

SUSTAINABLE CAPSTONE PROJECTS (SCAP)

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RUBE GOLDBERG MACHINE

GROUP MEMBERS

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INTRODUCTION

➤ What is a Rube Goldberg machine ?

A Rube Goldberg machine is a complex contraption designed to perform a simple task in a very indirect and overly complicated way. It consists of performing simple tasks through a series of steps involving various mechanical components such as ramps, levers, pulleys, etc.

Each component has a specific function and is carefully designed to trigger the next step in the sequence, ultimately leading to the completion of the task.

➤ Objectives of a Rube Goldberg machine

- Application of engineering principles
- Educate about physics concepts
- Encourage creativity
- Improve problem-solving skills

➤ Benefits of a Rube Goldberg machine

- Encourage Teamwork and collaboration
- Improve hands-on ability
- Showcase innovation
- Inspire learning

FINAL PRODUCT

➤ How the constructed Rube Goldberg machine works ?

The Rube Goldberg machine constructed consists of a ball following a predefined path and triggering different sections, which eventually pop a balloon.

It is divided into 3 sections as follows:

- **The first section** is made up of three inclined metal ramps which are then connected to the second section by screws.
- **The second section** consists of a pulley system and inclined cardboard ramps. These inclined ramps will release additional balls which will make the pulley system operational.

Then, the pulley will lift a lever to allow the ball to continue to the third section.

- **The third section** involves hitting the last ball, which will free the toy car stuck by the lever.

Once released; the car with a pin attached to it will hit its target: **Pop the balloon.**

RESULTS AND DISCUSSION

As all human work is subject to imperfections, here are some improvement ideas for our Rube Goldberg machine:

- Make the white board stand alone to avoid the need for inclination
- Add a section with a mini catapult or launcher that propels the ball to the last section
- Add a section with a rotating wheel to increase the complexity
- Put a balloon that releases confetti when it is popped
- Add sound effects in between the sections as the ball progresses
- Add a toggle clamp mechanism to release objects at specific points in the Rube Goldberg machine
- Add more customization to the board (stickers, paint, etc.)

MATERIALS USED IN CONSTRUCTION

➤ Re-used/Recycled materials

- White wooden board
- Metal bar
- Metal covers
- Metal rod
- Bottle caps
- Cardboard paper
- Wool yarn
- Foam board
- Balls

➤ Other materials

- Screws
- Skewer sticks
- Small toy car
- Glue
- Paper tape
- Balloon

CONCLUSIONS

Through this project, we have gained a deeper understanding of the positive impact that sustainable practices can have on our environment. By utilizing recycled materials and incorporating them into the design of the Rube Goldberg machine, we have not only reduced waste but also promoted the importance of repurposing resources to create something innovative and meaningful.

However, this project also presented its challenges, such as sourcing and collecting suitable recycled materials, ensuring the functionality and stability of the machine, and coordinating the different components to work seamlessly together.

Participating in SCAP has provided us with new insights into the possibilities of sustainability and recycling in a creative context. It has reinforced the notion that small actions, such as reusing materials in a project like this, can contribute to larger environmental goals and inspire others to adopt sustainable practices in their own lives.

REFERENCES

The following references were used:

- <https://youtu.be/QsdLiAxDLAg?si=vlaTpWh-O4fjw3OF>
- <https://youtu.be/QsdLiAxDLAg?si=vlaTpWh-O4fjw3OF>
- <https://youtu.be/hPIMsvKgiOg?si=7N1zR212zkVSR93q>

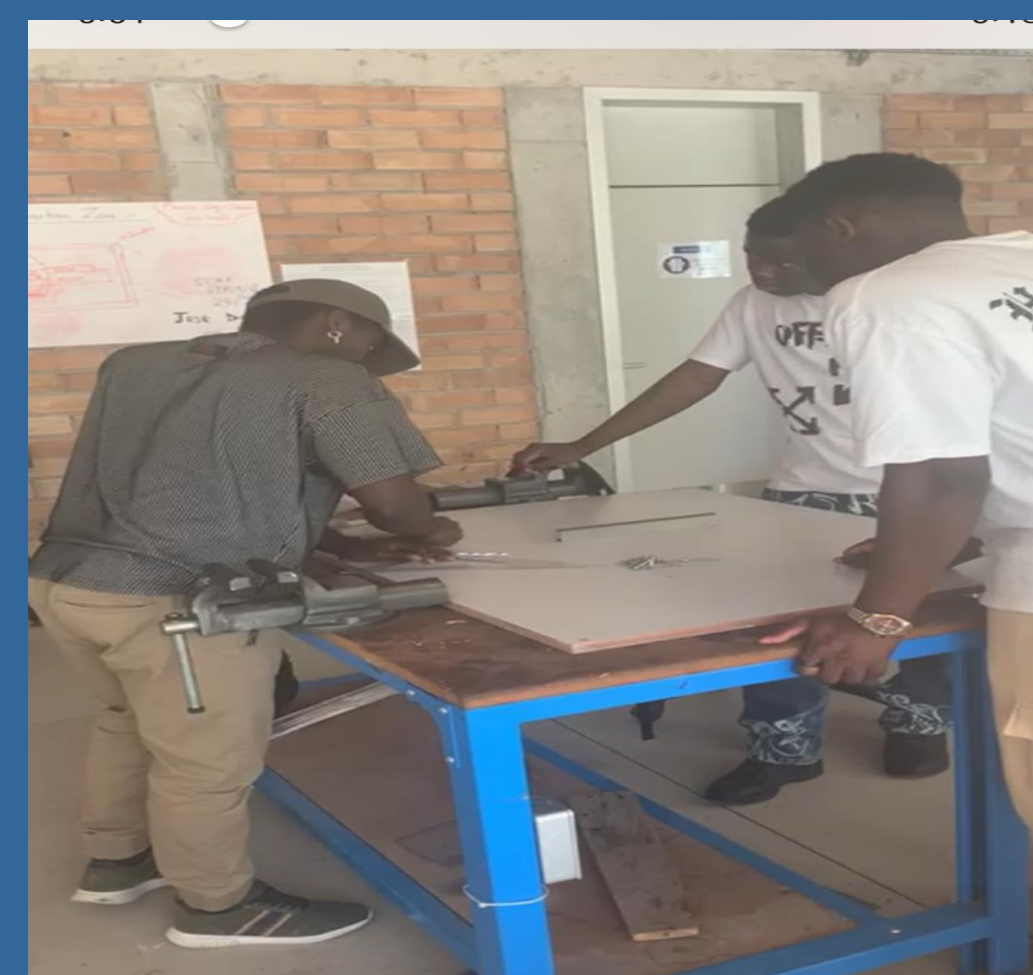


Figure 1. Initial stage / Measurements taking.



Figure 2. Construction Phase.

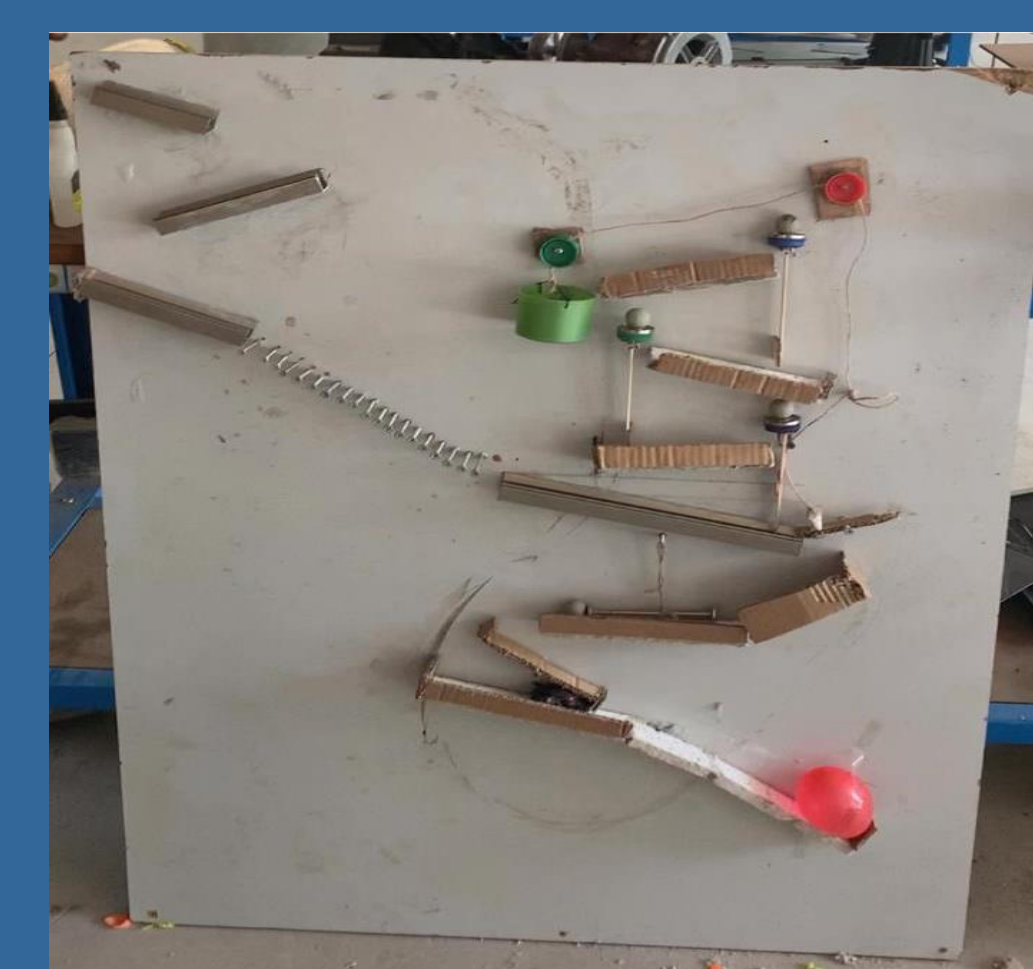


Figure 3. Final Product.



Table 1. Group Members.