A. JAMES CLARK SCHOOL OF ENGINEERING


**Mechanical Engineering Design Day**

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# Team AmbiDesk

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## Objective

In a random lecture hall seating arrangement, there is a potential for 20% of students to be seated at a desk that is not accommodating to their dominant hand. This can have a negative effect on learning and create a distraction during their educational experience.

**Goal:** To create a lecture hall desk that will accommodate both right and left handed students.

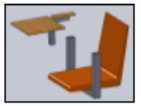
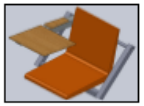
**Market:** Universities and other educational settings.

| Constraints | |
|---|---|
| Height of chair | Lecture hall layout |
| Space between desks | Armrest |
| Accessibilty | Repeated Use |

| Customer Requirements | |
|---|---|
| Ease of use | Reliablity |
| Size of tablet | Noise |
| Space between desks | Longevity |
| Comfort | Storage space |

| Engineering Characteristics | |
|---|---|
| Weight | Noise Level |
| Strength | Dimensions |

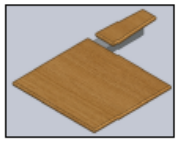
## Concept Generation

| Existing Competition | Concept #1 | Concept #2 | Concept #3 |
|---|---|---|---|
|  |  |  |  |
| Davis Furniture<br>(+) Ergonomic, Comfort<br>(-) Lack of strength | Swivel Tablet<br>(+) Ease of use<br>(-) Reduced storage area | Detachable Tablet<br>(+) Ease of fabrication<br>(-) Lose tablet | Behind the Back Swivel<br>(+) More storage space<br>(-) Long track (noisy) |

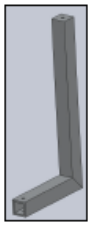
| Characteristic Weights | | | |
|---|---|---|---|
| Strength | 16% | Storage Space | 5% |
| Noise | 2% | Comfort | 10% |
| Dimensions | 6% | Ease of Use | 21% |
| Tablet Size | 8% | Longevity | 32% |

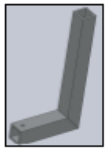
**Concept Selected: Swivel Tablet**
- Ease of use
- High strength
- Compatible with current lecture hall layout (EGR 1202)

## Design

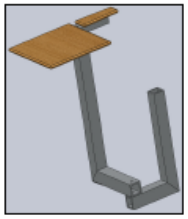


- Single product with right and left orientations
- Adequate writing surface with armrest
- User intuitive





**Tablet Assembly**
- Sliding tracks to move tablet
- Large, smooth writing surface
- Armrest
- Does not fold down (tradeoff)

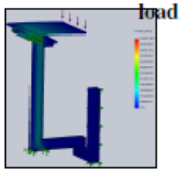


**Support Assembly**
- Bearings to facilitate 180˚ motion
- Little force required to operate
- Aluminum – cheap, light, strong, but hard to weld (tradeoff)

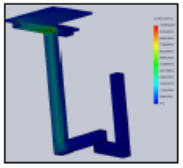
## Prototype and Testing

- FEA testing completed to verify material and assembly strength
- User survey to be conducted for functionality feedback
- Manufactured product to feature welds at all connections to ensure structural integrity
- Assembly and motion fully functional within dimension constraints

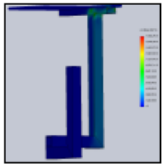
**Von-Mises Stresses for 200lb load**



Load applied to inner edge of tablet



Load applied to front of tablet



Load applied to armrest

## Test Results and Future Work

**Design Process**
1. Identified Need
2. Generated Concepts
3. Selected Concept
4. Created Prototype
5. Conducted Testing
6. Adjustments & Final Design

**Future Work**
- Integrate assembly to chair support
- Weld bearings and caster wheel
- Perform economic analysis, determine optimal manufacturing setup
- Integrate locking mechanism
- Improved tablet movement

**ENME472 - Integrated Product and Process Design and Development**