Project Statement

Monitor Lift for Adjustment of Computer Display

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TEAM #4

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**Statement of Need**

In the Neurolinguistics laboratory, it is a very difficult task for practitioners to lift the 21-inch monitor from the platform to the desk surface. The monitor needs to be lifted 12 inches off the desk surface and back down close to the desk surface frequently. The purpose of lifting this monitor is to present diagnostic and treatment materials to patients with neurogenic communication disorders.

With this difficulty being concerned in the laboratory, the request of creating a lift for this particular monitor is made. The client is seeking to obtain a monitor lift that does not require a lot of force from the person who is lifting up the monitor. Safety is also the main concern since the monitor lift has a heavy weight. The client also prefers to have a simple operating lift without much of operating complication.

**Basic Preliminary Requirements**

Patients with neurological abnormalities, neurogenic communication disorders in this case, are unable to respond to stimuli thus requiring a device to monitor their eye movements as a means of recording their comprehension of auditory and visual cues. The current problem is that the patient is required to be positioned to where the eye tracking monitor is, often resulting in an awkward and uncomfortable orientation during testing. Because of their disorder often time’s movement or communication are limited and require a device that can be brought to them opposed to their movement to the device.

The monitor lift project was initially attempted in 1999. However, it was not successful due to the bulky and complex mechanical structure of the equipment. The size of the monitor lift needs to be reduced to minimum because it is placed on the desk next to the patient’s station. The goal is not to distract the patient during the experiment. Therefore, no unnecessary wires should be seen. Further, the monitor lift is required to have an opening at the front which is used to place the optic unit from the eye tracking system. The height of the optical unit should not exceed 10.5 inches in height so as not to obstruct the patient’s line of sight. Other requirements are taking into considerations such as user-friendly, durable, and reliable. The monitor lift should not produce significantly disturbing noise when it is being used.

**Basic Limitations**

- Since the monitor is big in size, the lift might be large to withhold the monitor.
- Noise produced during operation, but can be limited
- The opening at the front of the lift should be able to accommodate the eye tracking device.
- Must be black in color or have the ability to be covered by a cloth without hindering its performance.
• Must also withstand fatigue and wear due to numerous operations throughout the day and from patient to patient.
• Must be able to operate in standard laboratory conditions (i.e. Normal pressure, room temperature, presence of air particles, etc.)
• Material of the device should have low reflective properties so as to not interfere with the patient’s sight.
• Simple and easy remote device used to control the lifting of the monitor.
• Range of motion of the device must not be less than 12 inches.

Other Data

Information about the Neurolinguistics laboratory at Ohio University and their studies can be found at the following websites:
• http://oak.cats.ohiou.edu/~hallowel/NeuroLinguistics/eyemovement.html

Questions

• What are the other devices currently in used?
• Does the device need to have infinite heights available or is it simply a lift that is either at maximum or minimum?
• How big is the eye tracking device that is to be accommodated below the monitor?
• What is meant by the “whole optics unit must be 10.5 inches below the patient’s line of sight?”
• What problems were encountered with the device created in 1999?
• What is the additional nature of the laboratory setting?
• Must the Device be able to accommodate a person in a wheelchair or hospital bed?
• How many devices needed in the laboratory?
• What is the budget for this project?
• Do we have to build the device from scratch or order another device and implement it?
Paint Cap Remover

Statement of Need

Multiple Sclerosis (MS) is a disease that afflicts over 90 million Americans and strips them from the activities they used to commonly perform. It is an autoimmune illness that attacks the central nervous system and becomes progressively worse throughout a patient's life. This devastating disease has different symptoms, but many suffer from a loss of physical and cognitive functions.

Our project will be to design a method to help a painter with MS open a specific bottle of oil paint. Since his disease is hindering his career, it is very important to find a solution to help him open his paint and regain control of his life. Our design will be a device which he can easily operate to remove the caps from the tubes. This will allow easy access to his paint and enable him to continue his new career as a painter.

Basic Preliminary Requirements

Our goal is to help a former physician who was forced to give up his practice due to complications from Multiple Sclerosis. He has no lower body function and only one functional hand, however he has astonishingly transformed his career into the world of art. He is now an imaginative and successful painter who works primarily with oil paint. Unfortunately, the paint tubes he most frequently buys regularly dry shut and become difficult to open. Due to the disease, his hand strength is severely limited and he cannot open the tubes of paint. As an adult it has become very frustrating to have his independence restricted, since his art has become his life.

The device must be operable by a person with very limited body function. It must be used with little strength; the painter's grip has been significantly diminished due to Multiple Sclerosis. The device must be operable with only one hand, which means it will probably be a multi-staged device. The paint tube can be lifted into the device. The device should be able to open crust-dried cap on a specific paint tube: the 1.25 oz Grumbacher brand. The device must be accessible from a wheelchair.

Basic Limitations

- The device must be safe and easy to use on a regular basis.
- The device must not damage or puncture the paint tube.
- The device should function properly whether the tube is full or nearly empty.
- The user cannot be required to use much strength to operate the device in any way.
- The user cannot be required to use more than one hand to operate the device.
- The device must be accessible from a wheelchair.
Other Data

Our client is a former physician who was forced to give up his practice due to complications from multiple sclerosis. The device should be fully automated since he does not have function of his lower body or dominant hand. He can place the tube wherever it needs to be, but there should not be any task that requires much force. Since the client has made a career of painting, the device will be used often. Therefore, it should be durable and wear resistant. He uses 1.25 oz. tubes of Grumbacher brand oil paint. At the very least, the device should be able to open this specific model of paint tube.

Questions

- Should the device be able to adjust to open different sizes/types of paint tubes if the painter decides to change brands in the future?
- Should the device be portable or will it be kept in the same spot?
- What material should the device be made of so that it is easy to clean?
- Does the device have to be able to put the paint cap back on?
- How will the device be braced so that as the cap is removed, paint will not come out of the tube and the tube will not be bent out of shape?
- Should the device be able to sense when the cap has been removed?
- Are aesthetics important to the client?
- If the device is electronic, should it be powered by batteries so it can be moved?
- Is there a power outlet at a convenient spot in the client’s workspace?
- Does the artist prefer to squeeze the paint out of the tube? Would it be an inconvenience to have the tube in some type of bracket?
- How should the device be formed so that it works reliably whether the tube is full or nearly empty?