Power tool operation - Rat Model

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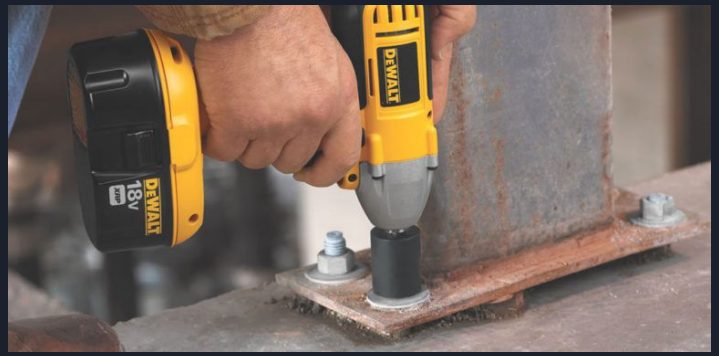
Presentation Overview

1. Problem Statement
2. Background
3. Summary of Product Design Specifications
4. Design Alternatives
5. Design Matrix
6. Future Work
7. Acknowledgements

Problem Statement

- Power tools present hazardous hand load
- Leads to repetitive motion injuries
- Use rat to model this motion
- Lever will apply reaction force
- Rat must pull lever until force achieved



Background

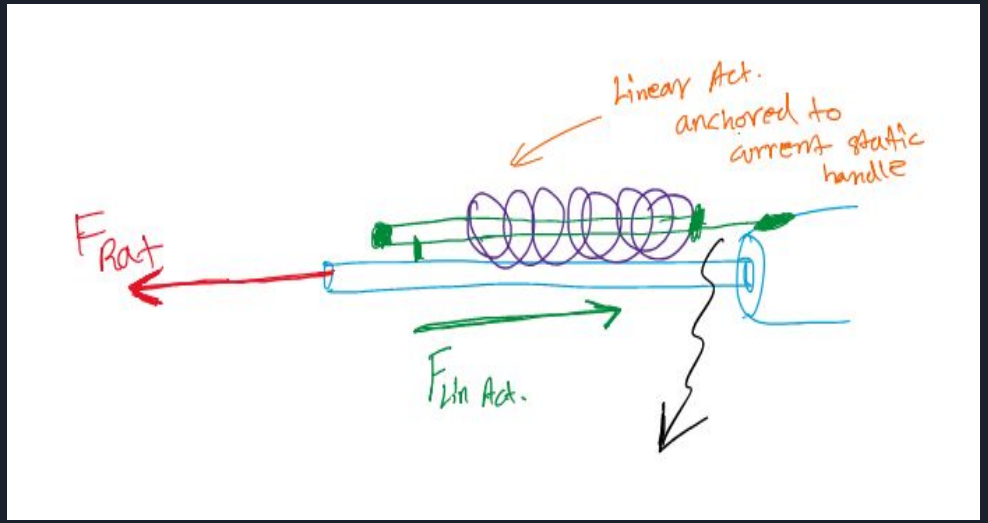
- Vulintus Model
- Automated, Quantitative Measures of Forelimb Function in Rats
- Model is static; no reaction force

Summary PDS

- Client requirements
- Competition
- Working system dimensions
- Rat Data
- Challenges

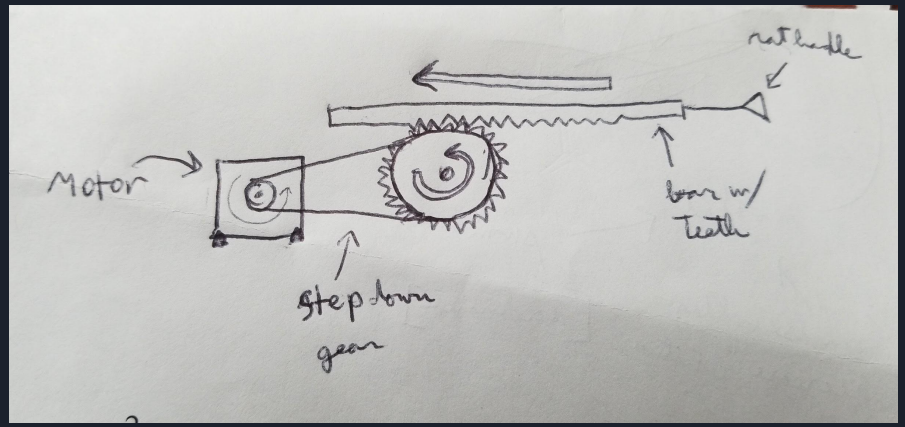
Linear Actuator

- Linear Actuator
  - Provides an opposing force to the rat's pull
  - Pwm -> mosfet -> solenoid
  - Arduino microcontroller



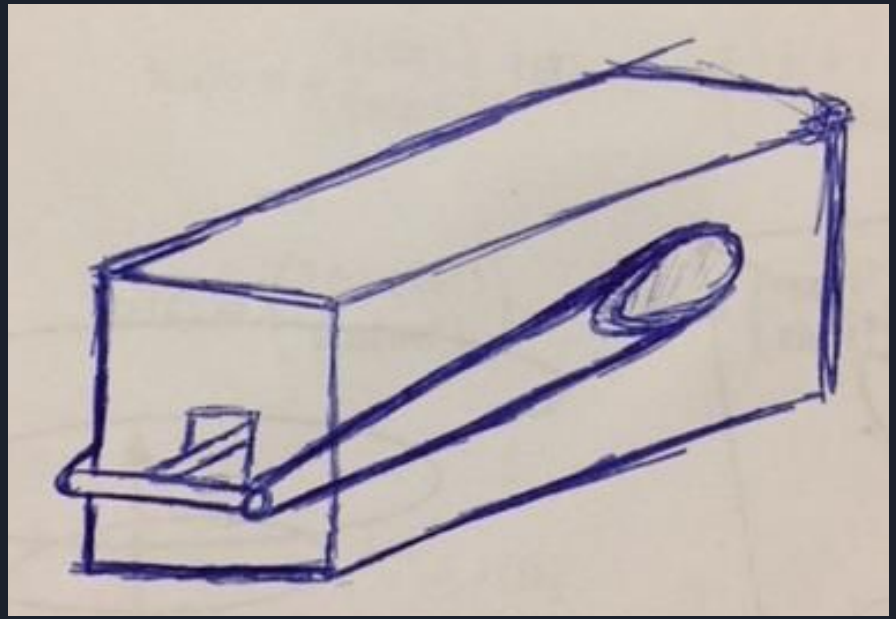
Motor and gear system

- Gear and Motor
  - Rotating gear provides linear resistive force
  - High torque ratio
  - Arduino microcontroller



Rubber Band

- Rubber Bands
  - Bands provide reaction force
  - Displacement is proportional to force



Design Matrix

Design:	Rubber Band		Motor & Gear		Linear Actuator	
Adjustability(25)	3/5	15	4/5	20	5/5	25
Consistency(25)	2/5	10	3/5	15	5/5	25
Ease of Integration(20)	3/5	12	3.5/5	14	2/5	8
Feasibility(25)	3.5/5	17.5	3/5	15	2/5	10
Cost(5)	5/5	5	3/5	3	3/5	3
Total 100	**57**		**66**		**71**	

Future Work

- Refine Design
- Fabricate chosen design
- Run tests on prototype
- Modify design based on results

References

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Thank You!