Executive Summary

The project assigned is to provide multiple movement assist devices. These are absolutely essential to aid in her development due to how her premature birth has affected her. Her muscular development will allow her to gain strength like any girl her age. However, her neural development for motor coordination is impaired. She has the physical ability to complete simple tasks and the capacity to gain strength for more complicated tasks. However, the wiring in her brain doesn’t allow her to complete them. This is incredibly frustrating for her because she can see and plan the activity but simply cannot complete it. For these reasons, it is absolutely essential to have multiple devices assisting different kinds of motion. Simple movements require many complicated connections in the brain. The more sensory input we can provide for her, the more connections will be created and the existing faulty connections will be adjusted in her brain so that she can properly master the skills for independent motion.

When she can do these motions on her own, her muscles will be strengthened. This is important because she does have muscle weakness. Once she masters the motions of the two fold requirement of coordination and strength, she will be able to complete motions of her own will and can have further progress. The more she can move independently, the better her overall health will be. It is well known fact that a life style that is too sedentary can lead to many health issues. For all these reasons, we are providing five different assist devices that focus on common activities and sports.

The saddle eating chair will allow her freedom of motion with her arms and legs and allow for core support while she is sitting at any table doing activities to help stimulate her brain. The stationary recumbent bike will aid her strength and coordination in her legs while supporting her core. Biking is a common activity and this will allow her to master the skills necessary to progress towards riding a bike. Skiing is another very common and fun sport. Exposing her to skiing using an adaptive device will be fun for her and give her more stimulation since she is often stuck inside the house. The zip line walking aid will allow her the ability to experience walking independently and safely. The water walking device will also add another way to strengthen her muscles in a safe environment.

1. Introduction

1.1 Background (Client and disability)

Elysa was born very prematurely. She did not receive the normal inputs during development and her brain developed differently. The motor control section of her brain was affected. Though her muscles are underdeveloped, she has the capacity for improving her strength. She has control of her arms and with therapy has learned center position for her body. This results in her having limited motor function and needs support. Elysa is bright and cheery little girl and can be very stubborn at times. She enjoys moving and lights up when anyone talks about going swimming or riding horses. She requires these devices to aid her brain developing the correct connections for coordinated motor functions.
1.3 Previous Work Done by Others

1.3.1 Products

**Zip line Walking Device:**
There are various products on the market that allow mobility, while keeping the child supported and secure. One of these products is the Gait Trainer Comet Anterior Mobility Product by Heliohealth. It combines the quality, safety, and durability of a walker with the added support that a traditional walker cannot provide, such as a seat harness, pelvic stabilizer, and ankle prompts that prevents the legs from scissoring. However, products like these are on the bulkier side and are not ideal for patients with a lack of core strength. Elysa’s parents bought one for her, but because it is bulky, she does not have the physical strength to walk too far with it.

Another product is the Kaye Suspension Conversion Kits, which is an attachment that can be placed on a walker and can suspend a harness off of. The concept is similar to what we had in mind for our device, though it is a less bulky version, as the conversion kit requires the use of a walker. With that product, just like with the walker, it would not be the easiest thing to move, especially since it is attached to a walker. Also, neither product provides any neck support, which Elysa needs to prevent her head from leaning towards one side, as she is used to doing.

A senior design team from Spring 2011 designed a jumper for their client, which is similar in concept to what we are going for. Like for our harness, theirs provides support for the client’s torso and legs. They were also thinking about adding neck support to keep their client’s head aligned properly. However, their device is much more bulky than ours, due to the large frame and motorized parts. Also, as a jumper, it is not providing the means of them learning how to walk, but just how to stand upright and jump in place. Our design has a minimal frame and harness and does not have any motorized parts.

![Figure 1: Gait Trainer Comet Anterior Mobility Product](image1.png)  
![Figure 2: Kaye Suspension Conversion Kit](image2.png)
Adaptive Skiing Device

Many assisted skiing devices provided by different companies. The devices are made for people who have disabilities but want to enjoy skiing or snowboarding. Those assisted skiing devices can be divided into two categories: rider controlled or assistant controlled. Most people with trouble moving their lower body who just want to have a feeling of skiing usually use the skiing devices that require another person to steer. The bi-skis provided by Enabling Technologies in Figure 3, provides an example of that. Bi-ski features a seated ski that allows the disabled person to sit comfortably while keeping him secured and fixed. The assistant who steers the ski then holds on to the bar on top and control its direction.

The other kind of skiing devices are for disabled people who want to ski or skateboard independently. Devices such as mono-ski and sit-ski require no assistant. Products such as snow slider and rider bar, manufactured by Freedom Factory, are devices that allow users to skateboard and ski normally with only minimum supports. Snow slider, shown in Figure 4, has some features that are similar to our purposed device. First of all, it has knees and hip belts that fix the skier’s lower body in place. Second, it has an arm resting feature that the skier can support his upper body by holding on to it. The second feature, however, differs from our device because it does not provide back and neck support to the skier. Since our client, Elysa, is unable to hold her head in the center position, neck support is necessary for our device. Also, our design requires a suitable seating device.

Figure 3: Snow slider

Figure 4: Bi-ski
Saddle Eating Chair

Companies and individuals have had similar concepts to the saddle eating chair. The senior design team from spring 2011 designed a chair that could be adjusted for height and had a pommel to support the child. A few items from a company that specializes in devices for children with disabilities are similar to the eating chair we are trying to design. The company is named Achievement Products and has many products available online.

Figure 5: www.achievement-products.com

Figure 5 is the mobile adjustable chair from the company. It has the back and head support we are looking to mimic as well as the ability to roll we desire in our product. It is padded for comfort and still has the ability to properly strap the child in for their safety. The seat is not the same design we are looking for. Also the tray is not necessary for our project.

Figure 6: www.achievement-products.com

Figure 6 is the chair with the seat type we require. This is meant to aid with abduction and to keep the legs from “scissoring”. This is the seat type we look to mimic as well as the back but it isn’t mobile but it can be adjusted 8 inches.
Recumbent Stationary Bicycle

For the recumbent stationary bicycle we are to build, there are an enormous number of options and modifications available on the market. Some brands include Schwinn and Nautilus.

Water Walker

Honda has created a device similar to this and is used to assist walking. This device however is used on dry land and supports the weight of the patient. Although this device is not used to teach a person how to work the concepts are very similar. They both restrict the operator to only use a normal walking motion. People who have tested this device say that at first the device feels very awkward to use but they quickly adapt to using it. This is promising for the underwater design in that hopefully her muscles will remember the walking motion at a relatively quick pace.
1.3.2 Patent Search Results

Zip Line Walking Device
There are no patents that are equivalent to what we have to design for this type of walking apparatus. The closest patents that could be found were for various child harnesses or jumpers, which none of them required the use of a zip line. All the patents that were relating to zip lines were for trolleys and zip line braking, not for assisted walking apparatuses. With the child harnesses, one that was somewhat similar to our design does not have an official patent number as of yet. Its Publication No. is US 2008/0018163 A1. The design includes support for the torso and back, while keeping the legs free to move. There are also shoulder straps that can be held by another person or hung from a frame. However, the design lacks in having any neck support, which the client needs.

Another one that could be used as a potential alternative design was Patent No. 3,447,832, which was for a jumper harness. This design featured a body belt that could be adjusted to accommodate for a child’s growth, as well as having snap fasteners for easy removal. The carabiners at the end of the suspension lines provide easy assembly and removal from where it is hung off of. That aspect of the design will be useful in our harness design. A problem with this design is that like the previous design, this one does not have any neck support. This one did not seem to have much padding, which from extended use can cause discomfort.

Adaptive Skiing Device
The patent for the ski assembly is 4,759,570. The ski assembly provides support to the skier by shifting the upper body weight of a skier from the skier’s legs to the skier’s skis and ski boots to reduce the strain on the legs of the skier. This product provides us an insight of how we should design our skiing device.
Recumbent stationary bicycle

The recumbent bicycle had many patents but patent number 7,662,070 is the device that most matches with our goals.

![Figure 12: Diagram of Patent 7,662,070](image1)

This bicycle was made with motorized pedals so the user can have aid in moving their legs. Elysa is going to need some kind of adaptation to allow her parents to help move her legs since she can’t do it on her own. This bike has the straps we would require as well as the adjustability for leg length.

Saddle Eating Chair

The saddle eating chair had a patent granted in 1989. Its patent number is 4,852,942.

![Figure 13: Diagram of Patent 4,852,942](image2)
This is very similar to what her parents are asking for. This chair has the ability to move by the rollers in the back. The design is clearly very fun. The rubber stoppers in the front keep it stationary while the child eats. It has no ability however to adjust to table heights. As well as no back support so it would need to be modified to allow for that and would need straps to hold her in so she couldn’t slip off.

2. Project Description

2.1 Project Objective

Zip Line Walking Device
Elysa does not have the muscle strength needed to be able to stand up for long, let alone walk on her own. This device will allow Elysa to stand upright, without needing her parents to support her, and allow them to more easily be able to teach her how to walk properly. Over time, as her core muscles and legs develop and strengthen, Elysa will be able to rely more on her own strength to stand upright and increase her coordination abilities to walk without assistance. It will help her gradually become more independent and be able to experience the freedom of being able to move around freely in her home.

The design will be based off of the Kaye Suspension Conversion Kit, with only the top part of the frame connects to the straps of the harness. A padded torso and pelvic harness will provide back and neck support in order to give Elysa support to stay upright. The harness will be made to be adjustable, so it can accommodate her future growth. It will also have removable padding, which can accommodate for Elysa’s need for the support. Attached to the harness are adjustable elastic straps that will suspend from the lightweight, metal bar being hung from the zip line. The metal bar will hang down from a swivel that is attached to a guiding wheel on the zip line, which will allow for the structure to rotate 360° to allow for maximum mobility.

Adaptive Skiing Device
The primary purpose of this project is to design a skiing device that allow our client, Elysa, to enjoy the excitement of skiing. Her parents want her to be able to stand on the ski on her own with minimum support, therefore she can enjoy the freedom and independence when skiing down the hill. The other purpose is to teach Elysa the proper stance of skiing. To do that, the device can fix her legs and hip in place, and the 3-point safety harness straps can prevent Elysa from falling off the device and provide support when she cannot stand up on her own. By using the skiing device, Elysa will be able to extend her activities to outside the house.

Saddle Eating Chair
This device is meant to allow Elysa to participate in activites at the table and allow her arms and legs to be free to move around. First for her safety it will have a harness to help support her sitting upright and keep her from sliding off the chair. The harness will be soft and comfortable and with the least bulk possible. he chair will have a seat to imitate the appearance of a riding saddle with a pommel for extra support and reduce her sliding. The chair will have wheels to allow for mobility. The wheels will have a locking mechanism so that it
stays in place while she is at the table. The base will be wide so it doesn’t tip. Also the chair height will be adjustable so it can reach several different table heights.

**Stationary Bicycle**

The major difference in this bike from other stationary bikes is the addition of the component that allows her parents to pedal the bicycle for her. This recumbent bicycle will include a harness to make sure Elysa is safely seated and doesn’t fall out. The seat back will be adjustable as well as have head and neck support. The leg distance will be adjustable as well as the seat height. Also a toy will be added and powered by the pedal rotations. The toy will dance in response to her pedaling to motivate her and add a sense of play to the activity. Also this will be made to fit her smaller size as compared to the normal size of a stationary bicycle.

**Water Walker**

The water walker has a simple enough design with little room for error. The harness and frame only allow the user to move their legs in a walking motion. The purpose of this device is to stimulate the repetitive motion of walking in hopes to create muscle memory that will translate to walking on land. The design is similar to that of the Honda walker but the main difference is that this will operate under water and will not have to support Elysa’s weight. Also, the water walker will have a lot more straps and be more restrictive than Hondas walker.

### 2.2 Methods

**Zip Line Walking Device**

The zip line will consist of a 100’ galvanized aircraft cable that is ¼” thick. Three ¼” cable clamps will be used to tie off the ends of the wire on the two ends, since tying cable by hand is virtually impossible. To protect the cable from crimping and along the connection points, a ¼” thimble can be use – one on each end. The loop that is formed from the thimble and cable clamps will make it easy to clip on a snap hook, carabiners, or quick links for easy installation and removal of the line when not in use. Two eye pins will be installed the walls A cable pulley will be attached to the cable, which will glide along the wire as Elysa walks across the room. The pulley will provide minimal resistance against the cable, allowing for ease of motion. It also has a double wheel feature that does not allow twisting of the cable.

To grant maximum mobility, a ½” eye/jaw swivel is added to the lower part of the pulley to allow the lower section of the device – the bar and harness, to rotate and adjust to the direction where Elysa is walking toward. Connecting to the zip line to the lower structure that has the harness requires a combination of a lanyard and carabiners. Just as for the zip line cable itself, the addition of the carabiners allows for the device to be easily assembled and taken apart. The frame of the device, where the harness will be connected to, will consist of either a pipe or a rectangular shape that will support both Elysa and the harness. The
dimensions for the frame will be around 16"x3"x1" (LxWxH), which may be
adjusted for the final product. Handle bars could be added to the frame for
additional stability and maintaining good posture. The harness will be made to be
adjustable, as to accommodate for Elysa’s growth and to prolong the practicality
of the device.

The harness will support Elysa’s torso and leg straps will give the support she
needs to be able to stand upright. A detachable neck and back support will
provide extra support when needed, and help keep her neck and back straight.
Supporting straps will hook onto the harness itself and will be attached to the
frame in multiple sections to provide the greatest stability and safety to Elysa
while she is using the device.

Adaptive Skiing Device
Our design of the skiing device will have similar features to the snow slider
manufactured by the company Freedom Factory, but with some new features
that will be customized and added to match our client’s needs. The ski will be
provided by one of our group members. The ski will be place in parallel to each
other. Four tubular stainless steel bars will be used as the main structure of the
device; two longer bars will be used as the backbone of the device and two short
bars will be used to support the device.

The bars should be adjustable since the client is only 6 years old and is still
growing. The 3-point safety harness straps will be tied to the four bars so that it
stays in the middle of the device. The connecting point between the harness
straps and the bars will be adjustable so that it can be changed to the
appropriate height of Elysa.

A plastic board will be placed between the two longer bars to provide back
support, and an adjustable safety strap will be placed on the plastic board where
Elysa’s forehead is to provide neck support. Foot and hip straps will also be
placed to fix her legs when using the device. Two rubber grips will be placed on
top of the two shorter bars so Elysa can grab onto them. The device should be
simple and not bulky, so therefore the design should avoid having unnecessary
parts attached to it.

Saddle Eating Chair
The chair back will be placed behind the saddle and attach to the component that
the saddle rests upon. The saddle will be designed to look just like a horse
saddle. It will be a cushion covered in vinyl colored to look like brown leather of a
saddle. And the seat will be shaped like a saddle as well. The saddle will have
optional stirrups for her feet. The pommel will look similar to the pommel in a
western saddle but will be a little larger to add extra support to Elysa. The chair
back will be a comfortable fabric with metal or plastic frame that the harness will
attach to.

The back will also provide added head support with two cushions on either side
of her head. The base will be stainless steel to aid in its cleaning and resisting
corrosion to possible spills. The base will be rather wide and have at least four
wheels. There will be a locking mechanism on the base similar to one for any stroller. The piece connecting the seat and the base will be metal and contain a jack like mechanism to lift and lower the seat to the appropriate height.

Stationary Bicycle
The frame will be stainless steel. The section that supports the seat will be angled, so, as the seat is moved towards to pedal the distance and height above the ground is reduced. The chair back will be adjustable to allow her to sit up straighter or lean back farther. Also the chair back will be a woven fabric with a metal frame to which her harness and lap belt will attach. The pedals will be typical bike pedals that are attached to a small wheel. The small wheel will have a rim break attached so that resistance can be added by a knob that one can turn.

The wheel will be housed inside a compartment. In this compartment, the wheel will have a belt running over it that will power another spinning wheel. Through a series of cogs and other mechanical components the belt will power the motion of a doll that can be visible on top of the compartment. The doll will spin in response to how fast the pedals go. The frame will have supports on the ground to ensure it cannot tip side to side. The frame will also collapse to a small extent to reduce the amount of space it takes up when it is stored. This will be achieved by having a hole in the frame that allows the interlocking frame components to slide past each other when a pin is removed from the hole.

Water Walker
The purpose of the water walker is to stimulate the muscle memory of walking. Elysa’s parents have expressed an interest in a device that will stimulate her legs to move the way they would while walking when she is in the water. Elysa enjoys going to the pool and this could be a perfect environment for her to work on some hydro physical therapy and enjoy herself. She is already in possession of a coast guard certified life preserver so the device will not have to keep her afloat.

The basic concept of the design is mechanical legs that run parallel to the Elysa’s legs but only allow movement in a form analogous to walking. This way her muscles will do all the work but are restricted to a walking motion. The hope is that this repetitive therapy will translate back to help Elysa’s muscles to remember the motion when using her zip line on dry land.

Elysa will be seated in a in a modified bicycle like seat. The seat will rise up in the front and back with a strap around Elysa’s midsection. This will allow for free range of motion with her legs but be secure enough to keep the device in place while in the water. It is important to note the Elysa will not be actually sitting in this seat but rather the seat will be acting more as a harness than anything else.

Attached to the bottom of the seat will be two steel rods on hinges that will mimic the range of motion allowed by a normal hip joint. These will extend down to another hinge and rod parallel to the knee joint. This hinge will only allow for back and forth rotation as if a person were walking in a straight line. Just below the knee will be a strap attached to the leg to further secure the device. This will then extend down to the ankle and use the same hinge concept.
The feet will rest on a flat surface to prevent Elysa’s feet from curling as this occurs from time to time with her and it makes it difficult for her to stand on them. Again there will be another strap here. There will also be handles attached outward from the base of the device on either side. These will allow someone to assist Elysa and show her the correct motion.

3. Budget

**Zip Line Walking Device**

The proposed budget comes from the prices of the various parts as there’s no exact device like it out there in the current market. The table below breaks down the cost of parts that go into building the zip line walking device. The estimated cost of this project is around $420, where most of the cost is going to the zip line cable, pulley, metal, and harness.

<table>
<thead>
<tr>
<th>Parts</th>
<th>Cost</th>
</tr>
</thead>
<tbody>
<tr>
<td>¼&quot; Galvanized Aircraft Cable (100')</td>
<td>$68 (.68 per foot)</td>
</tr>
<tr>
<td>Pulley/Trolley</td>
<td>$79.95</td>
</tr>
<tr>
<td>½&quot; Eye Bolt (x2)</td>
<td>$18</td>
</tr>
<tr>
<td>½&quot; Eye/Jaw Swivel</td>
<td>$13.50</td>
</tr>
<tr>
<td>Snap Hooks (x6)</td>
<td>$23.10</td>
</tr>
<tr>
<td>Lanyard (4')</td>
<td>$14.25</td>
</tr>
<tr>
<td>Thimble (x2)</td>
<td>$1.90</td>
</tr>
<tr>
<td>Metal Frame</td>
<td>$88.12</td>
</tr>
<tr>
<td>Harness</td>
<td>$70</td>
</tr>
<tr>
<td>Harness Padding</td>
<td>$20</td>
</tr>
<tr>
<td>PVC Pipe</td>
<td>$15.50</td>
</tr>
<tr>
<td><strong>Total Expense</strong></td>
<td><strong>$412</strong></td>
</tr>
</tbody>
</table>

**Adaptive Skiing Device**

The commercial products usually range in price from $900 to $3500. The estimated cost of this design is $400, which is about 44% of the lowest retail price in the market. The majority of the budget will be spent on the stainless steel bars and plastic board. Most parts can be bought pre-assemble, such as the safety harness straps, rubber grips, hip belts, and foot straps. We will try to minimize the number of parts to maximize the efficiency of the skiing device, so the product can match the client’s expectation: simple and not bulky. Also a
group member has a pair of child size skis so that price of the ski’s themselves is covered. The table listed below is the cost of parts for building the skiing device.

<table>
<thead>
<tr>
<th>Parts</th>
<th>Cost</th>
</tr>
</thead>
<tbody>
<tr>
<td>Stainless Tubular Steel Bars (x4)</td>
<td>$250</td>
</tr>
<tr>
<td>3-Point Safety Harness Straps</td>
<td>$20</td>
</tr>
<tr>
<td>Rubber Grips (x2)</td>
<td>$10</td>
</tr>
<tr>
<td>Ski</td>
<td>$0</td>
</tr>
<tr>
<td>Hip Belts</td>
<td>$40</td>
</tr>
<tr>
<td>Foot Straps</td>
<td>$25</td>
</tr>
<tr>
<td>Plastic Board</td>
<td>$100</td>
</tr>
<tr>
<td><strong>Total Expense</strong></td>
<td><strong>$445</strong></td>
</tr>
</tbody>
</table>

**Stationary Bicycle**
The cost of recumbent stationary bicycles can range anywhere from 200 to 2000 dollars. The models with less electrical components cost about 200 to 300 dollars. We plan to buy a stationary bicycle and just make adjustments to the frame and seat as necessary. Extra cushioning will be added as necessary by sewing and creating items the cost of the fabric and cushioning should be about 40 dollars.

<table>
<thead>
<tr>
<th>Parts</th>
<th>Cost</th>
</tr>
</thead>
<tbody>
<tr>
<td>Stationary bicycle</td>
<td>$200-300</td>
</tr>
<tr>
<td>Toys</td>
<td>$20</td>
</tr>
<tr>
<td>Hand crank component</td>
<td>420</td>
</tr>
<tr>
<td>Internal mechanical components</td>
<td>$40</td>
</tr>
<tr>
<td>Extra cushioning</td>
<td>$40</td>
</tr>
<tr>
<td>Harness</td>
<td>$25</td>
</tr>
<tr>
<td><strong>Total Expense</strong></td>
<td><strong>$400-545</strong></td>
</tr>
</tbody>
</table>

**Saddle Eating Chair**
The saddle eating chair made by Acheivement Products costs 539.95. this product has every component necessary for my product and would only need
basic modifications. So assuming we use similar components our product should actually cost less because unlike the company our costs do not include labor.

<table>
<thead>
<tr>
<th>Parts</th>
<th>Cost</th>
</tr>
</thead>
<tbody>
<tr>
<td>Saddle and chair back</td>
<td>$100-200</td>
</tr>
<tr>
<td>Stainless steel base</td>
<td>$63</td>
</tr>
<tr>
<td>Harness</td>
<td>$25</td>
</tr>
<tr>
<td>Chair legs</td>
<td>$100</td>
</tr>
<tr>
<td>Wheels and locking</td>
<td>$50</td>
</tr>
<tr>
<td><strong>Total Expense</strong></td>
<td><strong>$338-438</strong></td>
</tr>
</tbody>
</table>

**Water Walker**

There are no products on the market currently to compare pricing options for this device. Pricing will have to be based solely on parts prices. The table below breaks down each part with a rough estimate of the pricing. The combined total of all the parts should be somewhere around $500.00.

<table>
<thead>
<tr>
<th>Parts</th>
<th>Cost</th>
</tr>
</thead>
<tbody>
<tr>
<td>Seat/harness</td>
<td>$100.00</td>
</tr>
<tr>
<td>Stainless steel bars</td>
<td>$150.00</td>
</tr>
<tr>
<td>Restrictive Straps</td>
<td>$25.00</td>
</tr>
<tr>
<td>Foot Straps</td>
<td>$25.00</td>
</tr>
<tr>
<td>Handle Grips</td>
<td>$10.00</td>
</tr>
<tr>
<td>Steel pivot joints (x6)</td>
<td>$150.00</td>
</tr>
<tr>
<td>Foot Plates</td>
<td>$30.00</td>
</tr>
<tr>
<td><strong>Total Expense</strong></td>
<td><strong>$490.00</strong></td>
</tr>
</tbody>
</table>

**4. Conclusion**

The Zip Line Walking Device will provide the means for Elysa to be able to stay upright, as well giving her mobility to get around the house. It will hopefully give her the opportunity, as time progresses, to develop her core and muscles, so that she can one day walk completely on her own, without any assistance. The padded harness and frame will keep her comfortable after extended use, as well as keeping her safe. The removable neck and back support can be removed as Elysa’s strength increases or if
she’s having a good day and does not need it. It will allow her parents to focus more on teaching her how to walk, rather than trying to keep her upright and teach her how to walk simultaneously. All of the parts aren’t bulky and simple to assemble and disassemble when necessary, so that the device can be easily be stored away when it is not in use.

The purpose of the adaptive skiing device is to allow Elysa to extend her fun to outside of the house and enjoy the ride on the ski with the least amount of support. While using the skiing device, Elysa can not only feel more independent doing thing on her own, but also be more willing to step foot outside the house. Eventually, she can learn the proper way to ski and also strengthen her core and leg muscle.

The goal of the water bike is to develop a muscle memory while in an aquatic environment that will translate to dry land. Elysa enjoys her time at the public swimming pool and this creates a perfect environment for a low impact and enjoyable form of physical therapy. With time and repetitive use we feel a positive outcome is realistic.

The goal of the saddle eating chair is to allow Elysa more freedom while she participates in activities at the table. Also, the device is supposed to be fun for her since she enjoys riding horses. The goal of the recumbent bicycle is to help teach her the proper techniques for coordinated motor function in her legs. This will help strengthen her legs and set her along a path where she can learn to ride a bicycle.

All of the devices above should help Elysa develop her muscles and stimulate her brain to increase her ability of coordination. The hope is that she can enjoy the devices and help her to become more independent as her muscles strengthen.