Making UCI Accessible: Lecture Hall Desk Redesign

UCI Samueli School of Engineering | Department of Mechanical and Aerospace Engineering

Equitable Design Solutions

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Executive Summary

In an effort to increase accessibility in the classroom, we were tasked with redesigning the tablet arm desktops in UCI's lecture halls. Our team set out on a mission to improve comfort and ease of use for all users, with a special focus on those who have difficulty using the current desk. Our redesign features an armrest with three levels, allowing 3.5" of height adjustment and 4" of depth adjustment. This flexibility, along with a fold-out desktop that provides 50% more surface area than the current design, should improve the classroom experience for students of all proportions and handedness, allowing them to focus completely on learning.

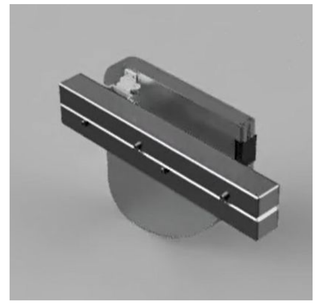


Figure 3: Full desktop when folded and stowed away

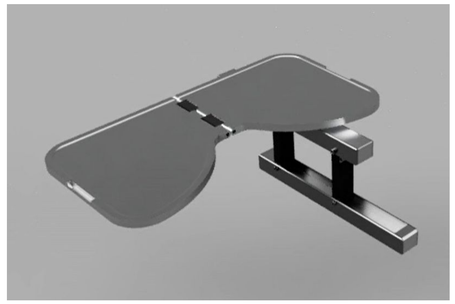


Figure 4: Full desktop when unfolded and raised up

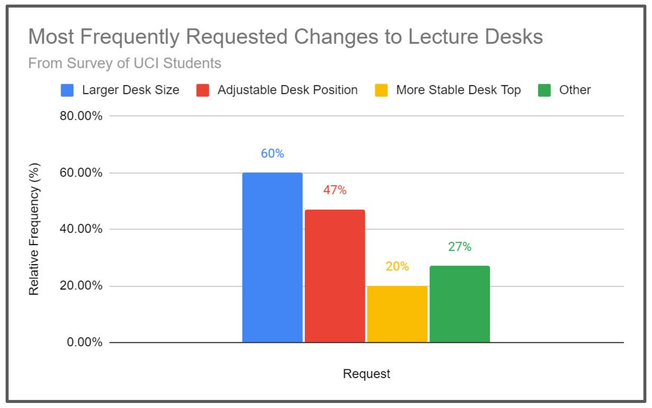


Figure 1: Poll of UCI students showing most desired features for new desk

Engineering Analysis

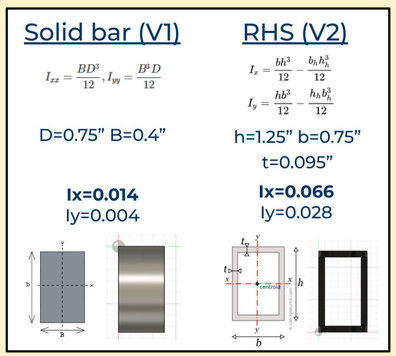


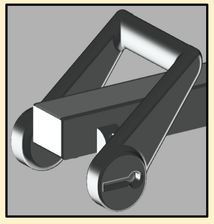
Figure 2: Bending moment inertia calculation for linkages

- Bending moment calculations are shown for different linkage cross sections
- Steel RHS was chosen for its light weight and high strength
- Ease of manufacturing was another factor, as steel allows for the locking mechanism to be welded onto tubing

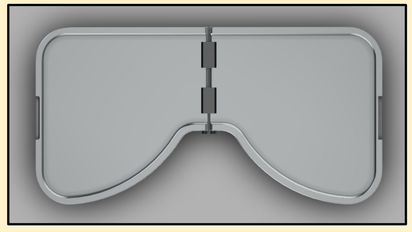
New and Improved!

Key Features

Three levels of height adjustment:
0.5", 2", and 3.5" above current desktop



Handle for easy height adjustment



20" wide fold out desktop

Final Design

- Physical functionality and geometry verified in SolidWorks
- Physical prototype constructed
- Desktop is wider to accommodate both left and right handed students
- Ergonomic design allows students to comfortably take notes without sacrificing total surface area

Figure 5: Real size of redesigned desktop (top) vs. current (bottom)

Future Work

Due to budgetary and time constraints, some compromises in material have been made for the prototype as of week 8. Listed below are improvements which could be made in the future:

- Use ideal materials (e.g. make desktop of hardwood)
- Consider separate vertical and horizontal desktop adjustment
- Conduct user testing and integrate feedback into future subsequent prototypes

References

1. Bedford, A., Liechti, K., and Epstein, M. (June 10, 2002). "*Mechanics of Materials*." ASME. *Appl. Mech. Rev*. May 2002; 55(3): B51–B52. https://doi.org/10.1115/1.1470679
2. Gordon, Claire C. et. al *1988 Anthropometric Survey of U.S. Personnel: Summary Statistics Interim Report*. March 1989.

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