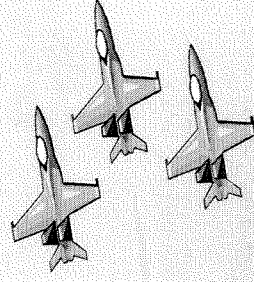


## Acknowledgments

Team Cadet Biszko and the Engineers would like to thank Dr. Rice, Dr. Gaver, and Dr. Walker for their guidance and support throughout this project. We would also like to thank the Team Design teaching assistants. The funding for this project was provided by the National Science Foundation.

Cadet Biszko  
and the  
Engineers

School Desk with  
Motorized Slant Board



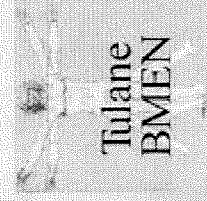
## Contact Information

Grace Ledet  
gledet@tulane.edu

Samy Abdelghani  
sabdellgh@tulane.edu

Justin Cooper  
jcooper1@tulane.edu

Beth Doughty  
edoughty@tulane.edu



Department of Biomedical Engineering  
Tulane University  
Lindy Boggs Suite 500  
New Orleans, LA 70118

## Project Goals

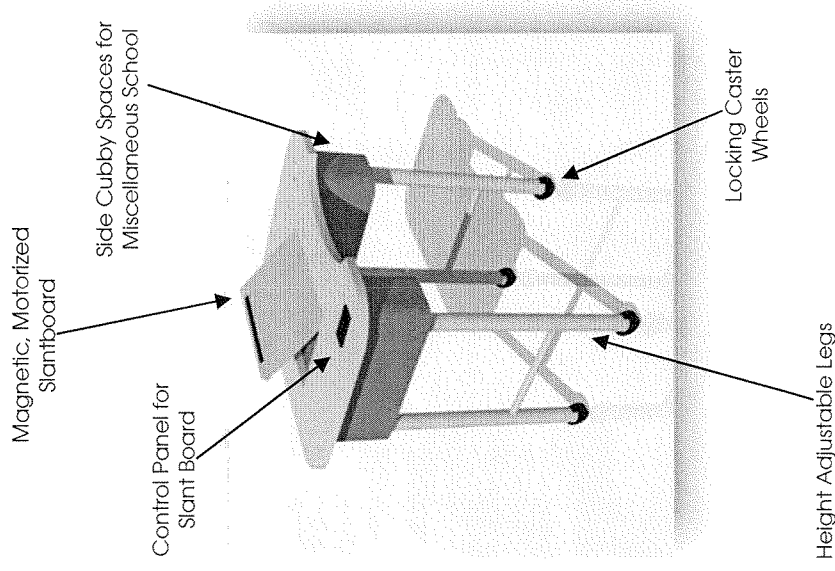
Our client is a kindergarten student with Arthrogryposis, a genetic condition with decreased or no joint movement, which causes muscles to atrophy and severely limits movement. She uses her mouth to power her wheelchair and to perform all of her kindergarten activities such as writing, drawing, and typing. In order to write and draw, she needs her desk surface to be tilted towards her. Our goal is to design a school desk with a motorized slantboard. The height of the desk will be adjustable to accommodate the varying height of her wheelchair. Additionally, the desk needs to be mobile since it will be used throughout grammar school.

## Solution

We have fabricated a free-standing desk which allows our client to be as independent as possible. The desk's main feature is a motorized slantboard that raises and lowers at the touch of a button. Alongside the slantboard, our desk features adjustable legs, cubbies for storage, and a surface that will assist our client with her daily schoolwork. The desk surface has been designed to allow our client's wheelchair to fit between the side storage spaces. Our desk will require little to no maintenance and will follow our client throughout her elementary school career because of its versatility and quality construction.

## Methods and Materials

### Desk Features



**Linear Actuator:** We are using a linear actuator with a 6" stroke to lift the hinged slantboard. The actuator uses 12v DC voltage and draws 3 to 4 amps. The actuator can lift with a force of 110 lbs and can hold a load of 550 lbs in static equilibrium. The actuator can easily lift a 20 pound weight on the slantboard (factor of safety  $\approx 4$ ).

**Control Panel:** The actuator is controlled by a double pole double throw (DPDT) toggle switch. The switch has three positions so that the slantboard is stationary when the toggle is in the middle position, moves up when the switch is thrown in one direction, and down when it is thrown in the opposite direction. The actuator has built in limiting switches so that it will shut off when it is fully extended or retracted.

**Biscuit Joints:** The wooden panels of the desk are glued together using compressed wood joiners called biscuits. A semicircular notch is cut into each of the two panels using a biscuit cutter, and the biscuit expands to make a strong joint after it is glued between the two panels. This makes for strong joints without necessitating unsightly screws and nails in the desk's exterior.