CHAPTER 6
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ADJUSTABLE COMPUTER TABLE TO ALLOW EASIER ACCESS TO A COMPUTER AREA FOR PEOPLE WITH CEREBRAL PALSY

Designers: Brian Duncan, Clauvins Durace, Jeff Eluto, Sharif Fakhr
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INTRODUCTION
A girl with cerebral palsy needed better access to a computer work area in an elementary school. This device was specifically designed for the client and consists of a modified table with a section cut out. The table sits on a PVC frame on three sides with wheels attached to four adjustable legs. A Velcro strap is attached around the cutout section. This secures the client's seat to the table.

SUMMARY OF IMPACT
The table allows the client a more comfortable work environment. The table is vertically adjustable, so it will grow with the client. Since it has wheels, it can also move with the client. The strap secures the client's seat to the table and prevents too much mobility, thus keeping the client focused on the computer in front of her.

TECHNICAL DESCRIPTION
The frame of the cutout table is made out of PVC piping. The cutout tabletop is made out of half-inch plywood, which provides for a smooth surface and easy accessibility. The PVC frame is attached to the tabletop by four hinges screwed into the tabletop. The wheel on each of the two legs of the PVC frame allows for the table to be easily moved. The table is adjustable to a maximum height of 30" and can go as low as 11". The cutout is 12" wide and the total length of the table is 22" while the total width is 23". A locking Velcro strap is attached around the back of the table cutout.

The final cost of the Table is approximately $40.
MODIFIED HANGING SCALE FOR A PERSON WITH SIGHT IMPAIRMENT

Designers: Ivy Wai Tse, Darwin L. Valdez, Charles Watson
Client Coordinator: Susan Ruff, Southern Tier Independent Center
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INTRODUCTION
A man with legal blindness, who raises rabbits, needed a scale to determine the weight of his rabbits. The client uses weight measurements to determine how healthy his rabbits are. The device is a modified existing hanging scale. The modifications include adding a bigger tare knob onto the scale, a magnifying sheet, and a color code. The new tare knob is a large bolt glued over the preexisting knob. The bolt is large enough for the client to grab. The magnifying sheet is attached to a piece of Plexiglas, which is bolted to the scale frame, providing distance between the scale and the frame. There is also a color code added to the scale odometer to allow the increments to be easily read. The scale is attached to the client’s garage ceiling and hangs down at face level.

SUMMARY OF IMPACT
The modified hanging scale allows the client to read a weighing scale with greater ease. It eliminates the need for him to use a magnifying glass and strain his back to read from the scale. It also allows the client to easily adjust the tare knob when using different containers to weigh his rabbits.

TECHNICAL DESCRIPTION
The device consists of modifications made to a hanging weight scale purchased from the McCaster-Carr Supply Company. The scale contains a dial with a pointer and weight increments on an 8 1/2" face. The tare knob is modified to contain a bigger knob for adjusting to the larger size buckets. A large bolt was glued to this knob that is large enough for the user to identify and use with comfort. A magnifying sheet (Fresnel lens) is added to enlarge the numerals for the user. It is supported by a horizontal piece of Plexiglas, bolted to the scale frame. This conveniently separates the magnifying sheet from the scale. The transparent characteristic of the Plexiglas permits light between the sheet and the scale. To enhance the visibility of the increments on the scale face, alternating squares of black, red, and white were painted between the narrow increments to make their position more visible.

The final cost of the Modified Hanging Scale is $42.
NAPKIN FOLDING DEVICE

Designers: Michael Frey, Jason Scher, Andrew Troicke
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INTRODUCTION
A young man with Down's syndrome is employed by a steak house. His job is to fold napkins around silverware for customers to use. The device constructed for the client is a rectangular wooden block which has a semicircular section carved out for the napkin and silverware. It also has a cube-shaped cutout for storage of adhesive strips. In operation, a napkin is placed over the semicircular groove, and a knife, fork, soupspoon, and teaspoon are placed on top of it. When the silverware is pressed down into the groove, the napkin collapses around it. The groove holds the silverware in place, allowing the client to manipulate the napkin setting with two hands. After the napkin is successfully wrapped around the silverware, it is removed from the groove. An adhesive strip from the cube cutout is then placed over the groove. The wrapped silverware is placed over the adhesive strip and pressed into the groove. The adhesive strip then collapses around the napkin.

SUMMARY OF IMPACT
The napkin-folding device keeps the silverware properly stacked when the client wraps the napkin around it. This allows him to increase his speed and efficiency. It enables the client to meet his quota more quickly, which will enhance his possibilities for promotion.

TECHNICAL DESCRIPTION
The device consists of a solid block of wood (pine) of rectangular shape. It is 8" long, 3 1/4 " wide, and 3" high. There is 1 1/8" wide, and a 1 1/2"deep semicircular groove cut out of block, across the width of the block. This groove is where the actual folding of napkin occurs. The storage unit for the adhesive strips is 2" X 2 1/4" X 2 1/2". In order to prevent the device from moving during its use, a skid-pad is adhered to the bottom of the device.

The final cost of the Napkin Folding Device is approximately $5.00.

Figure 6.4. Napkin Folding Device.
WHEELED CANE FOR A CHILD WITH A VISUAL IMPAIRMENT

Designers:: Markus Olvet, Liang-Che Wang, David Wu
Client Coordinator: G. G. Knight, BOCES
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INTRODUCTION
A device similar to a cane is required for a child with a visual impairment and autism. The device created is a wheeled cane, made of PVC pipe. The handle is a bar that extends from two points on the base at a 55-degree angle. The base has two wheels positioned in the middle of the left and right sides of the base. The device is adjustable to grow with the child.

SUMMARY OF IMPACT
The child using the wheeled cane had a similar device, which he had outgrown. The new, wheeled cane allows the child to easily traverse and interact more with his environment. Since the device is adjustable, it allows for the cane to grow with the child and be utilized for many years.

TECHNICAL DESCRIPTION
The wheeled cane is constructed from PVC piping. To determine the correct dimensions for the cane handle, the piping was bent to a 55-degree angle using a heat gun. The telescoping PVC pipe contains an inner tube of copper pipe. The wheeled cane has stem castors with cushion rubber wheels to absorb shock and minimize friction with the ground.

Figure 6.5. Wheeled Cane.

It will stand vertically on the front frame when not in use.

The final cost of the Wheeled Cane is $18.50
PUSH-PULL SLED FOR A CHILD WITH CEREBRAL PALSY

Designers: Richard Caminari, Charles Palian
Client Coordinator: Kathleen Hanson, Special Education Instructor
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INTRODUCTION
A special sled was constructed for a six-year-old girl with cerebral palsy. The sled can be pulled with a harness while snowshoeing or cross-country skiing. It can also be pushed from behind. An oversized car seat supports the client and provides a harness to hold her in the sled. The seat is mounted on a flexible frame so that the runners can absorb shock and unevenness. A metal pan underneath the seat serves as a footrest and deflector to keep snow from flying up into the client’s face. The sled can be disassembled for transportation.

SUMMARY OF IMPACT
The client is totally dependent upon others for mobility. When she was younger she could be carried, but she is now too heavy for that. Her mother asked for a sled so that she can go along when they venture out in a park during the winter. The sled has made it possible for the client to join in many activities.

TECHNICAL DESCRIPTION
The push-pull sled is based on short, child-sized downhill skis. Four vertical steel posts, 1” in diameter and 6” long, are attached to the skis as a base for the suspension system. Foam rubber donuts on the posts support a metal frame that is attached to the car seat, which serves as the seat, and support for the client. The metal frame is formed out of 16-gauge sheet steel. PVC plastic tubing was inserted in holes in the metal frame to provide a guide for the steel posts.

The car seat was modified to fit the sled. The bottom frame was removed and cut to allow the seat to sit at a more reclined angle.

A 20-gauge sheet steel pan was formed to serve as a snow deflector and footrest. It is attached to the bottom of the car seat. (See Figure 6.8)

The pushing handle is formed out of ½” ENT steel pipe. It is bent to provide a handle that will accommodate people of different heights. The ends
of the pipe were flattened and drilled so that the handle can be attached with one of the rear anchor bolts for the frame with a wing nut (See Figure 6.8).

The pulling harness is made from a back support used when lifting heavy loads. It is attached to two PVC pipes with removable steel bolts and cotter pins. Similar bolts and cotter pins are used to attach the PVC pipes to the skis.

The push-pull sled cost approximately $120. A local ski shop donated the skis.

Figure 6.8. Detail of the Sled Suspension System and Handle Attachments.
COMPUTER/TELEPHONE HEADSET FOR A VISUALLY IMPAIRED OPERATOR

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Client Coordinator: David Ayers, Southern Tier Independence Center
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INTRODUCTION
The client is a program officer at a center to promote independence for persons with disabilities. He is visually impaired. When using the telephone, the client needs access to his sound-activated computer. However, he does not want the sound from the computer to bother the person talking to him on the phone. The device created in this project allows him to listen to the phone with one ear and the computer with the other, while leaving his hands free to enter information on the keyboard.

SUMMARY OF IMPACT
Professionals, who are visually impaired, find it difficult to take notes and check files when working with another person over the phone. The computer makes this possible, but the input signal to the operator is auditory. The computer/headset allows the client to listen to the phone with one ear while listening to the computer with the other ear. The computer no longer interferes with phone conversations. This has allowed the client to increase his efficiency in his job.

TECHNICAL DESCRIPTION
There are two components of the computer/telephone headset:

- A phone receiver with amplifier and
- A speaker from a regular stereo headset.

A standard telephone headset provides a very weak signal, thus an amplifier is needed to boost the signal. The receiver also consists of a mouthpiece and one earpiece. The speaker from the stereo headset is connected to the computer audio output. One set of wires runs to the amplifier and then to the phone. Another coaxial cable runs to the computer. The length of the cables was adjusted to fit efficiently into the client’s workspace. By using both earpieces on the stereo headset, the client can listen to the computer with one ear while listening to the phone with the other. He can also talk on the phone at the same time.

The final cost for the device is $43.
SLIP-PROOF STAIRS FOR BATHTUB

Designers: Mark Bruno, Kevin Chan, Seamus Cerretani
Client Coordinator: Judy Zeamer, High Risks Birth Clinic
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INTRODUCTION
A six year-old girl with autism requires a set of portable stairs to assist her in entering the bathtub. The stairs provided are made of furniture-grade PVC pipe. The treads are PVC plate, with nonslip treads. The stairs are built to fit in a conventional bathtub while taking a minimum space in the bathroom. There are three small steps on each side and a large step on the top of the tub edge.

SUMMARY OF IMPACT
The client now weighs 45 pounds and is difficult to lift into the bathtub. The stairs provide a means for her mother to get her in and out of the tub with reduced risk of slipping and falling.

TECHNICAL DESCRIPTION
The stairs, which are made of furniture-grade PVC pipe, are designed so that they can be disassembled when not in use. The handle can be removed and the stairs separated into two pieces, which can overlap. This reduces the space taken in the bathroom when the stairs are not in use. The legs on the stairs are adjusted with rubber bushings to ensure even contact with the tub and the floor outside the tub. The steps have a rise of 4.5 “ and width of 6 “ to make it easy for the client to climb.

The treads are made from 3/16 “ thick PVC sheet. The edges were sanded round to reduce the risk of cuts and bruises. Slip-resistant tape is placed on the treads to reduce the risk of slipping.

The cost of materials for the stairs is $23.
KITCHEN STEPS TO AID IN REACHING OBJECTS

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INTRODUCTION
A woman with dwarfism and scoliosis needs a device that helps her to reach areas above the kitchen sink. The device designed for the client is modifications made to a "Three Stepladder". The original stepladder is foldable and contains three steps and a railing on both sides. The ladder was modified for the client by decreasing the size of the lower leg support by half, which lowered the angle of the front leg support, and thus allowed the steps to be closer together.

SUMMARY OF IMPACT
The modified stepladder is a device that allows the client to easily reach areas above the kitchen sink. It is easily foldable for storage and contains the original railings to help the client reach the top step.

TECHNICAL DESCRIPTION
Starting with a "Three Stepladder" from Cosco, modifications were made to fit the client's needs. The rear leg support is cut in half so that the front leg support is at a lower angle and the steps are closer together. Longer aluminum support bars are attached, two on each side. One of the aluminum pieces moves while the other collapses. This was accomplished using a Nylon nut. The collapsible piece is made from two small pieces of aluminum. It was attached together in the middle with a screw casing.

The final cost of the Kitchen Steps, with modification, is $40.
TELESCOPING REACHER: A DEVICE TO ALLOW A WHEELCHAIR USER TO PICK UP OBJECTS FROM THE FLOOR.

Designers: Gil Salomon, Thomas Volper, Yangen Wang
Client Coordinator: Colleen Griffith, Johnson City School District
Supervising Professor: Richard S. Culver
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INTRODUCTION
A telescoping reacher was designed for child who uses a wheelchair and needs to be able to pick up objects from the floor. The device had to be lightweight and portable. Padded cubes are attached to the second set of telescoping pipes to aid in "grabbing" objects. To extend the tubes, the buttons are pushed in and then moved along a milled slot in the aluminum tube and extend the tubes to the desired length.

SUMMARY OF IMPACT
The telescoping reacher allows the child in a wheelchair to pick up objects from the floor on his own. In the past, he had to ask others to help him pick up dropped objects. Since the device is portable, the child can pick up objects whenever and wherever he desires.

TECHNICAL DESCRIPTION
The base of the telescoping reacher is constructed out of aluminum tubing. It is in an "X" shape and has slots milled in each tube to allow length adjustment. Bicycle handlebar grips are attached to the base end of the tubes. The second set of telescoping tubes is made of PVC pipe. They are also activated using buttons. Two tubes were cut, sandblasted, and milled to have slots run the length of the pipe with holes for buttons. They were bent and fastened together in a modified "X" shape. Spring steel metal strips were cut and heat-treated to add strength and permit flexibility. The metal strips were then attached to the handles of the telescoping reacher. This gives the telescoping reacher a spring action that allows the two grabbers to latch onto an object and return to their original position after the handles are released. Telescoping tubes allow the device to be adjustable. PVC grippers on the end hold the item being lifted. Spring steel buttons, which slide up or down in the slot, permit the user to change the length.

The final cost of the materials for the Telescoping Reacher is approximately $20.
INTRODUCTION
A rolling walker device was constructed to enable people with a Dynavox-talker, an augmentative communication device, to move around without having to carry the talker. The device has a PVC frame. Wheels are attached to vertically adjustable legs. The front legs extend from the middle of the back legs and are bent at an angle for extra support. There is a metal-wire basket, which is insulated by plastic, atop the walker. This is where the Dynavox-talker is placed. Handlebars extend toward the user from the basket.

SUMMARY OF IMPACT
This rolling walker allows the clients to be mobile with a Dynavox-Talker by placing it in the walker’s basket. It eliminates the need to carry the weighty communication device, thus enhancing mobility and communication.

TECHNICAL DESCRIPTION
The walker is constructed from PVC pipe. The rear legs attach to the base of the walker. They contain telescoping pipe and spring-loaded push buttons, thus making them vertically adjustable. The front legs are attached to the middle of the rear legs. They were bent to a 55-degree angle using a heat gun. The base contains a metal-wire basket, which has a plastic covering. Pipe extends from the base to the user. Bicycle handle grips are attached laterally.

The final cost of the Rolling Walker for Dynavox-talker is approximately $35.
WALL RAILINGS AND PARALLEL BARS TO FACILITATE WALKING FOR A CHILD WITH CEREBRAL PALSY

Designers: Lynn Boldt, Justin Boles, Christine Britton
Client Coordinator: Beth Parks - Independent Consultant
Supervising Professor: Richard S. Culver
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INTRODUCTION
A young client with cerebral palsy required a set of parallel bars for walking practice and a set of railings to assist her in walking down the hallway of her home. The railings were designed to client attach to the walls of the client’s hallway. They are constructed of wood and attached to the walls by brackets. There are separate rails in front of doorways, making those rooms accessible when the rails are not in use. The rails extend the length of the hallway, and they are kept close to the walls and around moldings of the doors to prevent accidents.

A set of parallel bars was constructed to allow the client to practice her therapy at home. The parallel bars consist of two sets of PVC pipe six feet in length. The bars are vertically adjustable to account for the client's growth.

SUMMARY OF IMPACT
Having the railings in her home allows the client to walk down a hallway to her bedroom by herself. The set of portable parallel bars, used in the basement of the client's home, allows her to practice her rehabilitation therapy on her own.

TECHNICAL DESCRIPTION
The railings are 30” in height. They are constructed from wooden rods 1.5” in diameter. The railings are 32” apart, conforming to the client’s arm span. They are attached to the walls by brackets. The brackets are positioned on the wall and the railings are laid on top of them. The railings remain within the moldings around the doors and the walls of the hallway, thus avoiding possible accidents. There are separate pieces of rails in front of doorways, so they can be removed when the railings are not in use.

The freestanding parallel bars are placed in the basement and consist of two sets each 6’ in length. They are constructed from PVC piping. Telescoping pipe held in place by a spring push button allow for adjustability from 30” to 55” and take into account the client's growth. The base has three extended pieces of PVC pipe with caps on the ends for added stability and support.

The final cost of the Rails on Walls is $62.

Figure 6.16. Parallel Bars.
POWER MOBILITY FOR A CHILD

Designers: Michael Kunzman, David La, Kenneth Lapolla, and Michael Li
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INTRODUCTION

A "Power Wheels" car, powered by two electric motors, was modified for a three-year old boy with hydrocephalus. He does not have the muscle tone for independent mobility. Modifications include:

- A joystick-like steering control to minimize the amount of force required for operation,
- A bucket seat with a five point seat belt for support and safety, and
- Caster wheels to enable easy turning.

The steering mechanism is a joystick about the size of a marker, permitting the client to grasp it with ease and comfort. The seat is molded to his specifications with a five-point seat belt to hold him in place in case of sudden movements. Swiveling wheels, allowing the vehicle to freely turn left or right, nullify the role of the existing front wheels. For the safety of the furniture and the client's younger brother, a front bumper with shut-off switches is installed to stop the car before any serious damage can be done.

SUMMARY OF IMPACT

Having the car allows the client to move around on his own and follow his brother in and out of the house, increasing his hand-eye coordination, increasing his independence, and providing a recreational outlet.

TECHNICAL DESCRIPTION

The entire electrical system of the "Power Wheel" was redesigned, starting with the steering wheel. The steering wheel was removed. In its place is a joystick, which allows the car to move in any direction. The joystick design consists of a series of six momentary push button switches (two for forward motion and four for reverse and turning). A front bumper made of 2 1/2' long and 1/4" thick PVC sheet was molded with a heat gun to conform to the shape of the existing body of the car. It was then attached to the car through a foam rubber spacer, using screws and nuts. Switches were added to the bumper system. Whenever they are activated, forward motion is disabled. PVC 1/8" sheet is attached underneath the car by screws to protect the electrical wiring.

The front wheels were modified to enable the car to turn using only the rear wheels. Two 2" caster wheels are added to the front of the car, hidden between the existing front wheels. This creates the effect of an unmodified toy car. The wheels are attached so that they actually lift the original front wheels off the ground. This allows the car to turn freely on its new wheels, without affecting the original wheels. The car turns via one of the rear wheel drives. A section of a truck tire inner tube is stretched around each rear wheel to provide better traction on smooth surfaces.

The final cost of the Power Mobility Car was approximately $140.
Figure 6.18. Front View Showing Castors.

Figure 6.19. Bottom View showing Wiring and Wheel Modifications.
INTRODUCTION
A balance beam was designed for children, age three through five, with a range of disabilities including cerebral palsy, visual impairment, hearing impairment, and gravitational insecurities. Although designed for children, it can support the weight of an adult. The device is constructed out of wood and can be extended into an "S" shape by the use of hinges, increasing the balance beam's difficulty. It can fold up into a compact unit, making the device portable.

SUMMARY OF IMPACT
The balance beam is in use by children with a variety of disabilities. It is used for diagnostic purposes, treatment planning, and in the development of children's motor skills. The children can also use the balance beam as a form of recreation.

TECHNICAL DESCRIPTION
The balance beam is constructed of wood, and it consists of three 3' sections fastened together with reinforced hinges and 2" wood screws that are drilled below the surface of the wood. The design consists of a 2X4 on end sandwiched by a 1X4 on either side. For support, strips of 2X4 are spaced out every eighteen inches along the beam's length. For added safety, the surface of the wood is sanded and varnish is applied to make the balance beam esthetically pleasing. When the balance beam is in an "S" position, spaces exist at the corners. To fix this problem, wood blocks were made to be attached to the beam in the critical spaces using Velcro strips. The device has a shoulder strap to increase portability.

The final cost of the Balance Beam was approximately $15.
WATER WALKER TO ASSIST PEOPLE WITH CEREBRAL PALSY TO MOVE INDEPENDENTLY IN A THERAPY POOL

Designers: Elizabeth Ryff, Angshuman Saha, Abdul Sani, Jerry Vattamala
Client Coordinator: G. G. Knight, BOCES
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INTRODUCTION
Teenagers with cerebral palsy needed support when exercising in a therapy pool. The water walker is constructed of a PVC piping frame with double bars on three sides. Handles are placed at the rear of the device. This device does not float, and it has wheels attached at the bottom. The walker contains a strap attached to the frame to catch the user in case he or she slips while using the device. Another strap is attached along the bottom bars on either side, in order to guide footwork. The water walker is adjustable to take into account the various sizes of the individuals who will use it.

SUMMARY OF IMPACT
The water walker allows individuals with cerebral palsy to move independently when they are in a therapy pool. The individuals are able to support themselves in the water. It is adjustable to fit the different heights of users. It also prevents the users from having their legs cross or "scissor". The addition of wheels allows for the teenagers to use the walker to enter the pool as well as move around in the pool with it.

TECHNICAL DESCRIPTION
The water walker is constructed of PVC piping. For added strength and support double bars are added along the front, bottom, and the sides of the device. To accomplish adjustability, PVC pipe of smaller diameter was inserted, thus creating a telescoping mechanism. Holes are drilled into both pipes and the height is adjusted by spring-loaded push buttons. For added stability and weight, steel rods were sealed inside the bottom left and right bars. A strap is fastened onto the piping to support the user. Another strap is fastened along the top left and right bottom bars to guide the footwork of the user and prevent his/her legs from scissoring. Holes are drilled into the PVC tubes to allow air to escape from the tubes and prevent the device from floating. The walker also has rubber handles and wheels for mobility.

The final cost of the Water Walker is approximately $60.
INTRODUCTION
A tricycle was modified to assist children (age three to five) with developmental delays in riding it. The modifications consist of Velcro straps to secure the child's feet to the pedals and a handlebar, for use by an instructor, attached to the rear of the tricycle. Users no longer have to be concerned with feet slipping off the pedals. The straps fit a wide range of foot sizes and can be used on diverse types of tricycles. The steel tubing handle enables the instructor to control the direction of the tricycle from behind.

SUMMARY OF IMPACT
The modifications made to the tricycle allow the children to ride the tricycle and have fun, while enabling the instructor to carefully monitor and stop the children if desired.

TECHNICAL DESCRIPTION
The instructor handlebar is bent so that it is held in place by spring action. A bolt attached to the footsteps on the back of the tricycle anchors the two ends of the handle. A copper tube pressed in place under the seat quickly attaches the handle. The handlebar is constructed out of 3/4" ENT electrical conduit. All parts are sanded to ensure no sharp edges will harm the operators.

The pedal straps are made of Velcro attached to a newly fabricated pedal. The new pedals and straps are attached using screws and are sanded to eliminate sharp edges and avoid injury.

The final cost of the Tricycle Pedals and Steering Arm is $12.
CRAWLER: A MOBILITY DEVICE FOR A CHILD WITH CEREBRAL PALSY

Designers: Adam Christie, Joe Regina, Elder Romero, Tim Romanowski
Client Coordinator: Colleen Griffith, Johnson City School District
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INTRODUCTION
A boy with cerebral palsy requires a mobility device that supports his body, enables him to see straight ahead, and maximizes the use of his legs. The device constructed for the client is a crawler. The device works by placing the client on the inclined surface. The head straps are placed around the client's head, so his head is constantly looking straight ahead. He uses his arms and/or feet to propel himself in any direction.

SUMMARY OF IMPACT
The crawler makes it possible for the client to move about on his own. This device helps to:

- Prevent his knees from buckling out to the sides,
- Support his head and arms,
- Allow him to see straight ahead, and
- Position him optimally to increase and maximize his motor control.

TECHNICAL DESCRIPTION
Three-inch rubber wheel casters support the crawler. The casters were screwed into the base, which is made from ½ inch plywood, 20 inches wide and 31 inches long. Attached to the base is another ½ inch plywood panel, inclined at a 15-degree angle and supported at the high end by two blocks of wood. The inclined piece is padded and covered with Naugahyde. A generic bicycle seat is attached to the base of the inclined panel of to prevent the user from sliding. Also toward the rear, fins constructed of plywood are attached to the base to prevent the client from spreading his legs.

For the head support system, 1 in. PVC tubing is attached to the wooden base. It extends over the top of the crawler to form a yoke. Adjustable Velcro straps hang from the yoke and can be attached to the user's head to provide support.

The final cost of the Crawler is approximately $30.
GARDENING CART FOR A WOMAN WITH SPINA BIFIDA AND SCOLIOSIS

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Client Coordinator: Dave Ayers, Southern Tier Independent Center
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INTRODUCTION
A gardening cart was designed for woman with spina bifida and scoliosis. It has a padded plywood base and a Naughahyde cover. Wheels are attached under the base. The wheels of the cart are wide so that they will not sink into soft soil, and they are large enough to move easily on grass. The front castors are smaller in diameter than the rear wheels. They can pivot 360 degrees. The rear wheels are attached to an axle that is fixed to the base.

SUMMARY OF IMPACT
The cart allows the client to be mobile and low to the ground while gardening. Bending of the back is minimized to prevent back strain.

TECHNICAL DESCRIPTION
The front wheels of the cart are 1.25" wide and have a diameter of 2.5". They pivot 360 degrees on an axis slightly behind the wheel's axis of rotation, which allows the cart to turn easily in any direction. They are attached above the plane of the seat. The back wheels remain on a fixed axle horizontal axle that is clamped to the seat. The back wheels have a diameter of 6" and a thickness of 1.5", with an inner radius of 450". Both wheels are heavy duty and can withstand 300 pounds of pressure. The seat of the cart is a piece of modified plywood 1' X 7" X 2 3/4". For comfort, a cushion is added to the base. The base is 3" above the ground. For safety, all corners of the base were sanded. The final weight of the cart is approximately 15 pounds.

The final cost of the Gardening Cart is approximately $40.
HEIGHT-ADJUSTABLE TILT TABLE FOR CHILDREN WITH CEREBRAL PALSY

Designers: Adam Juncosa, Brian Kern, Woo Lee, Jason Lei
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INTRODUCTION
A height adjustable tilt table was designed to create a workspace for young children with cerebral palsy. The table is constructed of a PVC frame. The legs are vertically adjustable. Two legs on both sides of the frame are attached, allowing one side of the frame to be adjusted at a time. On top of the frame sits a furniture-grade piece of wood that has a smooth top. It has been varnished and has a trim of white paint at the edges. Adjusting one side at a time allows the table to tilt and gives the client better workspace access for certain projects such as drawing.

SUMMARY OF IMPACT
The table allows children to take part in various activities including therapy, drawing, coloring, and games. Because the table is adjustable, no child will have trouble sitting at this table because of height or position restrictions.

TECHNICAL DESCRIPTION
The height adjustable tile table consists of a PVC pipe frame and a wooden tabletop. All four legs of the PVC pipe connected to the tabletop are telescoping, containing smaller diameter PVC tube inside them with spring-loaded push buttons. There are 5 increments in height on each of the 4 legs, 1/2" apart. Except for the four adjustable legs, the pipe is cemented together for added support. The tabletop consists of high quality plywood. The edges are sanded down for safety. The plywood is stained and has white paint around the edges to enhance esthetics.

The final cost of the Height-Adjustable Tilt Table is approximately $50.
ALTERNATING LIGHT PANEL TO INCREASE HAND-EYE COORDINATION FOR PEOPLE WITH FINE MOTOR IMPAIRMENTS

Designers: Nathan Bull, Richard Caminari, Thomas Carpenter, Eric Cheng
Client Coordinator: Inalou Davey, Rehabilitation Services Inc.
Supervising Professor: Professor Richard S. Culver
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INTRODUCTION
A device was needed to improve the motor skills of people of all ages with motor impairments. The device rests in front of a person sitting or laying on the floor. He/she finds an illuminated light. The user then triggers a switch corresponding to that light and another random light is illuminated. The process continues as the user “chases” the light. The panel consists of a painted design on the front with LEDs of different colors and switches. The rear of the device contains a removable panel, which allows access to the internal circuitry.

SUMMARY OF IMPACT
The alternating light panel is a device that improves the hand-eye skills of people with motor impairments. The device also aids people with cerebral palsy by exercising their arms.

TECHNICAL DESCRIPTION
The device consists of a case and electronics. The case has rectangular PVC tubing frame 3’ wide X 2’ high. Quarter inch thick wooden boards of the same dimensions are attached to the tubing with screws, one in the front and one in the back. Eight buttons are mounted on the front panel. They are arranged to form two diamond shapes, one on the right side and the other on the left. The diamond shapes are 15’ apart from each other, and they each contain four buttons. A 1/4 inch plywood board is attached the back panel by two hinges for support. A string holds the board at the correct distance from the panel. Rubber strips are attached to the bottom of the panel.

The electronics consists of a 555 TIMER, A 74SL164 shift register, 9 7404 Hex Inverters, 7 7408 "AND" gates, a 7432 "OR" gate, 8 normally open switches in parallel, and 8 different colored LEDs. Also contained in the electronics is a simple 4 C battery pack, which attaches to the back of the front panel. This keeps the voltage at 6 V DC (the operating level of the chips). The circuits are wire-wrapped together on a board, and since the panel is closed, nothing affects the wire wraps.

The final cost of the Alternating Light Panel was approximately $108.
ALL-PURPOSE MOVABLE CART TO AID IN THE TRANSPORT OF HOUSEHOLD ITEMS

Designers: Joji Varughese, Benjamin Vollmer, Gary Wong
Client Coordinator: David Ayers, Southern Tier Independent Center
Supervising Professor: Richard S. Culver
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INTRODUCTION
An all-purpose movable cart was designed for a woman with extensive nerve damage who has difficulty with the transportation of household items. The nerve damage has affected her legs, arms, and back, making it very painful for her to lift things. The cart consists of a PVC frame on three sides, with wheels attached to the bottom of the four legs. A plastic drying rack normally used to dry dishes is attached to the frame at the top. It is deep enough to hold any item the client desires to place in it and is also removable. A metal cookie sheet tray is placed atop the drying rack. It is also removable and is flat. The cart is constructed in such a way so that it supports a heavy load, but also supports the weight of the client.

SUMMARY OF IMPACT
With the cart, the client can now move things without having to carry them. In addition, the client can now move things around while supporting her weight since she could not carry objects while using a walker.

TECHNICAL DESCRIPTION
The frame was constructed from 1 1/4 in. PVC tubing. Thick walled tubing was used with external joints connecting each of the individual tubes. Three- and four-way joints were used to connect the frame together, and two-way joints were used to create a handle bar for the cart. All the joints are bonded together using PVC cement. When fully assembled, the frame is 3’ tall X 15 1/2” wide X 19 3/8” deep. The drying rack is placed into the frame to create a basket for carrying objects. It is constructed from metal wiring with plastic insulating the wiring. It is 17 3/8” long X 13 1/2” wide X 7” deep. The tray is a generic cookie-sheet tray that is flat, therefore allowing for transportation of baked goods.

The final cost of the All-Purpose Movable Cart is approximately $55.
ADJUSTABLE PHYSICAL THERAPY BENCH FOR CHILDREN WITH CEREBRAL PALSY

Designers: Charles Liem, Edward Lintz, Daniel Monopoli, and Oreon Montaque
Client Coordinators: Laura Cline, Handicapped Children’s Association (HCA)
Supervising Professor: Richard S. Culver
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INTRODUCTION
An adjustable bench was designed to aid in the physical therapy of children with cerebral palsy. It is designed for children to lie or sit on it, but it is also capable of supporting the weight of an adult. The bench is constructed of a PVC frame with vertically adjustable legs. A plywood top is attached to the frame and is fitted with foam padding and a Naugahyde cover.

SUMMARY OF IMPACT
The adjustable physical therapy bench is a device that allows a child or a small adult with cerebral palsy to lie down or sit on it so that a physical therapist may then massage the client’s muscles. The table is adjustable so it will accommodate children of all sizes, thus allowing the physical therapist better access to the client.

TECHNICAL DESCRIPTION
The actual dimensions of the bench are 24" x 36". The tabletop is 30" X 42". It is constructed from 1/2" plywood and is covered with 1" foam padding. The foam extends over the edge of the plywood and sides for added comfort and to prevent injuries. The padding is wrapped with Naugahyde and stapled into the plywood underneath.

The frame for the table legs was constructed from PVC piping. In order to adjust height, the legs are constructed with PVC piping of a different diameter.

The smaller diameter pipe is placed inside the larger and is able to telescope to the desired size. Holes were drilled through both the external and internal pipe, and spring action push buttons were placed inside the inner tubes, allowing adjustability. The PVC piping, except the telescoping legs, is cemented together for extra support. Caps are placed on the base of the legs to prevent the bench from sliding.

The final cost of the Adjustable Therapy Bench is approximately $50.
REMOTE BUTTON SWITCH FOR TOY

Designers: Andrew Oxford, Jayne Varghese, Crystal White
Client Coordinator: Mary O’Dell, BOCES-Appalachia
Supervising Professor: Richard S. Culver
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INTRODUCTION
A button switch was designed to allow a child with cerebral palsy to activate remotely a toy doll. The device is attached to the original toy and plugs into a control box on a wheelchair where the switch is set. The toy is a dog that plays music when either of its two front paws is pushed. The toy was modified by having flexible wires soldered to the circuit board of the toy inside the battery box. The wires then extend 3 feet from battery box, where they are soldered to two separate power plugs, one for each paw. The power plugs then are plugged into a control box mounted on the wheelchair. The client pushes a button on the control box, causing the toy dog to play music. When not in use, the wires with plugs can be wound up and placed inside the battery-box pouch on the dog.

SUMMARY OF IMPACT
The button switch allows the user to push a button on his wheelchair to activate the toy. There is no need for a manual button, yet the manual function is still operable for use by other children who may play with this doll.

TECHNICAL DESCRIPTION
The switch attaches to the circuit board inside the battery-box, where the manual buttons trigger music. Flexible wires are soldered to the board at this position. The wire extends from the battery-box and is soldered again to two coaxial power plugs. Each power plug is used to trigger the music corresponding to a specific manual button. The plugs are then attached to a control box, which is attached to the wheelchair, where a button will allow the dog to play music. When not in use, the wires can be wrapped up and placed inside the battery box avoiding injury with other children who may trip over or misuse the wires.

The final cost of the remote button switch for a toy is approximately $10.
ADULT-SIZED TRICYCLE FOR A PERSON WITH CEREBRAL PALSY

Designers: Matthew Dresser, Jonathan Ellis, Jeffrey Erlbaum
Client Coordinator: Judy Zeamer, High Risk Birth Clinic
Supervising Professor: Richard S. Culver
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INTRODUCTION
A "Joy Rider Jr.", a commercial adult tricycle, was modified for a girl who has cerebral palsy. The modifications included attaching foot straps and toe and heel clips to the pedals. They help to stabilize her feet to the pedals. The client has very little use of her right arm; in order to compensate for this fact, a circular steering wheel with an extension post of electrical conduit was designed and attached to the tricycle. It replaces the existing handlebars on the tricycle.

SUMMARY OF IMPACT
The modifications made to the "Joy Rider Jr." allow the client to ride it. The new device replaces an existing tricycle that the client had outgrown.

TECHNICAL DESCRIPTION
The handlebars for the "Joy Rider Jr." were modified to make the steering easier for the client. The new handlebars are constructed in two pieces from a ¾" electrical conduit. Each piece is bent 120 degrees. A small piece of ¾" lead pipe is inserted into the two pieces, and the handlebars as a whole are brazed together and painted with an oil base paint and a primer for galvanized metal. The existing pedals were removed from the tricycle and new ones were attached. The new pedals consist of a heel-cup that encases the existing pedal. Brackets are then attached to the back of the heel-cup and Nylon strapping is threaded through as the attachment device. The heel-cup was constructed of 1/16” aluminum.

The final cost of the adult-sized tricycle is approximately $475.
Figure 6.34. Modified Pedal.