

# **KU**

# **Dilatant Decelerate System**

# **Project**

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## **Overview**

The KU team has made some major revisions and improvements to the designs after reviewing with Mr. Christopher Perra. In order to do so, the following specifications were considered.

### **Specifications:**

- ❖ Design must allow upper body vertical and horizontal movement
- ❖ Must utilize outer two screws
- ❖ Length of Base Plate: 19cm
- ❖ Outer Screw Hole Size: 0.6cm Diameter
- ❖ Thickness of Base Plate: 0.1cm - 0.6cm

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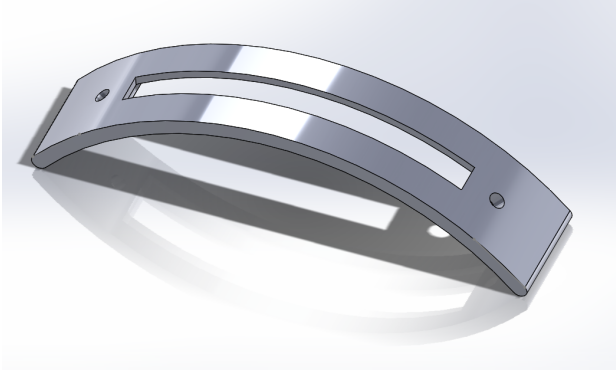
Up to now, the KU team has made up to nine design concepts and after adjusting/reevaluating them, the team concurred on one model. In the next following pages, the images will explain how the design operates.

The final design implements a mechanism that goes back to the first design. It will use a ball swivel design while including the original tab design. The tab will allow full lateral movement and the ball swivel will allow unrestricted 360° movement of the head. Two designs are made with very small changes.

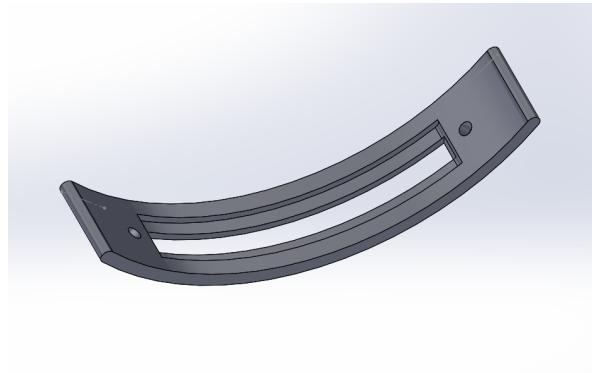
The first design is made with two thin parts that will make up the tab. To attach the two, using screws instead of a sticky adhesive will be more effective. It will be inserted in the slit that runs through the middle of the tab. On the tab, the ball swivel will screw onto the tab, and the RATs will be attached to the swivel.

The second design is the same as the first but the tab will be made of thicker component. Addition to that, there will be a bottom seal covering the bottom of the base plate to hold the tab in. The ball swivel mechanism will then be screwed into the thicker tab.

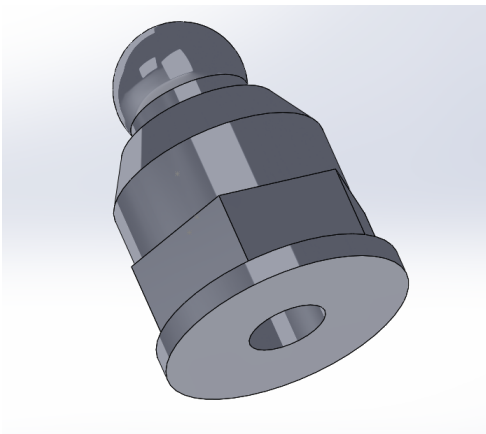
## **Base Designs**



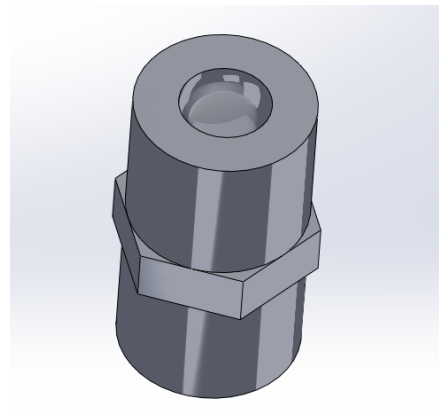
**Top View of Base Plate**



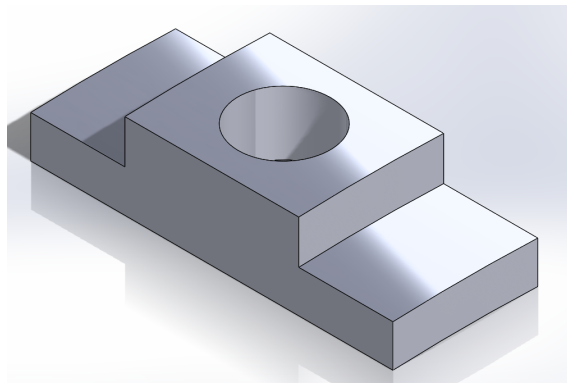
**Bottom View of Base Plate**



**Socket Joint**

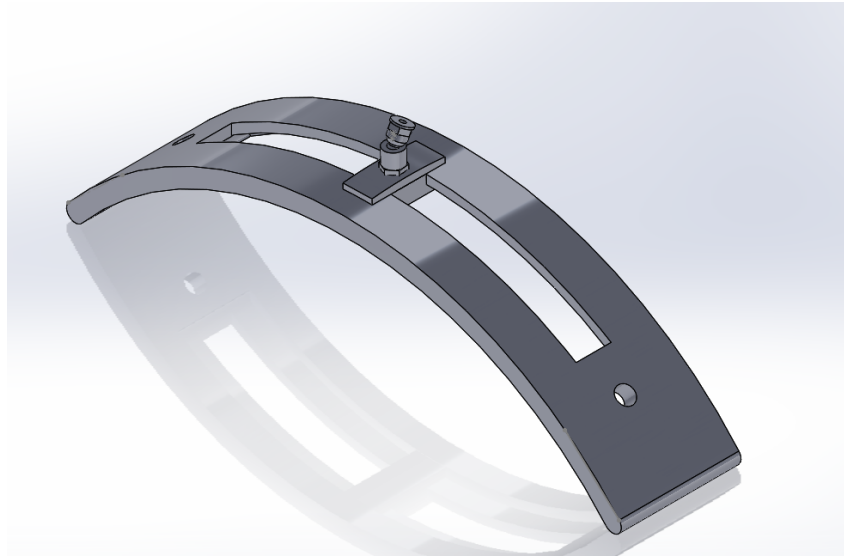


**Socket Joint**



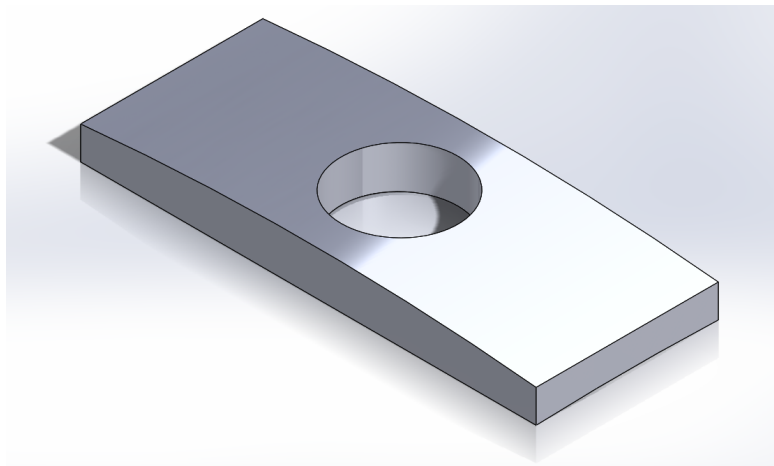
**Tab**

## **Design 1**



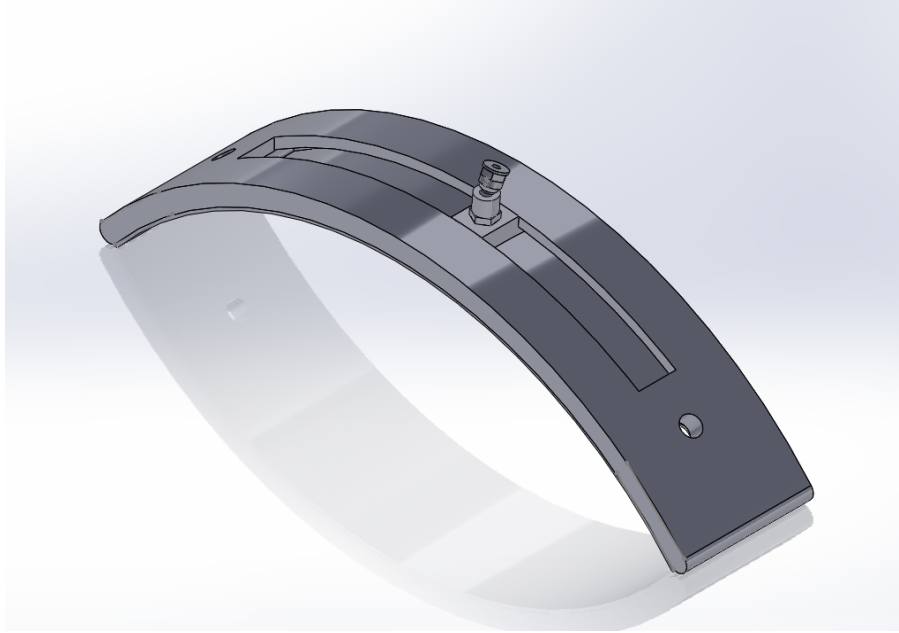
### **Addition to Design 1:**

- **Top Tab**
  - A top piece that is attached to the bottom tab to hold it in place while it slides left and right.



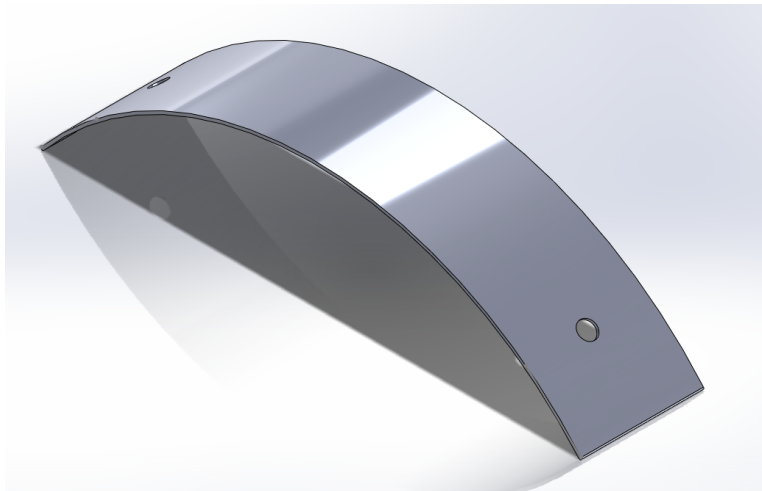
**Top Tab**

## **Design 2**



### **Addition to Design 2:**

- **Bottom Cover**
  - A thin sheet that will cover the bottom of the base plate that will hold the tab inside and separate the tab from the helmet.



\_\_\_\_\_ **Bottom Cover**



## DILATANT DECELERATE BASE PLATE SPECIFICATIONS

Metric	Target Value	Units	Importance*
Overall Length	<20	cm	4
Overall Width	<5	cm	4
Maximum Thickness	<2	cm	3
Weight	<5	N	2
Material Cost	<10	\$	5
Overall Cost	<100	\$	3
Force Reduction x-direction	50	%	1
Force Reduction z-direction	35	%	1
Expected Assembly Time	<3600	s	4
Anticipated Lifespan	>5	yr	2

\*Scale of 1-5, 1 being most important



## BILL OF MATERIALS

### Design 1

Part Name	Quantity	Cost	BOM Notes
Base Plate	1	<\$50	3D print
Tab	1	<\$50	3D print
Ball Joint	1	<\$20	Home Depot or 3D print
Socket Joint	1	<\$20	Home Depot or 3D print
Top Tab	1	<\$20	3D print
Screws	3	<\$50	-
RATs	2	-	-

### Design 2

Part Name	Quantity	Cost	BOM Notes
Base Plate	1	<\$50	3D print
Tab	1	<\$50	3D print
Ball Joint	1	<\$20	Home Depot or 3D print
Socket Joint	1	<\$20	Home Depot or 3D print
Bottom Cover	1	<\$50	3D print or aluminum film
Screws	3 - 6	<\$25	-
RATs	2	-	-

## **Conclusion:**

The decision between the two was quite difficult for the group to decide on. As a result, the KU team is waiting for Mr. Perra to decide on the final design. Otherwise, the KU team would like to make both designs to test both of them.