Engineering Project Proposal

Crescenta Valley High School

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# Introduction

The design project is a culmination of your time in the Introduction to Engineering class. You will be combining all of the knowledge you have gained and demonstrating it in one large scale project. This project will be used to demonstrate your knowledge in a set number of engineering disciplines. This project has an emphasis on good documentation, working with multiple constraints and limitations, developing project management skills and utilizing disciplined design techniques.

# Project Proposal

Your proposal will be broken up into six sections described below.

## Project Description

Our project is a mousetrap car. You might be asking, what is a mousetrap car? It is a car with light wheels that relies on a mousetrap as an “engine.” This is a very good starter project for many young engineers. If made safely, it can also be used as a fun toy for kids. However, you need to keep in mind that it is still a mousetrap, so there will always be a slight danger factor to it.

We will be using mechanical engineering for this project. It is mechanical engineering because it is a very handsy project that uses different materials and mechanics to bring together a strong product, like a Rube Goldberg machine. This project is also a lot like the Rube Goldberg machine for the simple fact that it also needs many laws of physics applied to it, such as the lever which represents that every action must have an equal and opposite reaction. However, physics won’t be the only thing we look at. Although it is a rather simple project in terms of engineering, there are still many things to be accounted for in the mousetrap car with great precision, and it can be a hassle trying to meet all the technical requirements of this project.

A mousetrap serves as the sole source of propulsion for a little car known as a mousetrap car. For extra power, variations include the use of numerous traps or huge rat traps. We will need light wheels so our car can travel as much distance as possible. However, we still need the wheels to be stable and usable. The spring of the mousetrap stores potential energy inside of it, which is converted into kinetic energy when the mousetrap arm moves forward. When the mousetrap is triggered, the spring-loaded bar is released. This spring-loaded bar then hits a lever. The lever starts moving the wheels. The car then begins to move and accelerate. Depending on the precision put into the project, the car will move very fast for a lengthy amount of time, or the car will be quite slow and will move for a much shorter period of time. It is also very important to use the proper materials. Lighter materials may or may not cause instability in your car, even though they accelerate it a considerable amount. Heavier materials provide wonderful stability to the car. However, since the car isn’t that big, it is very possible that the car might be too heavy to move to its best capabilities and provide maximum efficiency. Therefore, a good combination of heavy and light materials will be very important to the success of this project. Because there are so many materials and springs available to the general public, there are so many different variations of mousetrap cars that engineers can build, which is what makes it such an intriguing project. However, since building a mousetrap car isn’t too tall of a task, you don’t have to be an engineer to construct it!

In conclusion, a mousetrap car is an incredibly fun innovation to build with all of your friends and family. Although there is a slight danger factor, creating a mousetrap car is a great way to start your engineering journey. This is because a mousetrap car is suitable for most ages. This project is also a good bridge into scientific topics, such as energy conversion and conservation, as the transfer of energy is what allows this project to travel such significant distances.

## Project Research

[How to Make A Mousetrap Car | HST Physics Project (homesciencetools.com)](https://learning-center.homesciencetools.com/article/build-a-mousetrap-powered-car/) is a great website that provides much information about mousetrap cars.

It lists all the materials you need and explains how to build a mousetrap car broadly. However, there are a few things this website can improve on, such as:

* Going into more depth about some of the details
* Explaining the physics of a mousetrap car better
* Explaining about the importance of each material
* Discussing the STEM concepts used to create the vehicle in more depth

Overall, this is a good article for dummies, but when you truly want to understand the concepts of a mousetrap car and the different sciences that go into it more clearly, then this article isn’t for you. The main reason for this is that although the article does a great job of summarizing the creation of a mousetrap car, that’s just it, you can only draw so much information from a summary. Because of this, the article becomes a little vague.

[Fun with Mousetrap-Powered Cars | HowStuffWorks](https://auto.howstuffworks.com/mousetrap-powered-car3.htm). This is an article that truly talks about the nature of mousetrap cars and provides great information about them. It is divided into four sections.

The first section discusses how a mousetrap car is a cool way to spend your time instead of stimulating your brain with social media or video games. It’s a great way to socialize and go outside and enjoy life the way you should.

The second section explains how mousetrap cars are simple physics projects that require many accessible components. The main components you need are flat body, (traditionally from a board or a piece of wood) wheels, (from objects that use friction, such as CDs) string, and a mousetrap. The way this project works is that the mousetrap’s energy is moved to the wheels through a string attached to the axle. The mousetrap slowly closes as it pulls against the string, making it easier and safer to handle.

The third section actually elucidates how to build a mousetrap car and the materials you need for it. A mousetrap, besides the simple components, requires hot glue, rulers, pen barrels, and more to make sure all the measurements are precise and the components are stuck together nicely. You will also require pliers to be able to cut and place the string properly on the axle.

The fourth section describes how to use a mousetrap car. A mousetrap car can be used in schools for contests, rewarding the young engineer with the best mousetrap car with some sort of prize. It can also be experimented with, regarding different wheel sizes, string thicknesses, axle sizes, and maybe even different types of boards. You can also find a community that shares your interests by posting a video of your mousetrap car on social media like YouTube, TikTok, or Instagram.

[Mousetrap Vehicles | Science Concepts | Center of Mass (docfizzix.com)](https://www.docfizzix.com/topics/science-concepts/MouseTrap-Vehicles/center-mass.shtml) is another article that describes the center of mass a mousetrap car requires. A good, stable center of mass represents that a vehicle has good stability and great symmetry. It explains that the wheels should ideally be smaller because it is easier to construct and is more efficient in materials and use of energy. This is because large wheels can be unbalanced, which causes a waste of kinetic energy and backward movement. In order to balance the wheels, you need to add weight to the unbalanced sides.

## Design Constraints

* $100 budget constraint
* The dimensions of the mousetrap car will be 6 inches tall, 18 inches long, and 6 inches wide.
* The only power/energy from our project will be from the activation of the mousetrap car and the mousetrap itself, powering the vehicle to move at speeds that have amazing quickness.
* The wheels must be light, but strong, but also thin at the same time to reduce as much friction as possible.
* All the components must be small enough to not cause a weight imbalance. It is also so the mousetrap car can travel as fast as possible as quick as possible.
* The frontal area of the vehicle must be small so there is little chance of air resistance drastically lowering the speed of the mousetrap car.

## Bill of Materials (BoM)

The table of materials that will be used in the design of your final project. Each item should have a part #, a short description, the price per unit, the quantity purchased and the total price for that item. The final row of the table should include the total price of the device which should fit within the allotted budget (Don’t forget shipping costs). Any devices that you already possess should be indicated and their total price may be ignored (all other columns should be completed).

| **Part #** | **Description** | **Price per unit** | **Quantity** | **Total price** |
| --- | --- | --- | --- | --- |
| Wooden snap back mousetrap (couldn’t find the number) | mousetrap | $1.49 | 1 | $1.49 |
| 81076 | tape | $3.50 | 1 | $3.50 |
| 103CS-090 (already have) | Hot glue gun | $30 | 1 | $30 |
| Heavy cardboard (couldn’t find the number) | Heavy cardboard | $2 | 1 | $2 |
| Foam board (for wheels) (couldn’t find the number) | Foam board | $6 | 1 | $6 |
| Markers (already have) (couldn’t find the number) | 12 box of Crayola markers | $7 | 1 | $7 |
| Axle | 22 mm axle | $15 | 2 | $30 |

## Schedule of Milestones

* Our first milestone is gluing the wheels to the side of the base.
* Our second milestone is putting the wheel and axle together and seeing how those hold up
* Our third milestone is putting everything together and finalizing and perfecting it.

## Team Member Biographies

I am a 9th grader at Crescenta Valley High School. I graduated from Rosemont Middle School just last year. In Rosemont, I took two courses that set me up for success in this class. In 7th grade, I took Introduction to Robotics which helped me get a better understanding of building experiments from scratch. In 8th grade, I took Computer Science Discoveries, which helped me with researching. I graduate in 2026.