**Team 1**

**All-Terrain Power Chair Redesign**

**Client:** Annalee Hughes

**Purpose**
- Redesign her self-leveling all-terrain power chair so that she can safely and independently explore her yard.

**Special Features**
- Rear wheel drive system
- Automatic leveling seat
- Five-point harness

**Technical Description**
The auto leveling system on Annalee's power chair uses two accelerometers and a PIC microcontroller to operate. One accelerometer is mounted to the seat of the chair, while the second is mounted on the frame of the chair (as seen to the left and below, respectively). The PIC performs analog to digital conversions and compares the accelerometer values to each other and a "level" reference value in order to determine whether to raise or lower the seat. A printed circuit board (PCB) was designed and ordered to optimize the circuit and minimize the chances of causing shorts or other electrical failures.

**Conclusion**
With this power chair, Annalee will be able to traverse and explore her yard and other areas more freely and safely. All-terrain power chairs can cost tens of thousands of dollars, whereas this chair was modified with around $500, making it substantially cheaper than chairs on the market today.

**Acknowledgements**
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**Team 1**

**All-Terrain Wheelchair Redesign**

**Client:** Nathan Lamb

**Purpose**
- Redesign his all-terrain wheelchair so that Nathan can enjoy more outdoor activities independently.

**Special Features**
- Rear wheel drive system
- Independent rear wheel suspension
- Adjustable armrests and headrest
- Disassemblies for transportation
  - Removable seat and armrests
- Five-point harness
- Powder coated finish

**Technical Description**
The frame of the chair is made of 2" square aluminum tube stock. The chair is powered by a 12 V deep cycle battery and a motor controller that uses the joystick as an input device. The original joystick was replaced with a more robust model that will increase the life of the chair. The motors are driven by the motor controller and each has independent spring suspension. The front suspension was replaced with casters to give the chair better maneuverability. The seat and armrests are removable, making it easy to transport. The armrests are also adjustable allowing for continued use as Nathan grows.

**Conclusion**
With this power chair, Nathan will be able to traverse and explore the outdoors more freely on various types of terrain. All-terrain power chairs can cost tens of thousands of dollars, whereas this chair was modified with around $500. The original design was built from scratch for around $2000, making it substantially cheaper than chairs on the market today.

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**Purpose**
- Construct a beach-worthy wheelchair using Danielle’s old collapsible stroller frame to allow her to more easily enjoy beach trips with her family

**Special Features**
- Collapsible frame design
- Removable polyurethane balloon tires
- Rear swivel casters for easy turning
- Removable/adjustable PVC pipe seat
- Safety lap belt
- Powder coated finish

**Team 1**
**Beach Wheelchair**
**Client: Danielle Giroux**

**Conclusion**
With this new beach wheelchair, Danielle will be able to traverse the uneven beach without sinking into the sand. Public beaches provide beach wheelchairs, but they are often in short supply and are too cumbersome to use in beach facilities, like restrooms. Danielle’s family will now have their own specially made chair to use at their own will.

**Technical Description**
The frame of the chair is made of Danielle’s old collapsible aluminum stroller. The chair has four heavy-duty polyurethane balloon tires that enables the chair to stay on top of the sand when moving. The swivel casters are in the rear so that torque applied to the handlebars when turning is further from the pivot point, the front tires, making it much easier to turn especially on the uneven sand. The PVC pipe seat with mesh fabric is also removable for easy transport. The aluminum frame has a powder coated finish to prevent paint corrosion from salt water.

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