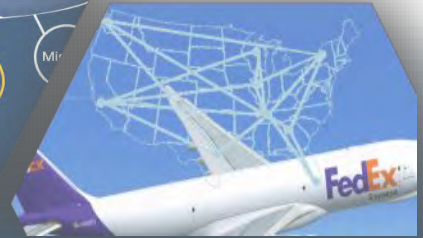
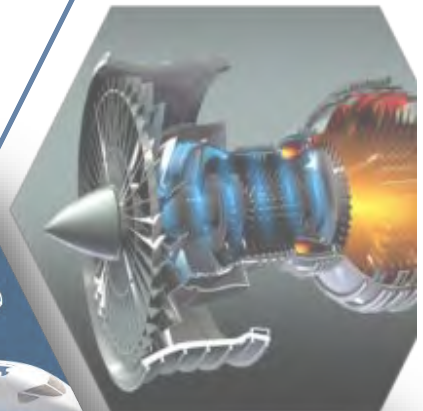
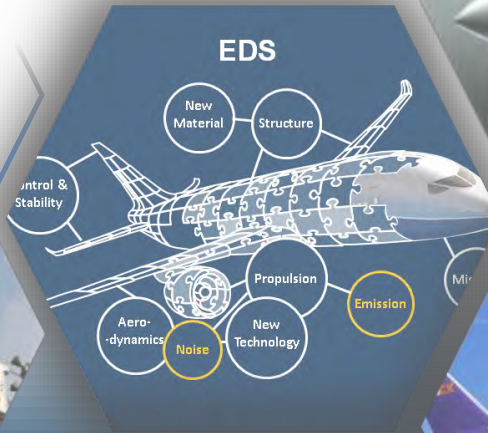
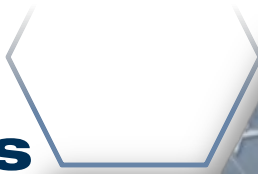


Cost-Effective Mounting Solution

Michael Pena

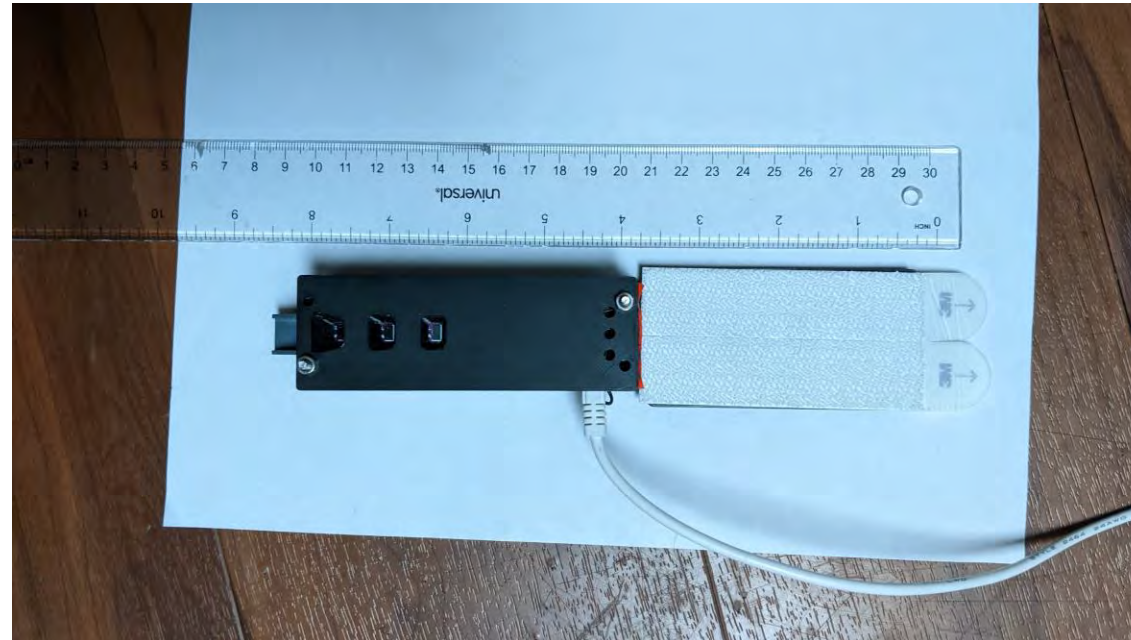
Kendeda Symposium

Georgia Tech  **Aerospace Systems Design Laboratory**



Occupancy Sensor

- What is it?
- How does it work?
- What is the problem?
 - Use cases
- What is my solution?



Types of Frames around Campus

Door Type	Number found
Aluminum Exterior	15
Aluminum Interior	7
Steel Exterior	0
Steel Interior	3



Home Frame
Material: Wood
Type: Lip (Very tiny < 0.1")



Kendeda Frame
Material: Aluminum
Type: Lip, about 2" thick, 1" deep



Weber Interior Frame
Material: Coated Steel
Type: Lip (Very Tiny < 0.1")
Con: Coated Steel has weaker magnetic field



Weber Exterior Frame
Material: Aluminum
Type: Lip 2" thick, 1" deep

Types of Frames Outside Campus

- Frames outside Campus
- Business
 - Aluminum Frame with lip
 - Steel Flat frame
- Residential Buildings
 - Wood frames around entrances
 - Common Area had steel framed open doorway
- Industrial Building
 - Main Entrances usually garage style door
 - Aluminum Frame with Lip



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- **Lathe Tool Mount**

- Allows for tools to be swapped out easily
- Easy Adjustment for vertical height

- **Clamps**

- Easy to adjust and secure
- Can hold things in place really well

- **Other solutions**

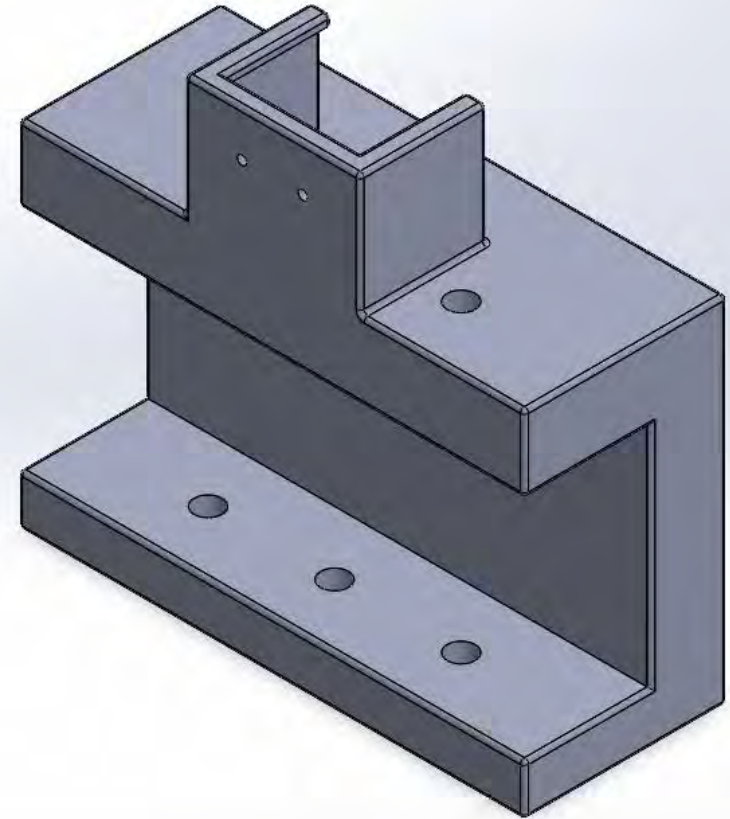
- Adhesives
- Permanent installations
- Magnets



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- Version One
 - Modeled after a lathe tool holder
 - Sized for one size fits all
 - Easy to mount solution
- Changes made after Version One
 - Screws were scaled up
 - TPU used to protect framing
 - Modified attachment point



- **Weight Testing**

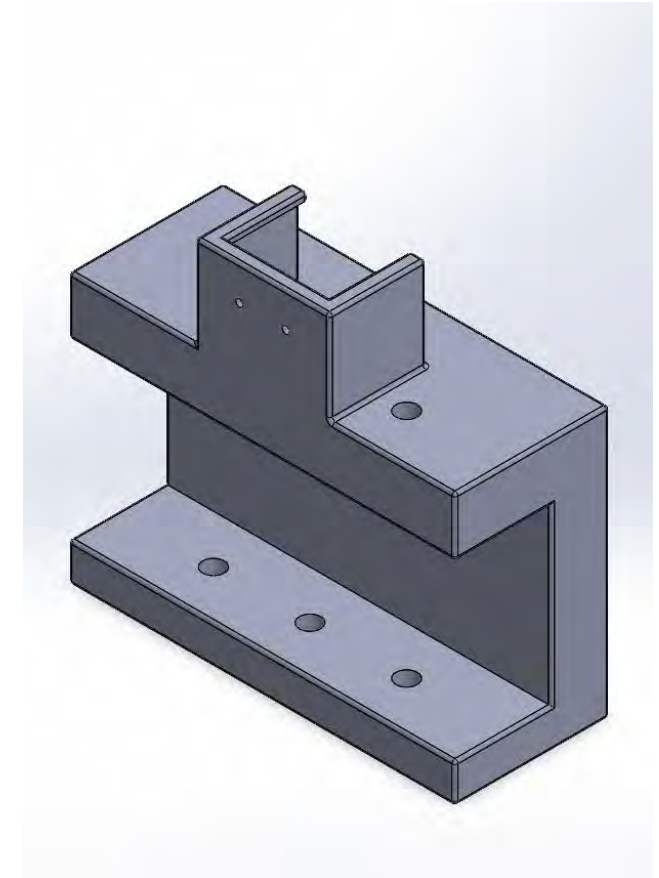
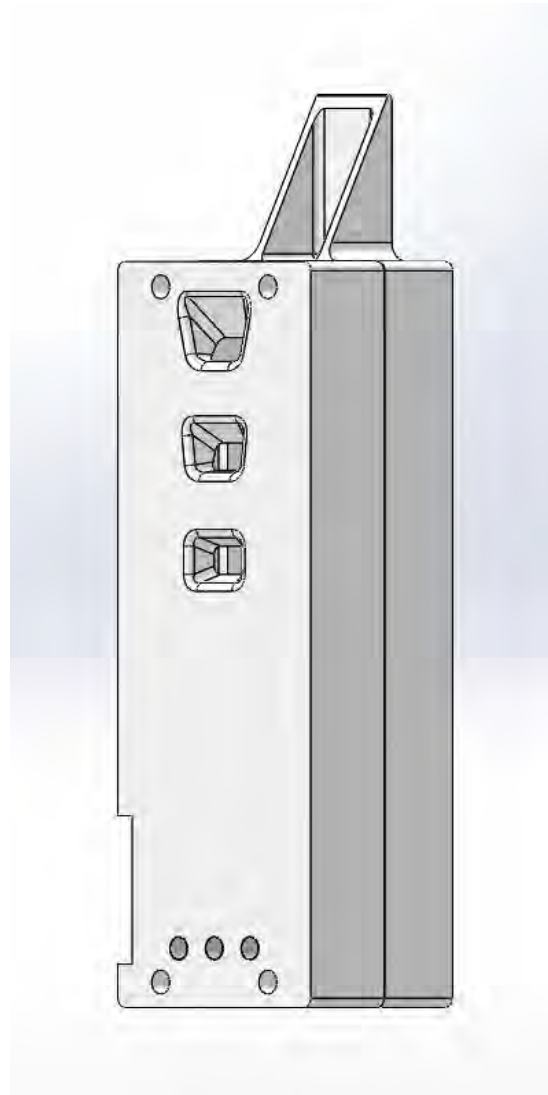
- Its own weight
 - Brass Insert began to slip
- 20 grams
- 40 grams
- 176 grams

- **Mounting Data**

- Changes to hole diameter for brass inserts
- Adding more holes to account for more weight
- Adding TPU to protect mounting surface



- Mounting Hardware
 - Time: 4hr 20 minutes
 - Filament Usage: 176 grams
 - Cost: \$3.52
- TPU Sheet
 - Time: 1hr 29 minutes
 - Filament Usage: 12 g
 - Cost: 60 cents
- Brass Inserts
 - Cost: 34 cents per Insert
- Screws
 - Cost: < 3 cents per screw
- Estimated Labor
 - < 1 cent per piece
- Total: \$4.48



- Overall
 - Cheap
 - Effective
 - Easy to handle
 - Easy to manufacture
- Changes
 - Moments can get difficult to counteract with just a clamping design
 - Increasing clamping from screws to flat surface for more contact and grip
 - Improve casing to allow for easier installation and seamless mounting



Thank you

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