his front mid-line as possible to allow him the best access to the materials inside. The family has requested a lightweight, wheel-chair compatible device that utilizes his present abilities, which includes a very functional right shoulder/arm/hand with good strength, range of motion and fine motor skills. The design should be a small and convenient accessory to his wheelchair. In addition, it will not interfere with his movement or mobility.

Based on a preliminary assessment of mason’s need, we feel that our design should possess the following properties:

- Ability to operate safely within a busy (school-like) environment
- Can be easily removed and attach to a different wheel chair
- Be able to handle at least thirty pounds of weight
- Light in weight and compact to eliminate cumbersomeness and the possibility of injury.
- Wear- resistant
- In case of unintentional damage, the device must have accessible electrical test points for checking or repairing its operation.

Basic Limitations:

Due to the nature of the environment in which our device will be utilized, and the unique requirements of our client, it is clear that safety is the primary concern. We must ensure that the electronic device does not interfere with any other activities. In addition, the device should require a low-voltage power source with an optimized working life.
Mason’s impaired motor activity calls for relatively few buttons (and large in size) to operate the device. It would be helpful to create a low-maintenance device, requiring minimal upkeep.

**Other Data:**

Although we were able to obtain some preliminary information about Mason from his parents, more detailed information on Mason McClement’s physical abilities and requirements is still the prime importance. Since he resides in Calgary, Alberta, we will not be able to test our device at various stages in the product development process. It would be helpful to know the specifics of Mason’s wheelchair to gain an insight on the environment in which the device plans to be functional.

Choosing materials to optimize our devices capabilities and cater to Mr. McClement’s physical needs will be vital considerations. Safety will be incorporated through appropriate materials. The design will account for Mr. McClement’s inability to extend his reach to the back of his wheelchair; thus, it will call for an instrument to bring whatever he requires forward at the right height.

**Questions:**

- Can he move his torso to either side of his body?
- What are the specifications of his wheelchair (length, width, height of relevant parts - arm rest, handles, other potential attachments points)?
- What wheelchair is the family planning on buying for Mason in the future?
- If the backpack is placed in front of him, will he be able to reach in and get the items he requires?
- How often will this device be used?