CHAPTER 5
BINGHAMTON UNIVERSITY

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Principal Investigator:

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JANITORIAL CLEANING CART FOR AN ADULT WITH AUTISTM

Designers: Avraham Assaban, Rui Meng Hu,
Client Coordinator: Darlene Dickinson, Southern Tier Independence Center
Supervising Professor: Dr. Richard Culver
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INTRODUCTION

A janitorial cart was designed for an adult with autism who works as a janitor. The janitorial pushcart supports a vacuum cleaner on the main platform and has room for a garbage can. On the shelf, the client has room to store cleanings fluids, garbage bags, rags, a water bottle, and cups. Since one of the primary ways the client communicates is by pointing to a letter on a sheet of paper, a paper on which the alphabet and numbers was printed and laminated so that it would not get stained.

SUMMARY OF IMPACT

Previously, the client had no such device for carrying his supplies and, therefore, had to go back and forth between the storage closet and the offices he was cleaning. With this cart, all the necessary supplies, such as a garbage can and vacuum and cleaning supplies, are readily accessible to him. Also, since the cart is rugged and durable, the client can expand his employment to different offices in the area.

TECHNICAL DESCRIPTION

The cart is 28 inches wide, 38 inches long and 46 inches high. The dimensions are suitable for the client's height. The frame of the cart is made of 1 ¼-in furniture-grade PVC tubing. Steel tubes are used to reinforce the PVC tubes on the bottom center of the cart, to support the trashcan.

A white plastic sheet, reinforced by ¾-in particleboard, covers the top of the cart, providing a surface that is easy to clean. The handle bar on the back of the cart provides support and is used to push the cart. There are four 4-in diameter casters on the corners of the cart. The wheels are easy to move in all directions and the back two wheels are equipped with brakes. There is a wooden sheet in the front that holds the vacuum upright.

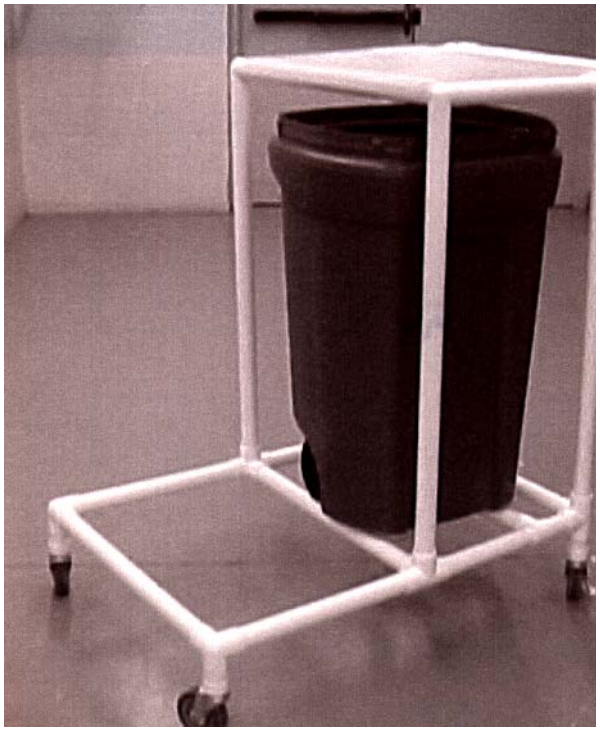

Figure 5.1. Cleaning Cart in Production.

There are two layers of the cart, the upper and lower. The trashcan is located on the bottom layer. The back of the cart is open for easy trash disposal. The trashcan is connected to the cart by a chain and is supported by a hook, which sits on the plastic frame. It can be tilted for dumping garbage. Since the client works in different buildings, the cart is lightweight and easily movable.

The cost of the material was about $ 130.

WHEELCHAIR ATTACHMENT TO SUPPORT SPEECH DEVICE

Designer: Alicia Heer, Kieron Ludde, Si Mai, Thomas Morrissey
Client: Melanie Coombs, Binghamton BOCES Developmental Center, Binghamton NY
Supervising Professor: Professor Richard Mecklenborg
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INTRODUCTION

A wheelchair attachment has been designed to support a speech device for an eight-year-old boy with cerebral palsy. As a result of his condition, Jared is unable to speak and balance anything on his lap. He uses a speech device to communicate with other people. The frame, which is made of ¾-in copper water pipe, supports a plywood table with a cutout to hold the speech device. The copper pipe is attached to the wheelchair with machined brackets.

SUMMARY OF IMPACT

As a result of the project, the client will be able to communicate with other people without the supervision of therapists. Moreover, the therapists will not have to carry the speech device around for the client because it can be directly attached to his wheelchair. It can also be detached when it is not in use. Furthermore, the frame can serve many other purposes when it is not supporting the speech device. For example, it may be used as a tabletop or a workstation.

TECHNICAL DESCRIPTION

The design constraints for the frame were that it be lightweight and detachable from the wheelchair. It must support the speech device, which weighs about 15 pounds.

The main materials for this project are two copper pipes (3/4 in. radius), a 11x14 piece of furniture-quality plywood (1/2-inch thick), and different types of clamps and elbows. These materials were chosen because they are very strong and light and can support the weight of the speech device and the forces exerted by our client.

Figure 5.2. Wheelchair Attachment To Support Speech Device.

The copper pipes are bent slightly into an L shape. The two pipes are connected to the two inner sides of the wheelchair with machined brackets, so the device is easily removable. A rectangular hole was cut in the wooden tabletop to fit and stabilize the speech device.

The cost of materials for this project is $10.

WATSON ALARM TO MONITOR A CHILD WITH AUTISM

Designers: Eugene Gasmen, Jason Gibbs, Vladimyr Gouin
Client Coordinator: Darlene Dickinson, Southern Tier Independence Center
Supervising Professor: Prof Richard Mecklenborg
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INTRODUCTION

An alarm device was designed to alert the family of a child with autism when the child leaves the house. The family's home is located at the intersection of two major highways, and the child has very good mechanical manipulation abilities. In the past, the family used different types of barriers to keep him from leaving the home. They did not want to use a two-sided keyed deadbolt because of the associated fire safety hazard. Also, it is difficult to have the house always on lockdown; the mother uses some of the doors to the house regularly to let dogs out and to hang out laundry. The alarm, which consists of transmitters that sound a central unit whenever any of the four armed doors is opened, is designed to be a safe and convenient remedy. It provides a non-intrusive form of safety for the child.

SUMMARY OF IMPACT

The design criteria for the alarm were dictated by the layout of the home and the desires of the family. The mother did not want an alarm that would be fixed to a wall somewhere in the house that would be so loud that it would wake her neighbors at night or scare the rest of her children. She asked us for some sort of portable, unit with adjustable volume to notify her when the doors are opened. She also desired four different doors in the home to be alarmed. There are three exits to the home and a closet that contains dangerous chemicals. However, the most important exit is the front door, because it leads out onto the road. As a result, she wants this door's alarm to be louder than the other three. If possible, she wanted four different tones for each of the four doors. Our alarm system produces four different tones, the front door's being the loudest and its alarm noise emanating from a portable, battery-operated, hand-held, volume-adjustable unit. The alarm provides safety and convenience for the whole family. Rather than having to unbolt large locks or worry about the safety of her child, the mother can know of his whereabouts. She can also do work outside of the home and monitor him.

Figure 5.3. Base Unit and Handheld Receiver.

TECHNICAL DESCRIPTION

The alarm consists of two separate radio-frequency systems. The first system consists of wireless doorbells. The pushbutton transmitters are modified so that instead of the circuit being completed when the integrated button is depressed, it is completed by opening the door. This is accomplished by using magnetic switches that are normally used in security systems. These switches are soldered to the circuit board of the doorbell transmitter units such that opening the door mimics the depressing of the switch.

When a door is opened, the unit sends a signal to the transmitter, causing the doorbell receiver to sound. Doorbell units with two transmitters per receiver are used. In order to wire each of the doors in the home, two such sets were required. The factory defaults on

these units send all signals at the same frequency. This would cause both receivers to sound if any one transmitter was tripped in the home. By changing the jumper settings on the circuit board of the transmitters and receiver of one set, it can be operated at different frequencies. Now all four transmitters work on different frequencies, but there are only two distinct sounds, those that come with the doorbell receivers. One is an eight-tone chime and one is a two-tone chime. By opening the receiver case and modifying the speaker, it was possible to cut the volume output and, to some extent, the sound frequency of one of the receivers. By doing so, one door chime sounds louder than the others.

The front door uses the loud eight-chime doorbell. The two receivers are placed in a locking plastic box. Along with them, a baby monitor transmitter is included. The microphone on the baby monitor picks up the noises of the doorbells and transmits it to a handheld unit with adjustable volume that the mother can attach to her belt. The plastic box is insulated with sound-deadening material that keeps the tones of the doorbells within it and can be placed anywhere in the home where it can be plugged in, out of sight. The only visible aspects of the design are very small transmitters of the doorbells, approximately ¾″ x ¾″ x 2″, the magnetic switches, ¼″ x ¼″ x 1 ¼″, and the baby monitor receiver, 1″ x 2 ½″ x 6″. The parts are readily available at local discount retailers and electronic supply stores.

Total cost for all parts and materials was less than $140.

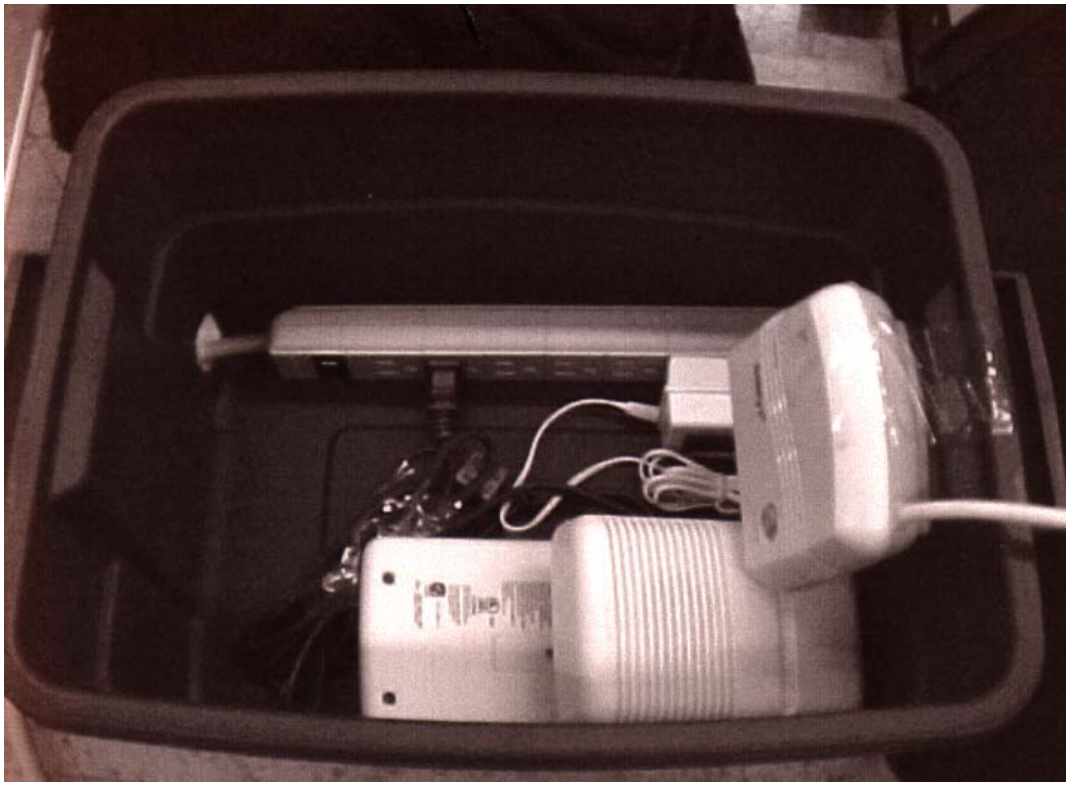

Figure 5.4: Interior View of Housing

MOVEABLE SHELVING UNIT

Designers: Matt Parker, Jamie Micha, Samit Pabuwal
Client Coordinator: David Scudder
Supervising Professor: Richard Mecklenborg
Division of Engineering Design
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INTRODUCTION

A woman with muscular dystrophy was arranging her kitchen so that she would be able to work inside her home. She needed a moveable shelving unit to hold paper and other supplies for her work. A free-moving freestanding cart, set on four pivoting castors was built. She can roll it to the position she needs for her work and then store it under her desk when she is finished.

SUMMARY OF IMPACT

The moveable storage cart will help the client improve her independence by enabling her to move more freely around her kitchen/office when she works from her home.

TECHNICAL DESCRIPTION

The moveable shelving unit is made of ½-in. furniture-grade oak plywood with a dark oak varnished finish. It is lightweight and easy to roll. Each side has a large, easy-to-grip handle. The front and top of the cart are open, making it easier to reach in and out without the hindrance of pullout drawers or closed cabinet doors. The shelves are adjustable, allowing the client to arrange the unit in a manner fit to her specific needs. Four locking castors make it easy for her to move the cart and then lock it in place anywhere she needs.

The project cost approximately $75. Similar commercial products cost as much as $500.

Figure 5.5. Moveable Shelving Unit.

STANDING FRAME FOR A CHILD WITH REDUCED MOTOR ABILITY

Designers: Greg McDermott, Rijie Zheng, Hae Jin Lee, Dave Naeder
Client Coordinator: Anne Marie Murphy, Rehabilitation Services, Inc.
Supervising Professor: Prof. Richard Mecklenborg
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INTRODUCTION

William is a two and a half-year old boy that has reduced motor ability. During his physical therapy sessions, the client performs exercises to strengthen his balance and coordination. In one of the exercises, he pulls himself from sitting to a standing position with the aid of a bar. He had been suing an old walker for this purpose. A new frame was created to offer stability. It has a series of bars on the front and sides to grab onto.

SUMMARY OF IMPACT

The device helps the client develop his strength and coordination. It is lightweight and portable. The device can be used in the client's home so his parents can work with him outside of therapy. It has a surface that is stable for him to sit on and bars that surround him on three sides so that he can pull himself to a standing position. The bars allow him to maintain a standing position and work on his balance. The device allows him to work on his coordination and balance with the aid of a physical therapist or a parent.

TECHNICAL DESCRIPTION

The base of the standing frame is 36 x 36 in., ½-in. plywood. The frame is made of furniture-grade PVC piping, which is strong yet lightweight, so the device is easily transported. In addition, PVC is aesthetically pleasing and easy to clean. The device is open on one side so the client can be placed on the base. The horizontal bars on the front of the frame are 1 in. in diameter as opposed to the 1 ½-in. diameter of the rest of the pipes. The smaller pipes in front allow him to grip firmly the bars to pull himself up. The pipes were converted to different diameters using bushings on each joint of the front beams.

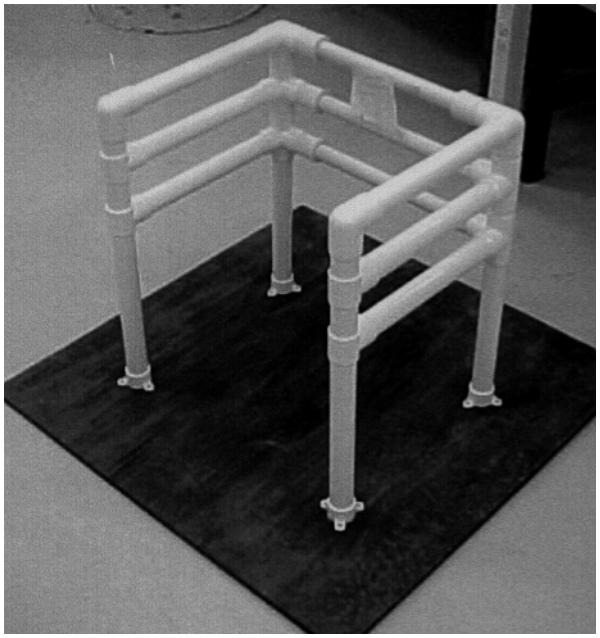

Figure 5.6. Standing Frame

WHEELED CART WITH LIFT-AND-LOWER PLATFORM

Designers: Kellen Wadach, Heather Sheiman, Weng Kai Sit, and Tania Philip
Client Coordinator: Darlene Dickinson, Southern Tier Independence Center, Binghamton, NY
Supervising Professor: Richard Mecklenborg
Division of Engineering Design
Watson School of Engineering and Design
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INTRODUCTION

The wheeled cart with lift-and-lower platform is designed to meet the needs of a legally blind client who breeds and sells rabbits. The client is 57 years old and recently had surgery on his back to remove a disk. Although he is able to see large objects, he is unable to see minute details. His rabbit business requires him to lift many 30-pound bags of rabbit feed from the back of his truck down to ground level. He was doing all of the lifting manually. Due to his recent back surgery, he is only able to lift one bag at a time. This process is inefficient and is putting a tremendous amount of strain on his back. A lifting device is needed that will lift at least 150-pounds at a time and be activated without putting strain on the client's back. The device was required to lift from ground level to over four feet and to be safe. .

SUMMARY OF IMPACT

Using the lifting device, the client will be able to run his rabbit business more efficiently. It will also help him recover from his back surgery more rapidly.

TECHNICAL DESCRIPTION

Many existing lifting devices are either too expensive or accomplish more than what the client needs. Only one hydraulic lifting table fit all of his needs. This lifting table weighs 215 pounds. It can lift about 770 pounds and it can rise from 13.8 to 52 inches. The dimension of its platform is 36" long, 20 " wide and 2.2 " deep. It operates with a foot pedal, contains a hand release. The client is concerned about the size of the wheels because of the cracks in his pavement but it appears to functions well. The platform was enlarged so the client can put more supplies on it at one time. The plywood surface is made of ¾ in. exterior grade plywood and is painted with exterior paint. It is 30 in. by 42 in.

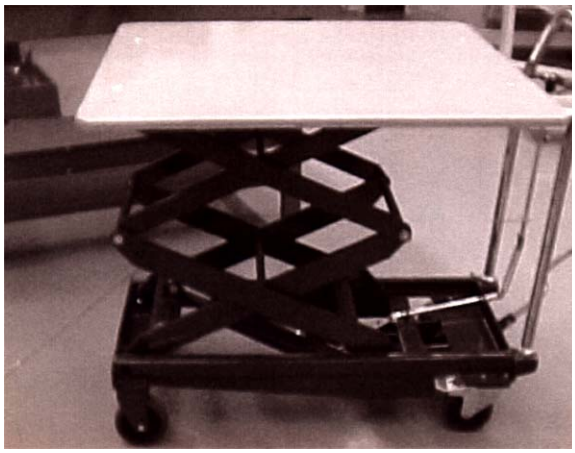

Figure 5.7. Cart with Lifting Frame

The total cost of parts and materials is about $380.

ADJUSTABLE TABLE FOR A PERSON WITH QUADRIPLEGIA

Designers: Austin Wong, Matthew Sills, Artem Treyger
Client Coordinator: Darlene Dickenson, STIC
Supervisor Professor: Richard Mecklenborg
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INTRODUCTION

The adjustable table is has been built to fit around a wheelchair. Due to a cancerous tumor on his neck, the client is paralyzed from the neck down. With therapy, he has regained some limited movement in his left hand. The table enables the client to freely place remote controls, telephones, beverages, and other objects at a comfortable distance. The table is made of wood and conduit metal pipes. The table surface is height adjustable from 32 to 44 inches off the ground. The three castors are situated so that the support frame can straddle the wheels on the wheelchair. The table can be used when the client is sitting in his wheelchair and also when he is in bed.

SUMMARY OF IMPACT

The new table freestanding, sturdy, adjustable and easy to use. The table allows the client to place essential items, such as telephone, remote controls, and beverages, at a convenient height so that his mouthpiece can reach these items. The table can also be wheeled to his bed where it is adjusted to bed height.

TECHNICAL DESCRIPTION

The base of the table was made of steel EMT tubing. Two different sizes of the tubing were used: ¾-in. for the base frame, and ½-in. tubing that telescopes inside the ¾-in. tubing, to support the tabletop. The three castors were fastened onto the base by bolts. The base is composed of two pieces of conduit pipes, brazed together. The tabletop is 16 x 28 in., made of ½ in. furniture-grade plywood. ½-inch pipe clamps hold the tabletop in place. The 3/8-in holes, which enable vertical movement of the table, were drilled into the ½-inch pipe every three inches. Two ¼-inch pins are used to set the height of the tabletop.

Figure 5.8. Adjustable Table

The cost of materials is about $20.

CHILDPROOF KITCHEN DRAWER

Designers: Ryan Varnum, Aaron Wright, Akio Yanagisawa
Client Coordinator: Darlene
Supervising Professor: Richard Mecklenborg
Department of Mechanical Engineering
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INTRODUCTION

The Child-Proof Kitchen Drawer has been built to contribute to the safety of a child with autism. The device uses a complex series of actions to open the locking system. First, the handle must be rotated 90 degrees to release a latch, which locks behind the inside of the cabinet frame. This allows the drawer to be pulled out about 3 inches. Second, a tab on a plastic locking mechanism on the bottom of the drawer must be depressed to allow it to be pulled out far enough to remove the internal contents of the drawer.

SUMMARY OF IMPACT

A child with autism has a fascination with the knife set in the family kitchen. Standard childproof techniques have failed to work. Hopefully, the complexity of the Child-Proof Drawer will deter the curious toddler from accidentally injuring himself. Both parents are very busy with work and family care. Hence, they cannot constantly keep him under scrutiny to prevent him from injuring himself. Therefore, the parents requested a locking system that would avert the toddler from regularly gaining access to the knife set. They also needed something that was convenient for them to open without having to worry about a key. In addition, the environmental impact had to be minimized. The childproof drawer device relieves the parents from constant worry about the child's accessing the knives.

TECHNICAL DESCRIPTION

The Childproof Drawer is a modification of a standard kitchen under-the-counter drawer. The modifications of the drawer are composed of two components. The handle on the front of the drawer has been modified so that it is held on just one side. Attached to the back of the anchored side of the handle is a sheet metal bracket which, when rotated so that the handle is in its normal position, locks on the back of the cabinet frame that surrounds the drawer. With the handle in its normal position, it appears that the drawer can be opened but, in fact, it can only be opened when rotated upward about 90 degrees so that the bracket no longer prevents the drawer from being opened.

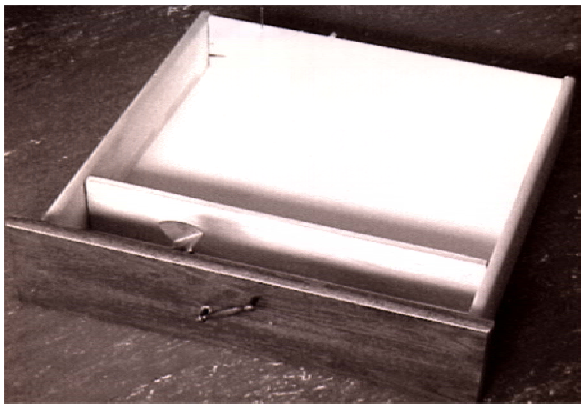

Figure 5.9 Childproof Drawer.

The bottom of the drawer is equipped with a plastic glider manufactured by Delta Industries. Originally the Delta glider was mounted at the back of the drawer to prevent the user from unintentionally pulling the drawer all the way out and spilling the contents on the floor. The modification involved moving the Delta Glider forward about 10 inches, where it is glued to the bottom of the Child-Proof Drawer in such a way that the glider slides along the metal track that has already been installed.

Hence, to open the drawer the handle has to be rotated about 90 degrees. Then, the drawer can be pulled out a few inches. Then, by reaching underneath the drawer and depressing a small lever on the Delta glider will allow the glider to detach from the metal track. Thus the device can be fully opened and the contents of the drawer accessed. The complexity of the device should prevent the child from opening the drawer, but allow the parents to easily reach the kitchen knives.

The cost of parts and materials is about $5.

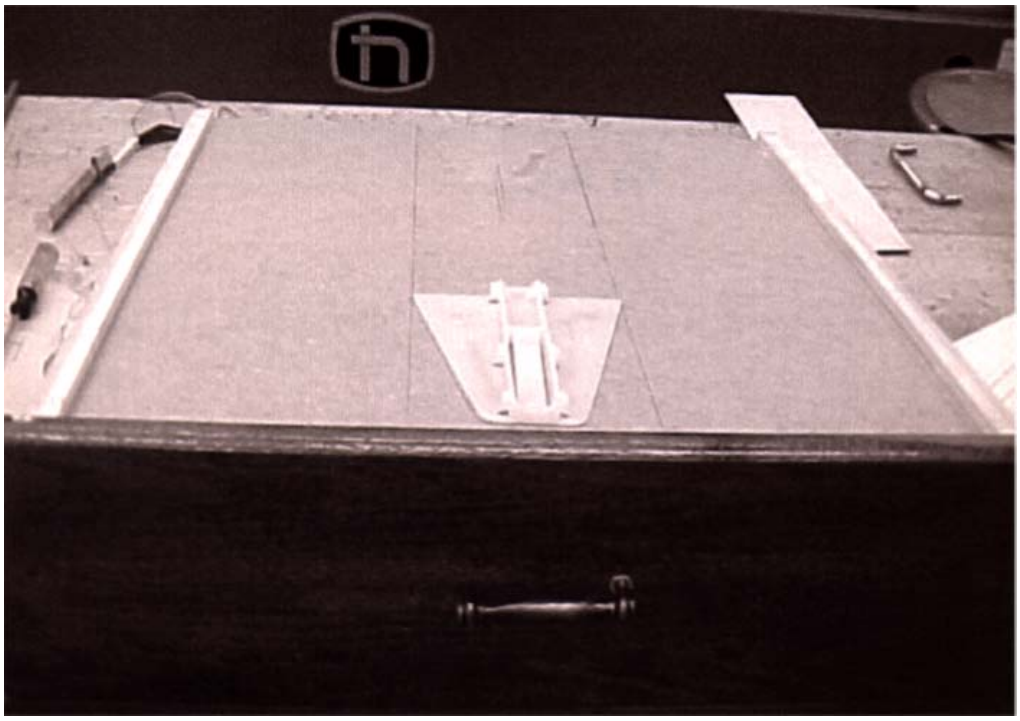

Figure 5.10. Plastic Locking Device.

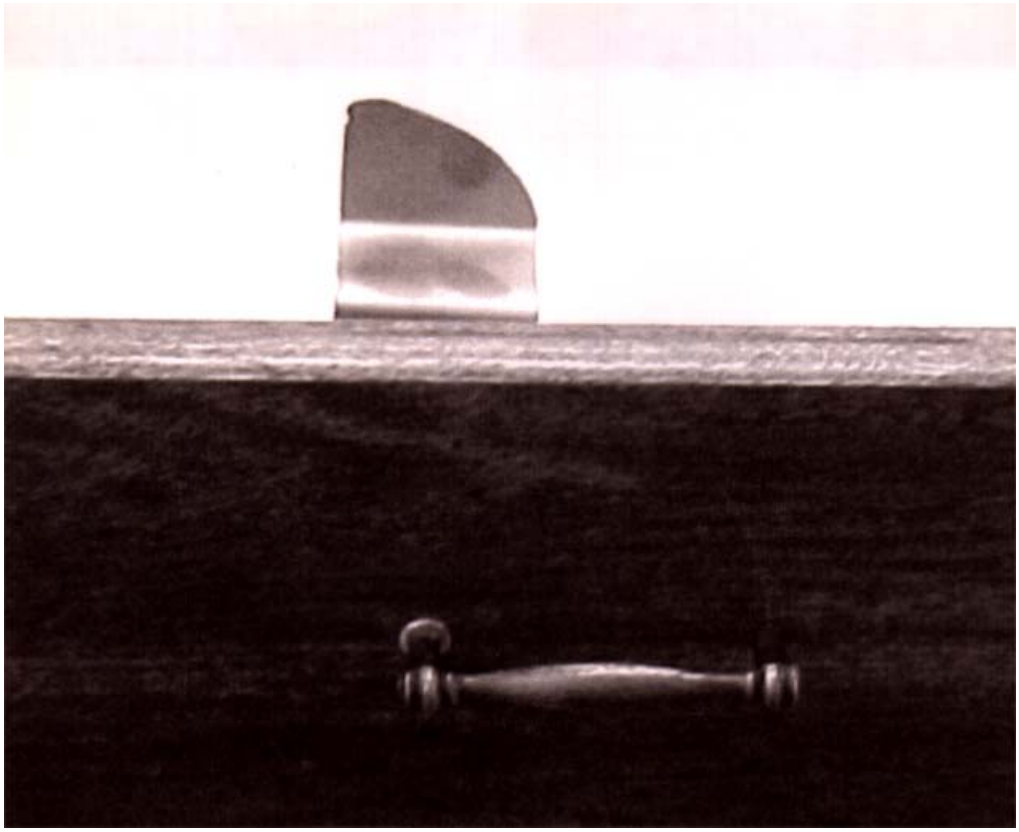

Figure 5.11. Locking Handle.

ONE HANDED CAN OPENER

Designers: Leo Yoon and Alan Weinberg
Client coordinator: Darlene Dickinson, STIC
Supervising Professor: Richard Mecklenborg
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INTRODUCTION

The One-Handed Can Opener (OHCOP) is designed to provide self-sufficiency in the kitchen for a person with hemiplegia. The OHCOP is an adapted electric can opener and has an exterior-mounted, adjustable support for the can. As the can is being opened, the person does not have to hold the can. This device requires only one action by the user for each can-opening operation. The OHCOP will accommodate up to one-quart cans.

SUMMARY OF IMPACT

The client has hemiplegia due to a brain injury caused by a motorcycle accident. The can opener allows her to open food cans with her functional hand and therefore allows her some self-sufficiency in the kitchen. The OHCO is small, reliable, easy to use, easy to clean, and inexpensive. With the possibility of making her own food with an adapted can opener, she will be more self-sufficient in the kitchen.

TECHNICAL DESCRIPTION

The original can opener is made by a Magic Chef. The main structure of the OHCO is the plastic outer shell of the initial can opener. The can support is made of 6061 -T6 aluminum. The vertical sliding base is supported by two vertical rods that, in turn, are anchored to an aluminum plate connected to the can opener. The sliding base is threaded and can be raised and lowered with one hand by twisting a knob on the top of a vertical screw. In operation, the can is placed on the base and the knob is twisted to raise the can until it engages the cutting edge. A lever on the can opener is depressed, puncturing the can and anchoring it to the can opener. The knob is then turned back slightly to remove pressure on the bottom of the can from the base. Once the lid is cut loose, the can settles onto the sliding base and is lowered with the vertical screw until it can be removed.

Figure 5.12. One-Handed Can Opener

The cost of parts and material was about $35.

CHILD'S SWING

Designers: Paul Checkovich, Scott Clough, Michael Cook, Christopher Cuevas
Client Coordinator: Anne Winschel, North Central NYS PTP
Supervising Professor: Dr. Richard S. Culver
Division of Engineering Design
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INTRODUCTION

A swing was requested for a thirteen-year-old girl with limited use of her arms and legs. She enjoys swinging, but her mother could not find a swing that provided enough support and that could be used indoors. A wooden seat, which can be suspended from eyebolts in the ceiling of the family's house was designed in the form of an easy chair, specially designed to fit the client. It can be used as a regular chair when not suspended by ropes from the ceiling. A pommel on the seat keeps the client from sliding out of the chair. Four parallel ropes suspend the chair so that it will swing freely when suspended only 2 inches above the floor. The ropes are attached to the seat with carabineers, so they can easily be removed when not needed.

SUMMARY OF IMPACT

The swing will be helpful in entertaining the child. Because it is designed to look like a normal chair, it can be used as piece of furniture when not being used as a swing. The swing will also be used by the client's two young siblings.

TECHNICAL DESCRIPTION

The chair is built out of ½-inch furniture-grade plywood and finished with cherry stain and urethane varnish. The seat and pommel have foam rubber padding with Naugahide covering. The seat design was based on the client's dimensions, but with room for her to grow. It is lightweight and yet sufficiently sturdy that it can be used by the other children in the family without danger of destruction.

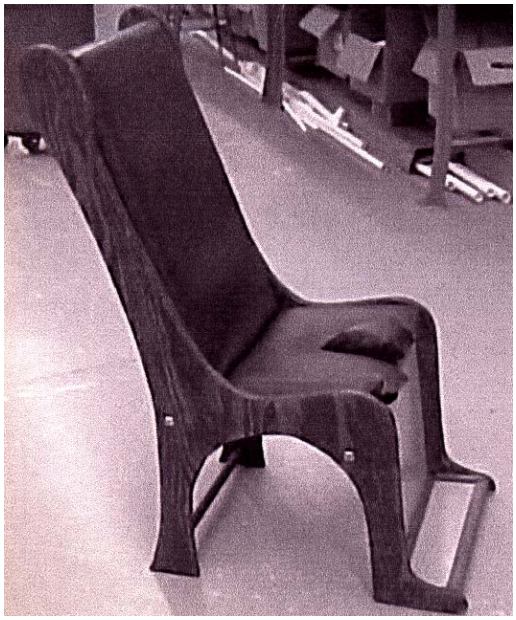

Figure 5.13. In-door Swing.

The supporting ropes are attached to eyebolts hidden under the seat. Four adjustable-length, ¼ inch nylon ropes are used to support the chair when it is used as a swing. The ropes are attached by carabineers to eyebolts, fastened to joints in the ceiling of the living room. Because the four ropes are parallel, the seat remains horizontal when it swings, so it can move freely with a minimum clearance from the floor. This reduces the potential impact if the client or one of the other children falls from the swing. The parents did not want a strap on the chair to secure the client when using the swing.

MAT TO DECREASE TACTILE DEFENSIVENESS

Designers: Dave Klepeis, Susan Kolakowski, Jena LaBagh and TJ Lamb
Client Coordinator: Maria Miller, BOCES, Binghamton, NY
Supervising Professor: Dr. Richard Culver
Design and Technology Engineering Department
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INTRODUCTION

A mat was designed to help a young girl develop the ability to process and use sensory perceptions and to decrease her tactile defensiveness. During the design process She is 11 years old, weighs about 70 pounds, and is approximately 53 inches tall. She has cognitive impairment and is legally blind due to cerebellar cysts and demyelination. She verbalizes through noises and responds to a variety of sounds.

The mat consists of different textures and produces a variety of sounds. As the client lightly touches different areas of the mat, sensory switches inside activate different sounds associated with each texture. She will learn to associate these sounds with the textures she touches, and hopefully overcome her fear of unfamiliar surfaces.

SUMMARY OF IMPACT

Since birth, the client has had tactile defensiveness, difficulty touching various textures because she is afraid of the feel of certain objects. This condition affects her in many ways, from the clothes she wears to the food she eats. The aids at her school were very busy and were seeking a toy to occupy the child's time. They requested that the device be portable and washable.

TECHNICAL DESCRIPTION

The final design choice is a square mat with 30-inch sides and six 5- x 6-inch sections on one edge. The main difference between this mat and many of the design alternatives is in the way that it will be used. As opposed to walking across the different textures, the client will sit on one side of the mat and simply touch the different textures in front of her. This better accommodates the limited space available for the mat in her classroom.

The circuit board was removed from a children's toy that plays sounds when different buttons are pressed. Five of the six sections at the top of the

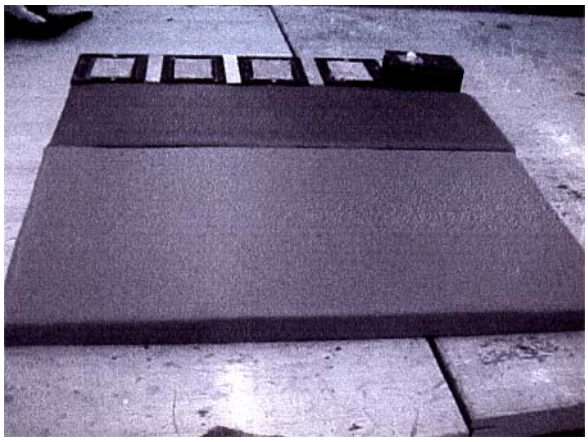

Figure 5.14. Tactile Stimulation Pad, Showing Capacitor Surfaces.

mat are covered in differently textured materials. These are the sections the client will be encouraged to touch. The sixth section contains the mat's electronics. A Styrofoam panel separates the material of the section from the capacitor switch underneath. The capacitor switch (type QT-111) detects when the material of the section is lightly touched through the Styrofoam layer. Wires connect these switches to a fabricated circuit board. The fabricated circuit board connects each section's wire to two corresponding nodes on the circuit board taken from the toy. These nodes will activate 1 of 5 desired sounds. The remaining part of the mat is for the child to sit on. The entire mat is divided into two 30- x 15-inch pieces of plywood, which are covered in foam. One of these pieces of wood is only partially covered in foam, leaving a 30- x 6-inch area for the textured sections. The other half is completely covered by foam. Vinyl fabric then covers the foam and wood base. The two halves were connected with Velcro so they could be separated after use for easy storage.

The mat design takes into account numerous safety considerations. First, the inner part of the mat is

foam because it must be soft so that if the client falls over while she is using it, she will not hurt herself. Also, the mat is washable in order to prevent the spread of bacteria and germs. The mat's electronic device is low voltage, as it uses two AA batteries. It also has a low current, thus preventing electric shock in the event of a malfunction or a short circuit.

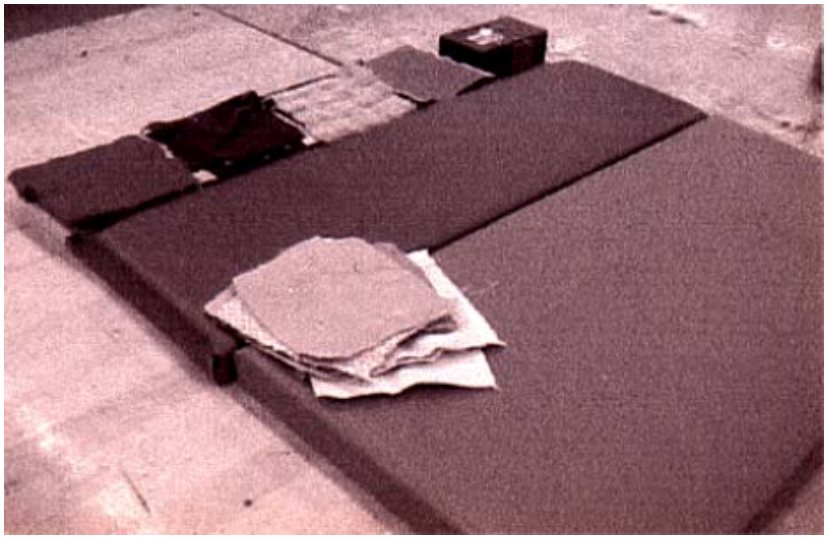

Figure 5.15. Various Cloth Materials for Tactile Stimulation.

CRAWLER DEVICE TO HELP DEVELOPMENT OF MUSCLE COORDINATION

Designers: Luigi Fosco, Daniel Durkin, and Sean Gove
Client Coordinator: Nicole Ruffo, Binghamton BOCES Developmental Center
Supervising Professor: Dr. Richard Culver
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INTRODUCTION

The crawler was designed to promote the development of muscle strength and coordination in children with reduced motor skills. The device is designed to allow the people working with these children to help them to learn to crawl so they can move under their own power. The device is a PVC tubing frame that supports the child from underneath in a sling-like harness so that he or she can learn the crawling motion with the help of fewer aids.

SUMMARY OF IMPACT

The crawler was designed to be used by aids at a center for children with disabilities while helping children learn to crawl. The children previously had to be pushed around in wheelchairs or have to drag themselves across the floor. The motor control and muscle strength gained from the crawler may help the children to learn to walk.

TECHNICAL DESCRIPTION

The frame of the crawler is 1½ inch PVC piping mounted on swiveling castors. The castors are mounted to the frame with bolts, and the frame is glued together with PVC cement. The child is supported by a cradle made of plastic sheeting, padding and cloth and is supported by a nylon strap. The cradle adjusts by varying the length of the nylon straps that connect it to the frame. The device is light, portable, adjustable, and easy to clean.

The approximate cost of the project was $45.00.

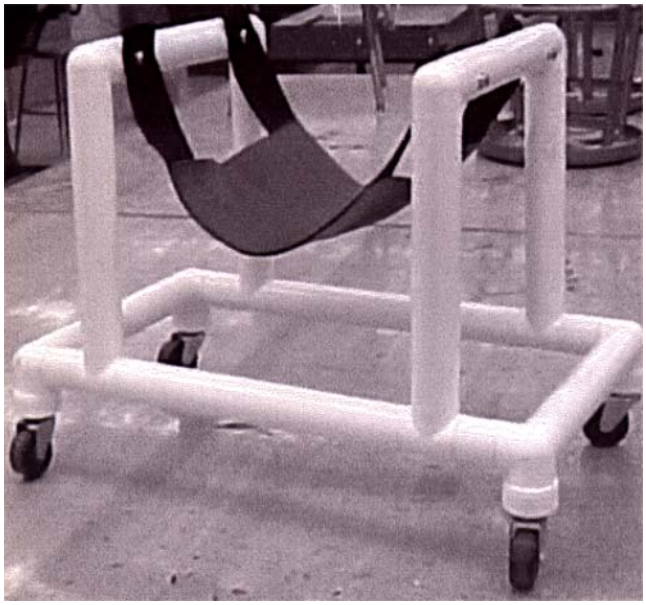

Figure 5.16. Crawler Device to Aid in the Development of Muscle Coordination.

WHEEL CHAIR UTILITY WAGON

Designers: Anish Patel, Don Miles, Josh O'Connor, Pat O'Hern
Client Coordinator:
Supervising Professor: Dr. Richard Culver
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INTRODUCTION

The wheelchair utility wagon was designed for a man with cerebral palsy. It affixes to his wheelchair so that he can transport several large binders. Previously, the client uses a specially designed backpack that is very expensive and had worn out several times. The wagon attaches to the front of his wheelchair. The reason for attaching it to the front is that the client uses his right leg to propel himself backward while he looks over his shoulder. Despite other, more practical, design suggestions, the client specifically requested a wagon.

SUMMARY OF IMPACT

This design will last a long time and has proven very inexpensive to construct. The wagon will take up more room and be a bit difficult to control. The client likes challenges, so the added difficulty in maneuvering will give him something fun to do. Also, the open-topped container will make it much easier for the people he works with to pick up the binders.

TECHNICAL DESCRIPTION

The wagon frame is constructed of furniture grade PVC plastic built around a large plastic container. The wagon originally designed had four attachment points to the front of the wheelchair, but they were not necessary. The final design has only two attachment points at the base of the armrests. Since the armrests lift out of their socket with the simple flip of a switch, a method was developed to attach the device with a ring that fits around the base of the armrest post. The solution was to use an eyehook screwed into the PVC end cap. Two four-inch casters in the front support the device.

The total cost of the project is $50 dollars.

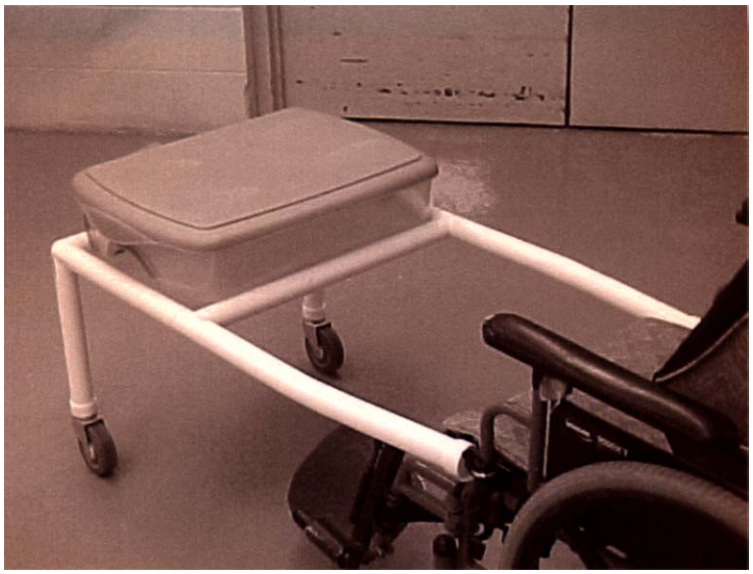

Figure 5.17. Wheelchair Utility Wagon.

STANDING TABLE TO IMPROVE CIRCULATION

Designers: Peggy Berkowitz, Rich Munn, Jeff Slocum, and Liz Talmage
Supervising Professor: Richard Culver
State University of New York at Binghamton
Binghamton, NY 13902

INTRODUCTION

The Standing Table was designed to provide a client circulatory stimulation to his legs. He is unable to walk and has problems with both his legs and feet because of the lack of blood flow to these areas.

The Standing Table gradually tilts from a horizontal position to a vertical one. Between the horizontal and vertical positions, the table can lock into other positions, so that the client can experience standing at different angles. By tilting him towards a standing position, circulation returns to his legs via gravity. Given that some of his leg muscles will also have to be used and this is another way for him to increase circulation to his legs and feet.

There are quite a few existing solutions for this problem. Currently on the market there are numerous types of standing devices. They include wheelchairs that can move into a standing position, standers that are made to hold a person in a standing position next to a table, and supine standers that tilt from the horizontal to the vertical position. The new design is most representative of the supine standers. But supine standers cost from $1,000-5000, which is why the client's supervisor requested this device.

SUMMARY OF IMPACT

Not only will the standing table benefit the client's circulation, but also it will give him the chance to get out of the wheelchair. The standing table could possibly even help him walk again some day. The table is mobile and washable.

TECHNICAL DESCRIPTION

The standing table is fabricated of wood (2x4s and plywood). It is made of two pieces. The top part like the top of any regular table and is approximately 2′ wide and 6′ long. The bottom part of the table is the frame that supports the top table and is approximately 33″ wide, 6′ long, and 3′ high.

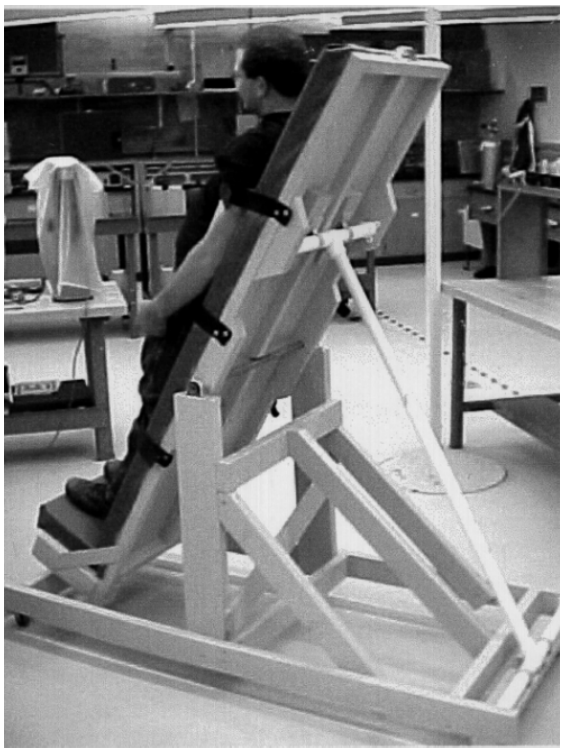

Figure 5.18. Standing Table to Improve Circulation.

The top table was made with 2x4s, plywood, and foam padding. The 2x4s created a base for the piece of plywood table surface. On top of the plywood is foam padding. The foam padding is covered with washable upholstery, stapled to the frame. Straps are attached to the side of the table to ensure that the client will not slide off. On the bottom of the table is a footrest upon which he stands when the table is near vertical. The footrest is made in the same fashion as the table. A hole is drilled on two sides in the middle of the 2x4 base for the plywood to hold a piece of pipe. This pipe allows the table to pivot.

The bottom frame is made of 2x4s. Castors with brakes are attached to the bottom four corners of the frame. Flange bearings are mounted to the two

sides of the frame. These bearings hold the pipe that allows the table to pivot.

A telescoping arm constructed with PVC holds the table in different positions between the horizontal and vertical. A spring-loaded button locks the table into different positions.

The approximate cost of parts and materials was $200.

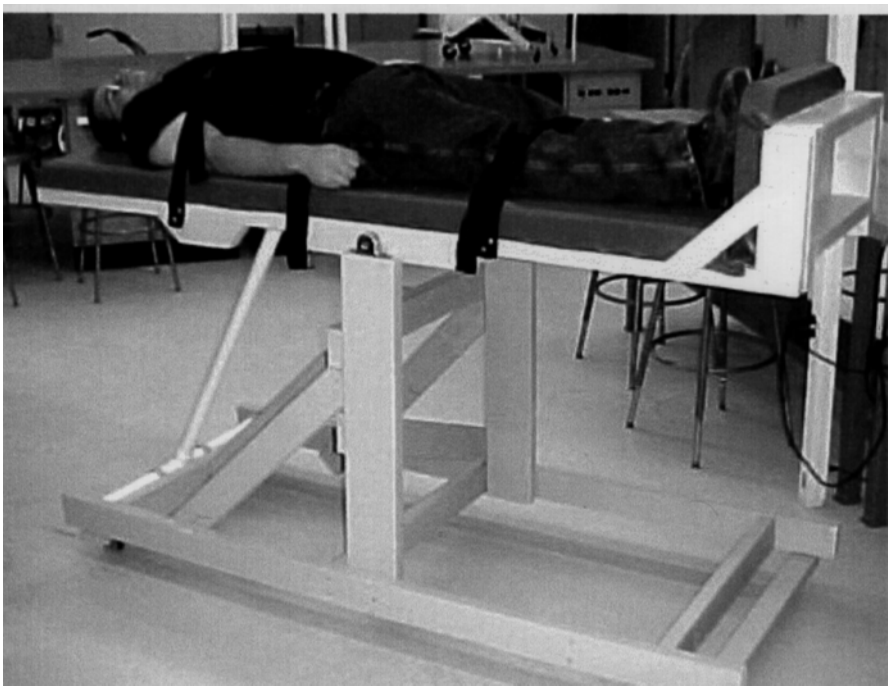

Figure 5.19. Standing Table.