All-Terrain Power Chair
Team 10

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Project for Nathan Lamb
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Introduction

- About Nathan (client)
- Purpose
- Products and Patent
- Objective
- Mechanical Components
- Electrical Components
- Software
- Budget
- Conclusion
- References
- Question period

Figure 1: Nathan at Plymouth Rock
The Client

Nathan Lamb

- 11-year-old boy
- Lives in Stonington, CT
- Adventurous and playful
- Challenges:
  - Autistic
  - Cognitively and physically challenged
  - Spina bifida
    - Shunt in skull to drain fluid buildup
  - Paraplegic
  - Excessive fidgeting
- Capable of using left hand for activities

Figure 1: Nathan and his sister
Purpose

Current Problem:
> Nathan can not enjoy all outdoor activities with his family and friends due to limitations of his current devices
> Most people find Nathan’s devices exhausting or hard to use

Intended Solution:
> Design Nathan an intuitive all-terrain power chair
  • Allows him to participate in more outdoor activities
  • Provides him more independence
  • Increases safety
Products and Patent

- Planet Mobility’s X4-Extreme 4 wheel drive power chair
  - $16,995
- UConn’s ATPC X42 – Spring 2010
  - $4,400 (including estimated costs of donations
- Both, as well as other similar products, utilize joystick control, oversized wheels, ergonomic seats, and suspension.

- An early patent:
  - Adoof Hammer filed the patent in 1998
  - Utilized combustion engine
  - Controlled by dual levers and had emergency steering wheel
Objective

- Design power chair to suit Nathan
- Implement Safety Measures
- Easy transportable, lightweight design
- Allow for use along trails & beaches
- Accommodate for growth of the client
- Have Fun
Mechanical Components

- Frame/Chassis – lightweight, modular, rugged
- Wheels – durable, all-terrain
- Suspension – comfort and grip
- Mechanical brake – safety
Electrical Components

- Joystick – easy to control
- Power supply – segregated for durability, safety, and longevity
- Hall Effect Sensors – feedback for wheelspin
- Microcontroller – brains of the chair
- Motors – 24V DC motors
Software

- Embedded C in microcontroller
- Feedback from wheels for 4-wheel-drive system
<table>
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<th>Part</th>
<th>Estimated Cost ($)</th>
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<tr>
<td>Motor Batteries (2)</td>
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<td>Other Batteries</td>
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<td>Suspension</td>
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<td>Joystick</td>
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<td>Sound Circuitry and Speaker</td>
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Conclusion

- This power wheel chair will safely increase Nathan’s mobility and allow him to explore at his own content.
- Nathan’s parents will have less strain caused from wheeling Nathan around.
- This design will be cheaper than alternatives already on the market.
References

2. https://health.google.com/health/ref/Myelomeningocele
Any Questions?