Nordic skiing is a strenuous sport that requires an immense amount of energy and strength to participate in. The goal of this project was to create a power assist Nordic sit ski for individuals with severe spinal cord injuries. The assistive device will be a removable system that can be attached to a conventional sit ski. This assistive device will help lower the barrier of entry for Nordic skiing for these individuals.

**INTRODUCTION**

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**PROBLEM STATEMENT**

Design a power assist device that will allow the user to get up small inclines without using significant upper body strength and slow down when going downhill. The power assist device needed to be contained in the area between the two skis underneath the saddle of the sit ski.

**TRANSMISSION SYSTEM**

**Requirements:**
- Lightweight electric motor
- High torque
- Operate in freezing temperatures
- Battery life of 1-2 hrs in cold temperatures
- Corrosion resistant

**Specifications:**
- Total output torque of system 250 Nm
- Gear ratio of 1:16
- Battery size of 5000 mAh
- 120 Amp ESC to drive motor
- 65 CC RC aviation motor

**BOX ENCLOSURE**

**Requirements:**
- Waterproof
- Lightweight design
- Corrosion resistant material
- House all electronics and gearbox assembly
- Adaptable to different sit skis

**Specifications:**
- Sealed system with waterproof rating of IP66 (Silicone sealed housing)
- Cutouts added on gearbox mount plate to help reduce weight
- Factor of safety of 5 achieved

**TRACK SYSTEM**

**Requirements:**
- Lightweight design and modular
- Operate in freezing temperatures
- High tractive force in snow

**Specifications:**
- Can rotate up to 15 mph
- Provides full contact on packed snow
- Corrosion resistant frame material
- Weight of 15 lbs

**SWING ARM**

**Requirements:**
- Lightweight design
- Sturdy design with minimum lateral flex
- Corrosion resistant

**Specifications:**
- Factor of safety of 5
- 1/4" Aluminum used
- Cutouts added on swing arm to help reduce weight

**KEY RESULTS (CONCLUSION)**

We were able to achieve a fully functioning prototype of our design. The design needs a few improvements to lighten the design and increase the tractive force the track produces.

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