Team #14: Adaptive Equipment
Designed and Constructed for
Samantha Gillard

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Overview

• Introduction
  – Client
  – Background and Purpose of Projects
• Adaptive Position Chair
• Remote-Controlled Ride-On Car
• Assisted Skiing Device
• Budget
• Conclusion
Our client, Samantha Gillard

• Three year old girl with Rett Syndrome

• Children's Hospital in Boston
  – Augmentative communication program
  – Recently chosen to take part in clinical drug trial

• Lives with parents Geoff and Jenny in Newton, MA

• Grandparents’ house in New Hampshire
  – a lot of land and close to a ski mountain
Background: Rett Syndrome

- MECP2 x-chromosomal mutation that affects neurological function
  - Only seen in female children
- Characterization:
  - Poor muscle motor control
  - Poor language expression but good reception skills
  - Developmental reversal around 6 – 18 months of age
- Symptoms typically include:
  - Lack of balance
  - Repetitive hand motions (ticks)
  - Inability to speak
Background: Samantha

- Strong language reception skills
- Involuntary tick: hands frequently in mouth
  - Difficulty eating
  - Arms must be restrained
- Weekly physical therapy
  - Upright muscles strengthened with low resistance exercise
Project Purpose

Design and construct adaptive equipment that will help improve Samantha’s quality of life:

1. Ability to do daily activities easily
   – Adaptive Position Chair (APC)

2. Accessibility to fun, family activities
   – Assistive Skiing Device (ASD)
   – Ride-On Remote-Controlled Car (RRC)
Adaptive Position Chair
Adaptive Position Chair

• Key Features:
  – Core support
  – Stability
  – Tray for activities
    • P.O.D.D. system / Tobii Eye Gaze
    • Eating
    • Laptop for online book reading
APC: Core Support

- Butterfly harness
- Pommel, padding upholstered with vinyl
APC: Stability

• Frame
  – Low carbon steel

• Adjustable feet
  – Allows for stability on uneven ground
Samantha’s Communication

- Pragmatic Organization Dynamic Display (PODD)
  - Picture-based language developed by Boardmaker®
  - Organized so that a desired idea can be expressed via a series of yes-no questions

- Tobii Eye-Gaze System
  - Touch-screen computer tracks Sam’s eye movement
  - Method of navigating the PODD
APC: Tray table

- Acrylic
- Dimensions 19” x 15” x 0.5”
- Adjustable in 3 planes of motion
  - Bike clamps and telescoping tubing
Assistive Skiing Device
Assistive Skiing Device

- Designed to allow Samantha to go skiing with her family
- Replication of proven concept (pictured lower left, Tessier Piloted Dual Ski)
- Requires pilot to lean the device which will turn or brake, imitating the articulations of an able-bodied skier.
Assistive Skiing Device

• Key features:
  – Adult driver
  – Chair lift compatibility
  – Safety restraints
  – Adjustable outriggers
  – Teleboard™ or snowboard
ASD: Chair lift compatibility

- Two positions of function
  - Downhill skiing position
    - Mimics a stroller
  - Uphill chairlift position
    - Mimics a person standing
    - Allows for ease of use
ASD: Chair lift compatibility
ASD: Adjustable Outriggers

- Provide balance, additional turning and stopping power
- Adjustable and removable for desired level of maneuverability
Teleboard™ versus Snowboard

- Multiple boards provide different levels of maneuverability
- Fully disassembles for transportation and storage
Ride-on Remote Controlled Car
Ride-on Remote Controlled Car

- Key features:
  - “Off-road” wheels
  - Safety restraint
  - Electronics
    - Radio Transmitter and Receiver
    - Electronic Speed Controller
    - Battery Elimination Circuit
    - Servo Motor
RRC: “Off-road” wheels

- Attained from NEAT Marketplace
- Rubber
- Better for the grass/packed dirt surfaces the Gillards wish to use the vehicle on
RRC: Safety restraint

- Stock seat in Power Wheels® deemed supportive enough by Gillards
- Butterfly harness
RRC: Electronics

- Radio Receiver
- Electronic Speed Controller
- Battery Elimination Circuit
- Battery
RRC: Servo Steering
Budget

• Originally $1600.00
  – $533 per device
• This total was increased three weeks ago
  – despite saving money whenever we could, more money was necessary to get our projects up and running
THANK YOU

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Questions??