Rube Goldberg

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Abstract

Rube Goldberg Machines (RGM) are intentionally over designed, over engineered, complicated and entertaining solutions to perform a simple task. RGM consists of multiple steps arranged in sequence to complete the assigned task. At the start of the project, the team comprising of six students was given a task to design the steps of RGM that are entertaining, self-resettable, reliable, durable, easy to assemble and requiring minimal human interaction. For designing the steps of RGM, team members interacted with all the stakeholders to find the customer requirement that needs to be fulfilled. The team derived the engineering requirement from the various requirements posed by all the stakeholders.

Design Description

This figure Represents the plunger, which can easily be assembled in sequence to trigger the mechanism of the plunger from the pulley system, and this is two-step from 12 steps. As can be seen from the figure, the weights are attached to both ends of the pulley with the thread. As the weight of the left side starts moving upward, the weight attached to the right of the pulley will fall down on the plunger. The Kinetic Energy and potential energy of the weight will apply the pressure on the water contained in the pipe assembly, which will actuate the other side of the plunger. Due to which the plunger will start moving upward.
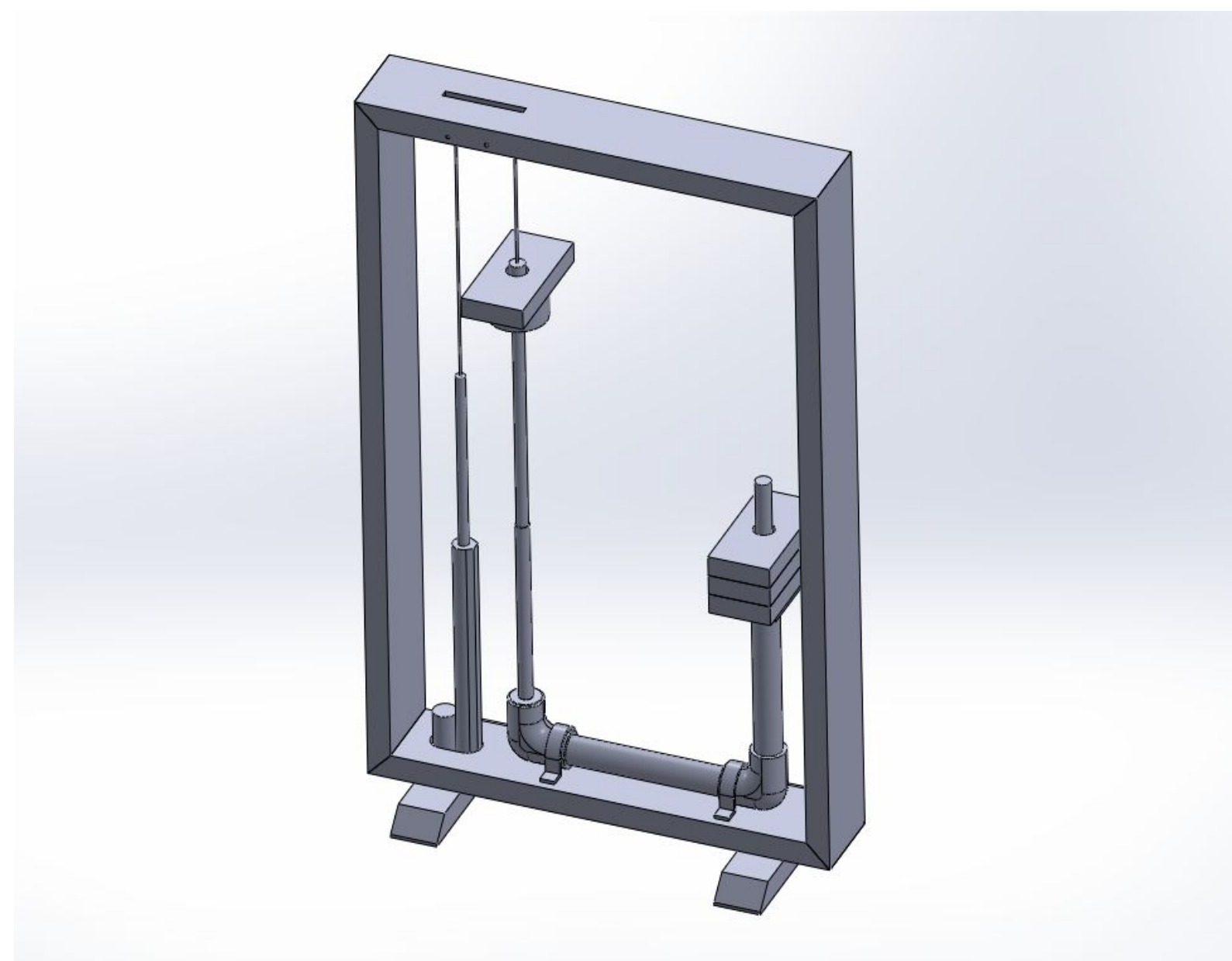

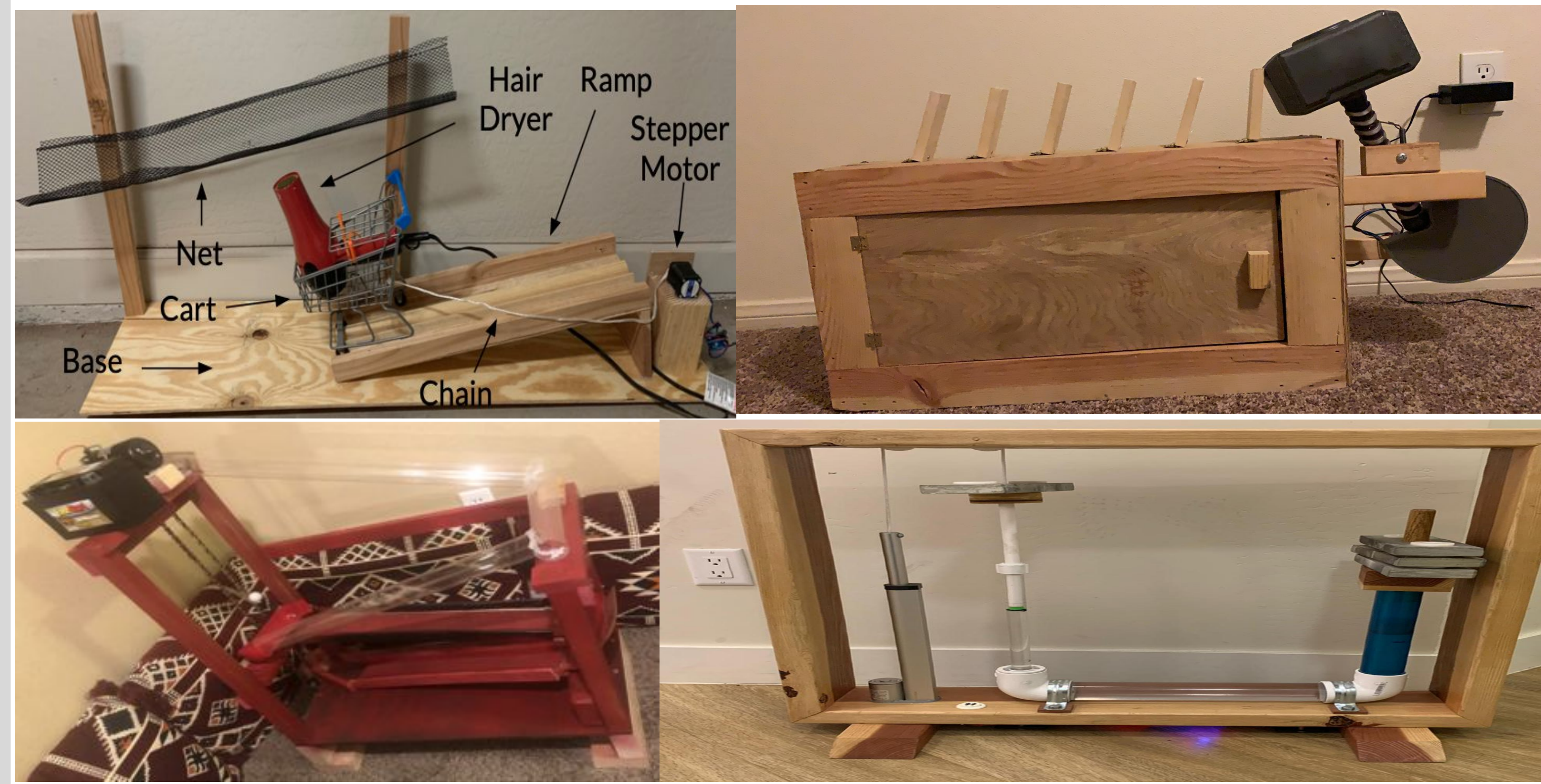Figure 1: Pascal law BOM

Rube Goldberg machine main steps

Figure 2 : Main steps

Restrictions & Requirements

- Resettable
- 12 Steps
- Size of 10 ft x 10 ft
- Electric part should be included
- No animals or flammable allowed
- Run and reset in 8 minutes.

Analysis for Snail Cam

- The snail cam used to push the hammer backwards gradually using a stepper motor
- A torsional spring attached to the hammer will pushed back to store enough energy which will be used later to move the hammer forward.
- The hammer will be released to hit the dominos.
- Fishing lines are connected between the spool and each domino.
- When stepper motor rotates, it will allow the spool attached to it to rotates.
- Eventually, the dominos will raise to start point.
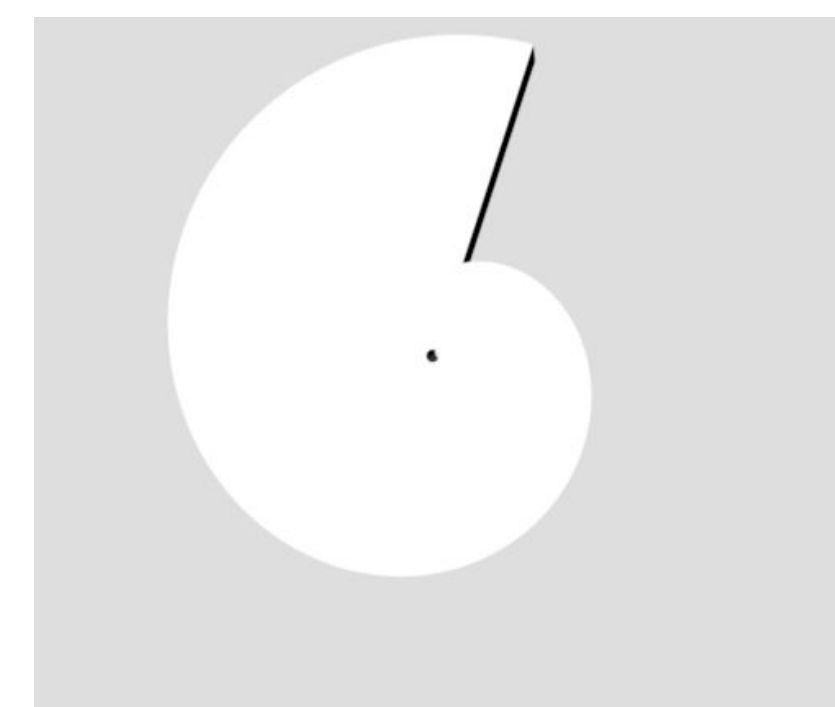
Steps Duration

The Steps	Action time	Time to be resettable
Pulley step & Pascal's Law step	13 sec	16 sec
Lever step	2 sec	31 sec
Hair Dryer Step	9 sec	8 sec
Roller Chain Staircase Design	22 sec	15 sec
Dominos and snail cam	8 sec	10 sec
conveyor belt	15 sec	14sec

Conclusion

The project is undertaken successfully, and it is designed according to the plan of conception. The different design models, which are involved in the RGM, are in the manufacturing phase. The material is purchased for the said purpose, and it is assembled as per design requirements. The design and manufacturing processes of this project shows that space is one of the most fundamental considerations of every project. However, much of the two special events in the design could have brought up various failures in the operation of the machine.
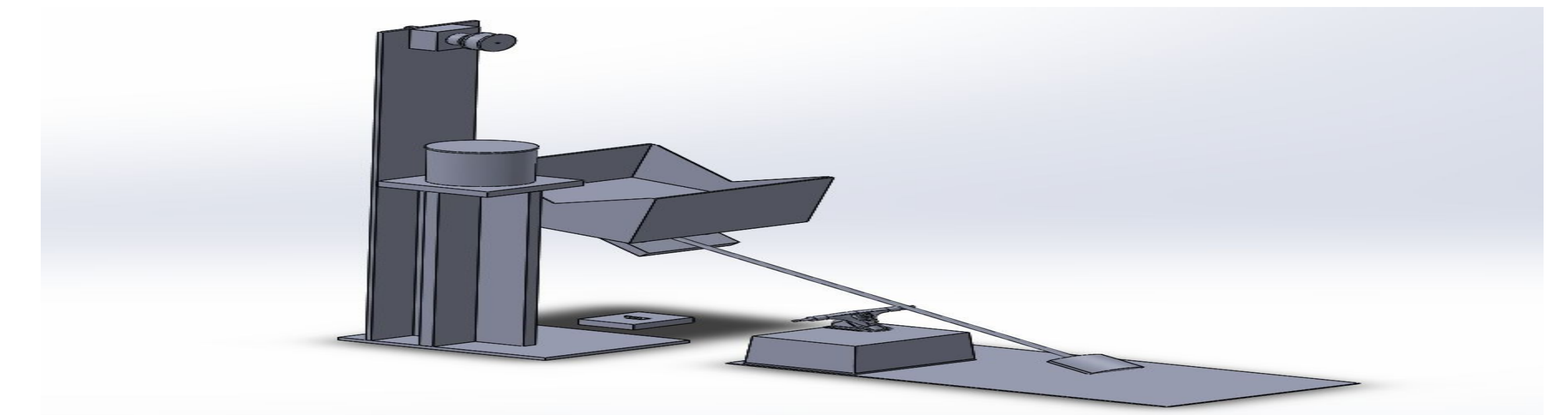

Figure 3: Lever step

References

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[2] Rubegoldberg.com. (2019). Contest – Rube Goldberg. [online] Available at: https://www.rubegoldberg.com/contest/ [Accessed 1 Aug. 2019].

Acknowledgements