Lab 1 Memo
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4:15pm
Prof. Jolanta Janiszewska
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Introduction

Purpose:

The purpose of this lab is to brainstorm for an initial AEV concept design. Each member of the group uses their creativity to generate the best design for the project to solve problems. The lab began with individual brainstorming, where each member designs their own AEV concept design.

Background:

A team of engineers is tasked with building an aerial tramway/sky tram from the top of a mountain to the bottom to efficiently move people from place to place, which Provides innovative solutions in steep, rocky, or densely populated terrain. Which also decreases the risk of people hurt while climbing up or down the mountain. The AEV must be able to pull up and pull down the passenger's cart. Since there is not much power in the mountain, the engineers should build the tramway/sky tram that uses minimal power usage. Each of the designs used an "L- shaped" hanger, the Arduino, the battery, and two motors, where the battery is attached underneath the center's main body. The motors were attached at the back of the main body, which helps to push the whole body as needed. Mati Desissa's motivation was to use the least amount of energy by only using two motors and to move slowly so that the people can enjoy the ride. Gabriel Bouahom’s motivation is the overall look of the design. The design should look appealing to the public, while also having a simplistic design. Matthew Pott’s motivation for design was to make the vehicle lightweight and efficient. Having a lightweight design will improve the speed of the vehicle.

Individual:

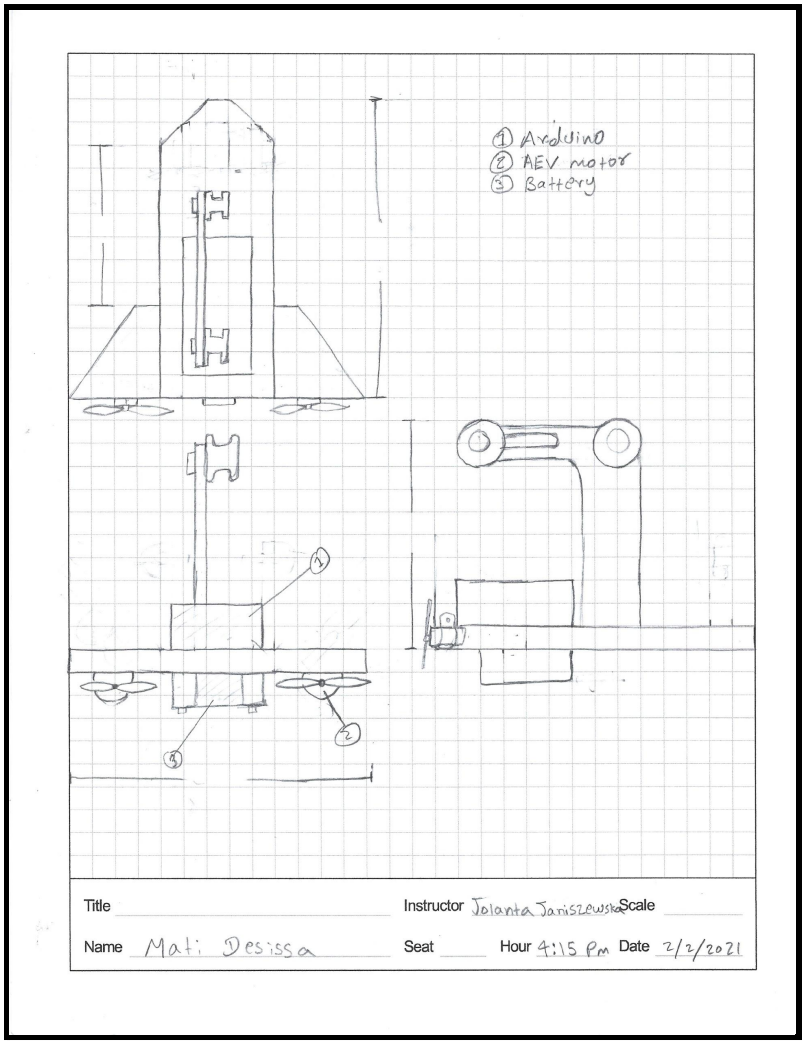
Mati:

The project was to design the AEV model that travels using two motors. The plan had to be compact, balanced, which the battery in the center makes it well balanced, and

lightweight for efficiency. To make the AEV aerodynamic, every member in the group had to develop their individual AEV design. The Pictures below show some initial stages of the design, including the team AEV model's preliminary design.

This design's advantage is that it is a simple design, economical, and consumes less energy. It is the most power-efficient method of moving or transporting goods and people. Almost lightweight and quick to install, operate, and takedown. The disadvantage of this design is that it is incapable of carrying a heavy load, the speed is slow. If one of the motors stops working, it may be stuck there for a while.

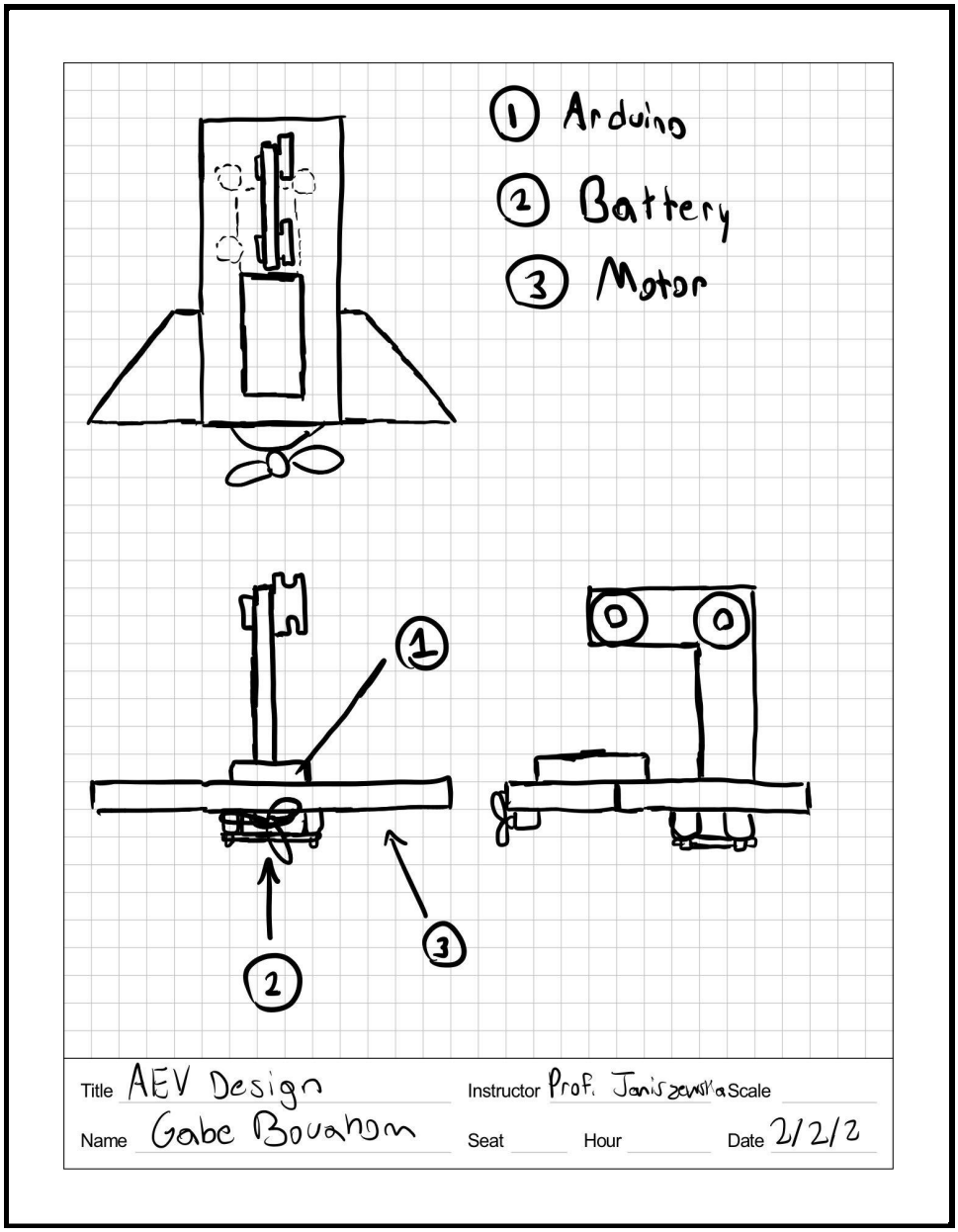
For this design the main body has to be light so it can travel long distance and faster without consuming much power or battery. Since the vehicle travels horizontally it does not need much power but it still needs to have a good amount of power to travel.
The design of the vehicle should be aerodynamic characteristic so it can move as fast as possible and cut through the air, to have air-resistance.



Design Consideration

I chose this design to go with for two reasons. The first is that the shape of the structure is rocket-shaped, which cuts through the wind without using much energy. Much like aerodynamics, in which it interacts with the air and moves through it. The second reason is that it uses less energy, which does not quickly consume the battery's power and ability to move large elevation differences.

Gabe:



The design of this system is centered around like a rocket. Although it's key component is the one motor with a single 3-blade propeller. The 3-blade propeller given in the kit is larger compared to the 2-blade propellers. Due to the track being horizontal, this system powering on one motor should complete the objective. As well as one motor drawing energy from the battery would thus be energy efficient. With power running to two motors for example, there could be a concern in energy usage. The system also has a flat design which can factor with the aerodynamics of the AEV.

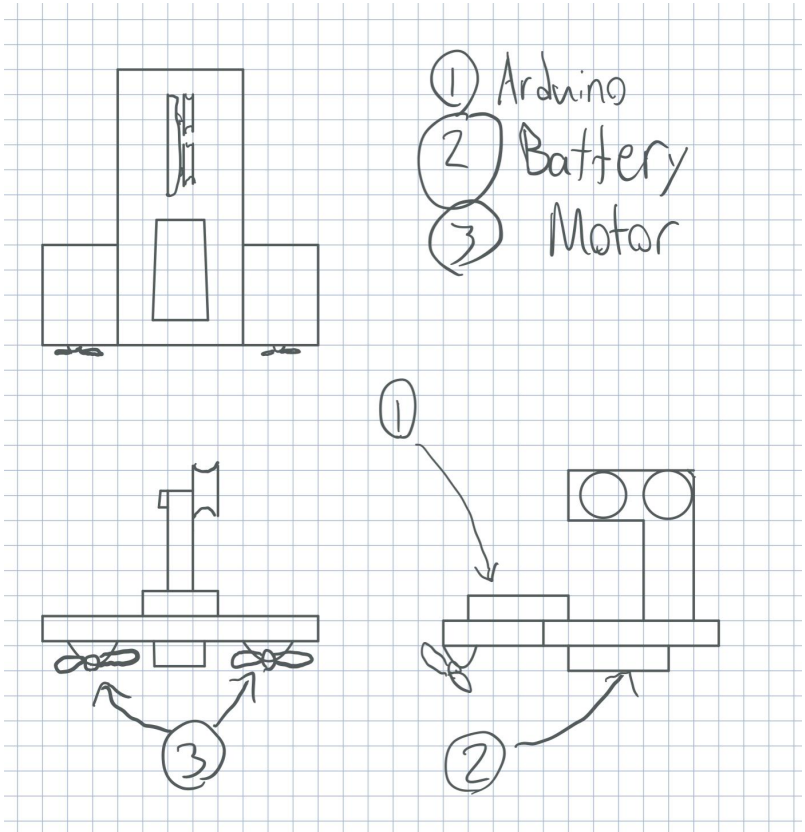
One advantage of this system is that it does not require that much energy. It is reliant on two motors, thus not consuming a great amount of energy. Another advantage is that it is lightweight. It does not have a lot of load on it. The only weight concerns would be the battery and the arduino. As well as since the system uses one motor, there is no concern for added weight in exchange for more power. The flat design allows for air to move smoothly through the system. Thus improving the aerodynamics of the system. The simple design also gives the system an advantage. The design is sleek and is not extravagant. One design that was implemented personally was giving the motor a 3-blade propeller. With one engine(motor), the 3-blade propeller would be bigger than two motors with 2-blade propellers. Although this may be seen as a disadvantage, the 3 blades would create less tip speed and noise. Thus being smoother and quieter than the 2-blade propellers.

This design was presented with the group. The concept shared similarities with the other designs. Thus creating a final decision to combine some of the elements of all the individually created systems. While also having two final designs and testing with both of them. This will allow the group to see errors with either design. As well as possibly creating one final design that has features of both systems. As a group, the design considerations that were taken account of were energy efficiency, mobility, and weight. Two tests will also take place with the system. One that runs on Energy efficiency was key to the considerations because the main objective was energy management. This is crucial due to energy being measured during the AEV operation. Energy consumption is one of the main factors that was implemented with the final design. One consideration was the overall ride for the passengers. Noise would be a concern when riding the AEV. This concern was addressed with the propeller blades.

Matthew Potts:

This design is a very simplistic, yet, efficient set up for the AEV lab. The design portrays two motors on the rear of the vehicle. This is the most efficient place to up the motors to allow them to push and pull the vehicle as needed. Having two motors will require more energy to power, but it will allow the vehicle to travel faster than a single motorized vehicle. The design also shows the arduino and battery on the top and bottom of the vehicle. Putting the battery on the bottom of the vehicle saves space and helps balance

everything out. The arduino fits nicely on top and will make this vehicle more functionable. The lightweight design does not use a lot of extra parts and components in order to be able to move as efficiently as possible. It will be able to move long distances at fast speeds due to not having excess weight. This is key for this experiment because the goal is to travel fast. The 2 blade propellers are shown in the design. These propellers were chosen over the 3 blade propellers because in last semester's lab with propellers, it was apparent that a 2 blade propeller would be appropriate for this project. These propellers will allow the vehicle to accelerate and decelerate at a speed that other propellers could not. Finally the L shaped rod whqs chosen to connect the vehicle to the track. This rod was picked because there is room on the front of the vehicle to be able to easily connect it. Also, it will help balance out the weight because it is connected to the front of the vehicle but will support the whole weight of the vehicle. If the T shape rod was chosen, the vehicle would be back heavy and would not run as efficiently.



Conclusion:

This lab provided the team members an understanding or knowledge of beginning large designs with multiple tasks, such as the initial design method. It also taught the team the importance of brainstorming and how to express concepts effectively. It guided the team members in brainstorming techniques that help in future use and a design to start developing a model.

Work Division Statement:

Gabe Bouahom - Worked on the background, but mostly the individual part of the memo.

Matthew Potts - Worked on the individual portion of the memo and some of the background.

Mati Desissa - Worked some of the background, and some of the conclusion and the individual.