

## About the Project

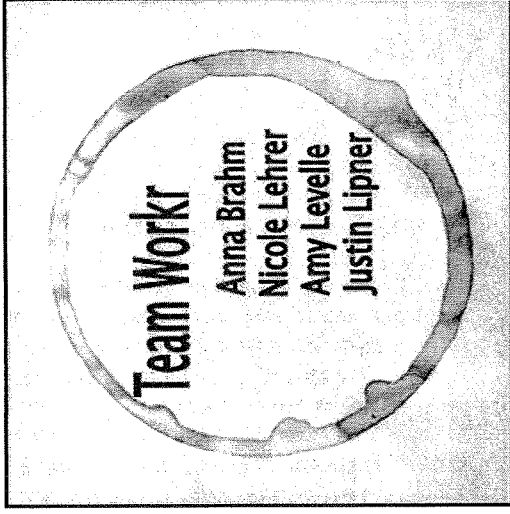
Team Workr is one of the senior design groups of the Department of Biomedical Engineering of Tulane University. Our client JE is a nine-year-old boy with cerebral palsy who requires weekly physical therapy for his muscle hypertonicity and lack of trunk strength. After meeting with JE and his family, our team decided to design a mechanical bull to address his lack of trunk tone. The mechanical bull provides a fun and effective way for JE to increase strength while simultaneously benefiting his digestion and overall flexibility.

## Acknowledgements

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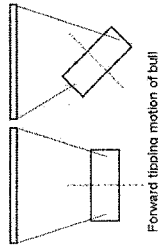
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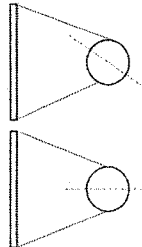
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## Motivation

J.E. is a nine year old boy with cerebral palsy. His very weak trunk tone makes it difficult for him to maintain his upper body in an upright position. The hypertonicity of J.E.'s legs causes adduction, which leads to scissoring of his legs while walking. J.E.'s lack of body movement also might contribute to digestive problems such as constipation. Our trunk tone trainer is an exercise device intended to address each of these issues.



Forward tipping motion of bull



Lateral rotation of bull

- Forward tipping exercises lower back muscles and medial abdominal muscles.
- Lateral rotation exercises external and internal obliques.
- Saddle abducts thighs and stretches the hip flexors and medial thigh muscles.

## Objectives

- Increased trunk tone
- Safety
- Enjoyment
- Social Interaction
- Improved Digestion

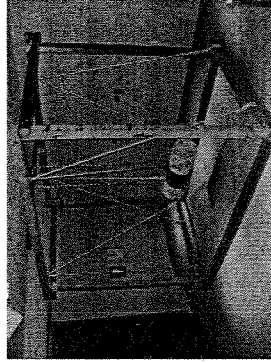
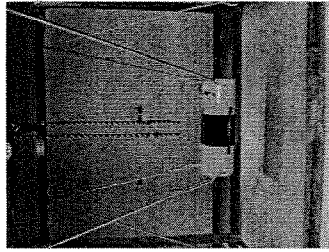


# Bourbon Cowboy

Tulane University  
Department of Biomedical Engineering  
with support from the National Science Foundation

## Team Workr

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## Features

### Frame:

- Timber frame is 10' long, 6' wide, and 8' high

### Bull:

- The bull is a padded PVC pipe suspended by four ropes. The ropes attach to the pipe at its four extreme points. These ropes run through pulleys and attach to the bottom of the frame.
- The bull is narrow enough for J.E. to straddle but sufficiently wide enough to stretch his legs apart.

### Motion:

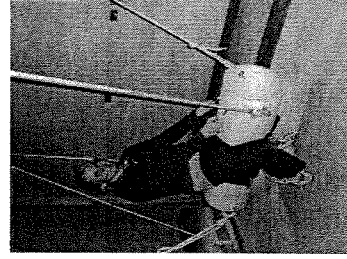
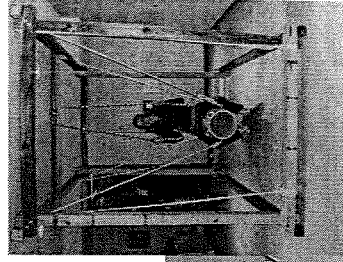
- The ropes are pulled manually by an assistant to simulate the motion of a mechanical bull.

### Additional Features:

- Overhead ropes provide an additional option for J.E. to support himself and remain on the bull. The overhead ropes also offer an additional challenge for J.E. to exercise his trunk muscles.

### Safety:

- Helmet and ground padding
- It has appropriate padding and rope hand grips in the front.



## Design

The trainer simulates the movements of a mechanical bull. J.E. straddles the bull to ride it. With the control of a supervising adult, the device moves J.E. around in an unpredictable way. This forces him to adjust his trunk position to avoid falling. His legs also abduct throughout the riding session.

## Conclusion

The dynamic body motion should assist with digestion. Experience with the prototype has shown that the proper motion is easily achieved without motors. It appeals to J.E. and his family, a characteristic that should lead to more frequent use. This system provides a fun and useful way for J.E. to get the exercise and muscle development that he needs.