



NORTHERN
ARIZONA
UNIVERSITY

Assistive Device for the Art Studio

Team 27

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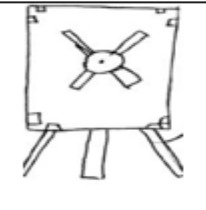
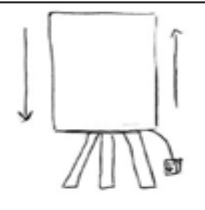
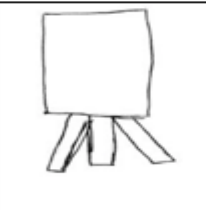

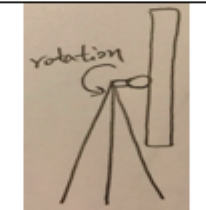

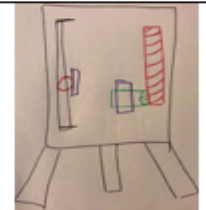
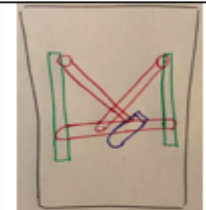
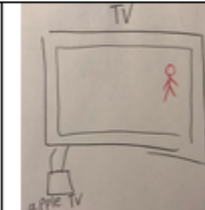
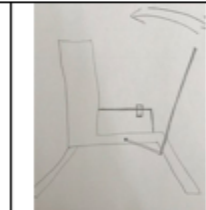
Rakan Alhajraf

Oct 27, 2016

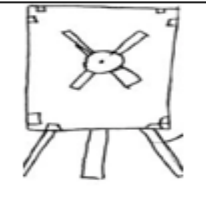
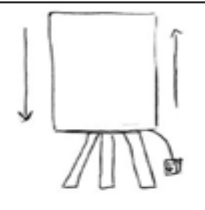
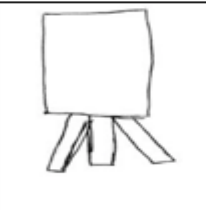

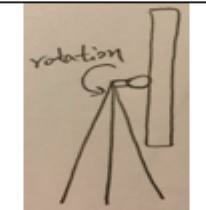

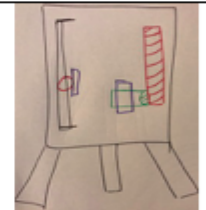
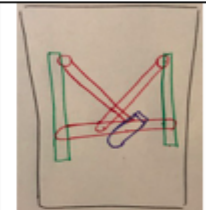
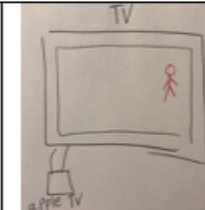
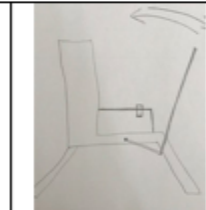
* Project Description:

- **Main Idea :**
 - Make a device that help disabled adults to draw and paint.
 - Give them wide options to do their hobby.
 - Support them to be more professional.

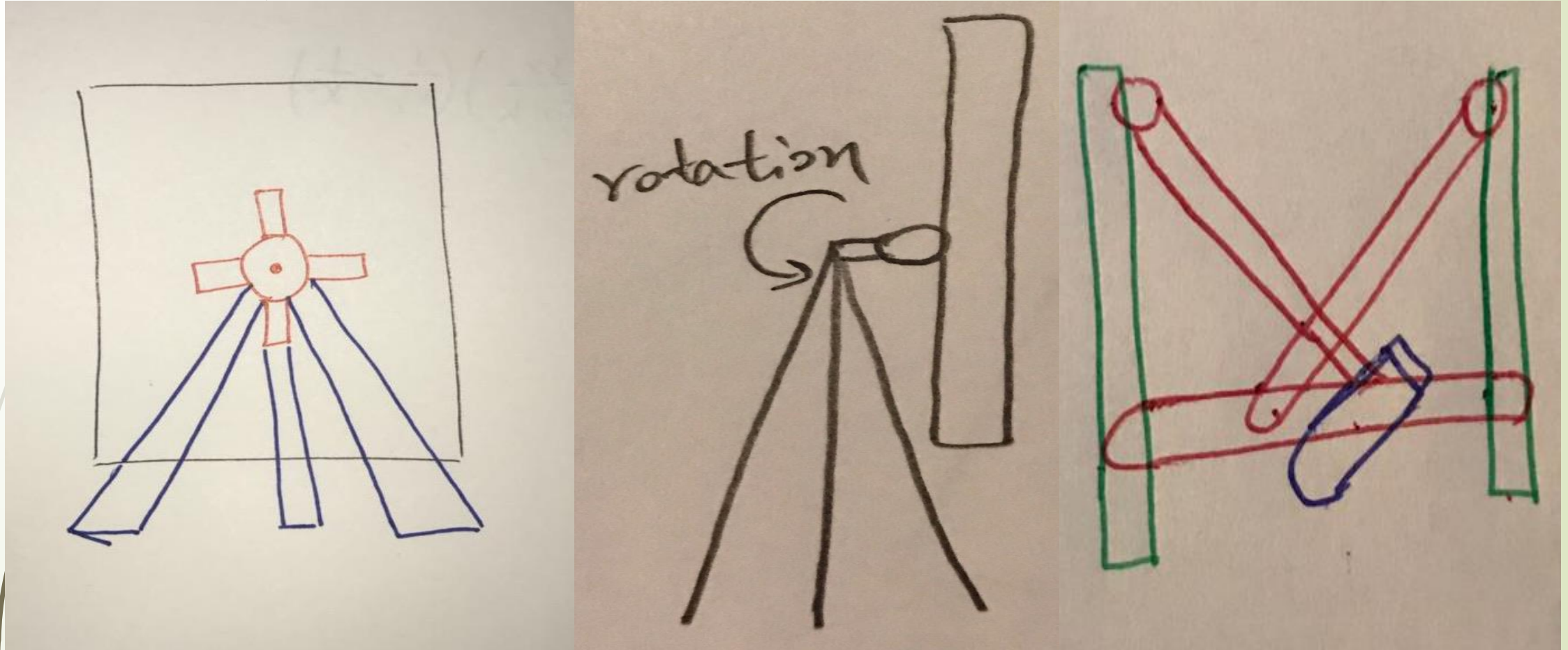
* Designs Considered :

| Concept |  |  |  |  |  |  |  |  |  |  |
|----------------|-----------------------------------------------------------------------------------|-----------------------------------------------------------------------------------|-----------------------------------------------------------------------------------|------------------------------------------------------------------------------------|-------------------------------------------------------------------------------------|-------------------------------------------------------------------------------------|-------------------------------------------------------------------------------------|-------------------------------------------------------------------------------------|-------------------------------------------------------------------------------------|-------------------------------------------------------------------------------------|
| Criteria | 1 | 2 | 3 | 4 | 5 | 6 | 7 | 8 | 9 | 10 |
| Design Name | Rotation Easel | Hydraulic | Adjustable Easel | Wall Stand | 180 Stand | Wheelchair Stand | Easel Gear | Regulator | <u>Ipod</u> | Chair Stand |
| No sharp parts | D | + | + | + | + | + | - | + | + | + |
| Movable | | + | - | - | S | - | - | + | - | - |
| Light Material | | - | + | - | S | + | - | - | - | + |
| Flexible | A | - | - | - | + | - | S | + | - | - |
| Simple Design | | + | + | - | + | + | - | - | + | + |
| Muscle less | | + | - | + | - | + | + | + | + | + |
| Cleanable | T | - | + | - | + | + | - | - | + | + |
| Easy to handle | | S | - | + | - | + | S | + | + | + |
| Time | | - | - | + | - | + | - | + | + | + |
| Low cost | U | - | + | - | S | + | - | - | - | + |
| $\sum -$ | | 5 | 5 | 6 | 3 | 2 | 7 | 4 | 4 | 2 |
| $\sum +$ | | 4 | 5 | 4 | 4 | 8 | 1 | 6 | 6 | 8 |
| $\sum S$ | M | 1 | - | - | 3 | - | 2 | - | - | - |

*Advantages/ Disadvantages:

| Concept |  |  |  |  |  |  |  |  |  |  |
|----------------|-----------------------------------------------------------------------------------|-----------------------------------------------------------------------------------|-----------------------------------------------------------------------------------|------------------------------------------------------------------------------------|-------------------------------------------------------------------------------------|-------------------------------------------------------------------------------------|-------------------------------------------------------------------------------------|-------------------------------------------------------------------------------------|-------------------------------------------------------------------------------------|-------------------------------------------------------------------------------------|
| Criteria | 1 | 2 | 3 | 4 | 5 | 6 | 7 | 8 | 9 | 10 |
| Design Name | Rotation Easel | Hydraulic | Adjustable Easel | Wall Stand | 180 Stand | Wheelchair Stand | Easel Gear | Regulator | <u>Ipod</u> | Chair Stand |
| No sharp parts | D | + | + | + | + | + | - | + | + | + |
| Movable | | + | - | - | S | - | - | + | - | - |
| Light Material | | - | + | - | S | + | - | - | - | + |
| Flexible | A | - | - | - | + | - | S | + | - | - |
| Simple Design | | + | + | - | + | + | - | - | + | + |
| Muscle less | | + | - | + | - | + | + | + | + | + |
| Cleanable | T | - | + | - | + | + | - | - | + | + |
| Easy to handle | | S | - | + | - | + | S | + | + | + |
| Time | | - | - | + | - | + | - | + | + | + |
| Low cost | U | - | + | - | S | + | - | - | - | + |
| $\sum -$ | | 5 | 5 | 6 | 3 | 2 | 7 | 4 | 4 | 2 |
| $\sum +$ | | 4 | 5 | 4 | 4 | 8 | 1 | 6 | 6 | 8 |
| $\sum S$ | M | 1 | - | - | 3 | - | 2 | - | - | - |

*** Design selected :**



* Customer Requirements:





House of Quality (HoQ)

| Customer Requirement | Weight | Engineering Requirement | No sharp parts* | Movable* | Light material < (20lb) | Flexible* | simple desing * | muscle less = 5 lb | Cleanable* | Easy to handle * | time = 2 Hr | Low cost < 500 \$ | (add or remove ER columns, as necessary) |
|--------------------------------------------|--------|-------------------------|-----------------|----------|-------------------------|-----------|-----------------|--------------------|------------|------------------|-------------|-------------------|------------------------------------------|
| 1. Safety | 5 | | 9 | 6 | | | 6 | | | 6 | | | |
| 2. Easy to store | 5 | | | 9 | 1 | 6 | 6 | | | 6 | 3 | | |
| 3. Light weight | 4 | | | 3 | 9 | | 6 | 6 | | 6 | | 6 | |
| 4. Adjustable | 4 | | | 6 | 3 | 9 | 3 | | | | 1 | | |
| 5. Easy to use | 4 | | | 6 | | 3 | 9 | 3 | | 6 | 6 | 1 | |
| 6. Comfortable | 4 | | 6 | 6 | 3 | | 6 | 6 | 9 | | | 3 | |
| 7. Easy to clean | 4 | | 1 | | | 6 | 3 | | 9 | 3 | 6 | | |
| 8. size | 3 | | | 3 | | | 6 | | | 6 | | 9 | |
| 9. saving time | 3 | | | 3 | | 3 | 6 | | 6 | | 9 | | |
| 10. Low cost | 2 | | | 3 | 6 | | 9 | | | | | 9 | |
| [add or remove CR rows, as necessary] | | | | | | | | | | | | | |
| Absolute Technical Importance (ATI) | | | 73 | 183 | 77 | 111 | 222 | 60 | 90 | 123 | 94 | 85 | |
| Relative Technical Importance (RTI) | | | 9 | 2 | 8 | 4 | 1 | 10 | 6 | 3 | 5 | 7 | |
| Target(s), with Tolerance(s) | | | | | | | | | | | <2 hr | <500\$ | |
| [add or remove T/T rows, as necessary] | | | | | | | | | | | | | |
| Testing Procedure (TP#) | | | | | | | | | | | | | |
| Design Link (DL#) | | | | | | | | | | | | | |
| Approval (print name, sign, and date): | | | | | | | | | | | | | |
| Team member 1: Jarrah Albathali | | | | | | | | | | | | | |
| Team member 2: Abdulrahman Almarri | | | | | | | | | | | | | |
| Team member 3: Aly Alharbi | | | | | | | | | | | | | |
| Team member 4: Rakan Alhajraf | | | | | | | | | | | | | |
| Team member 5: Yongzhen Li | | | | | | | | | | | | | |

* Budget :

Total Price: 221.22\$
Budget Remaining: 1278.78\$



| Product | Cost | Source | Quantity | Dimensions |
|------------------------------------------------------------------------------------|-------------|---------------|-----------------|-------------------|
|  | 10\$ | Home Depot | 2 | 30 cm * 30 cm |
|  | 15\$ | Home Depot | 2 | 130 cm * 150 cm |
|  | 14.37\$ | Home Depot | 5 | 160 cm |
|  | 9.97\$ | Home Depot | 1 | - |
|  | 2.98\$ | Home Depot | 30 | 10-1/4 * 1-1/2 in |



* Schedule :

