Group Progress Report
Proof of Concept A

Project Details

Project name	Cat's Conundrum
Group Number	C7
Group Members	Elizabeth Andrews, CS; Alyssa Ferry, EE; Ryan Lane, ME; Jacob Johnson, ME; Mubarak, IE
Reporting period	Jan. 2018
Date Due	Jan. 29, 2018

Summary

Computer Science:

For this milestone, I focused mainly on research and compiling resources to be used in future development of the Graphical User Interface (GUI). At this point in the project, it is difficult to ensure that the GUI is functional because we haven't ordered the microcontroller that we will be using. So for now, I have made a basic prototype of what the GUI will look like, and I am researching methods of interfacing the GUI with the microcontroller. The basic prototype of the GUI contains four buttons: forward, backwards, right, and left. These will control the movement of the vehicle. The GUI will also have a label showing which button has been or is being pressed, and a timer that will start counting when a button is pressed for the first time. This will allow us to easily see how much time has passed as our vehicle is progressing through the course. For now, I am on schedule with my current tasks. Since there is not much more that I can work on until the microcontroller arrives, I will spend the time until we get our microcontroller refining and simplifying the GUI code, researching the most efficient way to interface the GUI with whatever microcontroller we choose, and determining which physical system I will use to run the GUI program.

Industrial and management systems engineering:

For this milestone, my main focus is basically on group planning and keep tracking of what each member of the group is doing through using Gantt Chart, budgeting and other types of requirements. Also, I have made some research about pathways optimization (transportation) to find the optimal path that we should keep on but it needs so much work on each sketch. Also, I've thought about the best method to have the best prediction about time by taking videos (top view) over each obstacle in a random way while we are running our RV and then start sketching them in operation research technique and then start matching them up with physical analysis. However, it gets very complex to some geometries such as the bowl. Also, since I am required to use Monte Carlo algorithm, I found the best methods that I would expect some good results on the last design (Prototype 2) especially if I am assuming that the perfect time to win the competition is between 7-9 minutes. In addition, I've been thinking how we manage the RV to let it go without any issues by avoiding the randomness in each path and mark them based on the calculation and the graphical construction charts that would be given by mathematical applications. After all, we can't guarantee the best result if we don't look at the other factors such as speed (the type of motor) and the power supply. Moreover, as a group, we are taking a consideration of other alternative plans if we face any problem in the future. As I am required to be a group leader, I will try to keep track each aspect of the subject and keep the price manageable with the contribution from each member as well as avoiding any possible disturbance that could lead us to delay our project progress and hopefully we meet all the requirements in an efficient manner.

Electrical Engineering:

For this milestone I generally researched various electronic parts to determine which were superior. I did this by looking at the components list from the previous semester and observing which parts were successful and useful. I

also researched these parts individually. I have decided that the best parts to use are from the Adafruit feather line because they are very easy to integrate with themselves and many come with multiple parts that we will need such as a bluetooth module. I have also started a list of parts that I will be purchasing including a battery pack, a basic feather board, and a featherwing add-on pack. I will be able to finalize this list once we finalize our design which should be soon.

Mechanical Engineering:

For this milestone we determined the preliminary aspects of the mechanical design portion of this project. We decided that four wheels with two motors to provide all-wheel drive would provide stability and mobility needed to successfully navigate the course.We have also compiled a list of parts needed to construct the first prototype of the vehicle. Once we have determined the exact motors we will use we can begin to perform the calculations and further develop the design sketches using the specifications of those particular motors. Once this is done we can begin to determine the proper gear ratios to provide the vehicle with the ideal amount of torque.

Visual Progress Update

Figure 1.

Figure 2.

Figures 1 and 2: Dimensions of the tunnel obstacle for the course. The tunnel obstacle is one of the required obstacles, so our vehicle must be able to go through the tunnel by not exceeding the above dimensions.
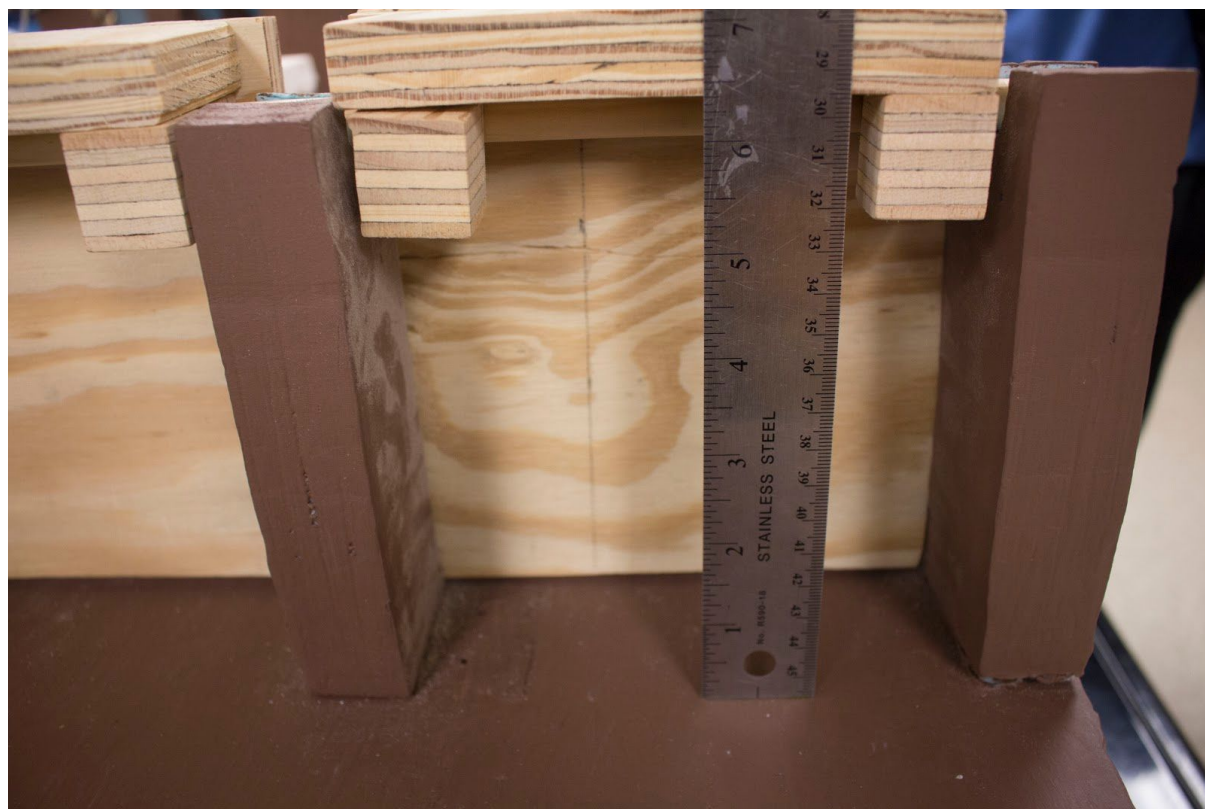
Figure 3.

Figure 4.

Figure 5.

Figures 3, 4 and 5: Dimensions and overview of another obstacle that we can use for our course. This obstacle consists of three wooden "doors", with each one being a different weight that the vehicle must push open and go through in order to get points. The size of these openings is slightly smaller than the tunnel obstacle, so if we choose this as one of our course obstacles our vehicle will need to be smaller than the maximum dimensions for the project.

Figure 6.

Figure 7.

Figure 8.

Figures 6, 7 and 8: The dimensions and overview of the wall obstacle. This obstacle involves getting the vehicle up and over a wooden wall. The maximum length of the vehicle is not quite tall enough for the wheels to reach the top of the wall, so if we choose this obstacle we will need to come up with an alternate method of propelling the car over the wall.

Figure 9.

Figure 10.

Figures 9 and 10: Another potential obstacle to use for our vehicle's course. The three different sections of the obstacle are three different difficulties and have differing levels of steepness.

Project Management/Gantt Chart (Attached)

IE(Responsive Report) :

PROGRESS

To date, all the Information that has been mentioned in the individual progress report is already on Gantt Chart. When it comes to scheduling and addressing issues of the project tasks, it requires regular communications to handle the known problems with the full excess of open resources and be ready to face any unknown problems. Overall, the group is working on finding possible solutions so we don't only have only a plan B but C, and D to resolve any issue without stress from the group members and delays in the project progress. However, we have to expect some troubleshooting issues and delays during our project by the given tasks but hopefully, through planning & management skills, we will handle the issues on time. Also, we have to meet our design expectations through the project & objective goals so our project will be handed to the users at the end of a high quality.

Since we are supposed to start ordering our purchases items by the end of proof of concept A, but we still need to study and analyze the systems carefully so we minimize our financial risk and make sure of systems' familiarity & compatibility especially in EE & CS systems. Ryan & Jacob informed me that the ME parts are going on the plan and they will start their own purchases lists as soon as they analyze and solve some design issues. In general, the project is ongoing smoothly & we expect some decent updates on the next milestone.

ADDITIONAL WORK

Two key tasks are to be analyzed and formed in the upcoming weeks, one is to find all the possible solutions to the current problems by the group members. The second one is to order for the most parts needed and heads up to the EM engineers to start building up their own part in the project. Then, we will look at the other aspects of the project when the electrical engineer informed that she is ready to start her part along with the programmer at this stage, Communication is very mandatory to avoid any further issues.

Time on Task

Student Name	Total Hours On Task for this reporting Period
Elizabeth Andrews	6-7 hours
Alyssa Ferry	4 hours
Ryan Lane	3-4 hours
Jacob Johnson	3-4 hours
Mubarak	10 hours
TOTAL	29 hours

Bill of Materials

As of right now, our budget is not 100% finalized because we are still deciding between several different options for some of the components. So far, we seem to be staying within

our budget. We will have a better idea of costs and expenses once we narrow down more of the items we will be using.

Table for actual out of pocket expenses

Part #	Item Description/Supplier	Estimated Cost of Item	Actual Cost of Item	Quantity	Total
	Battery Pack	$15		1	$15
	1 servo	?		1	?
	DC motor and Stepper featherwing	$30		1	$30
	Adafruit Bluefruit LE	$30		1	$30
	4 wheels	$12		1	$12
	U joints	$5		2	$10
	set of gears	$10		1	$10
	ball joints	$5 for set of 4		8	$10
				Total	$117
				Amount Remaining ($250-Total)	$133

Table of estimated costs for scrounged or free components

Part #	Item Description/Supplier	Cost of Item	Quantity	Total
			Total:	

Signature of ALL Team Members

Student Name	Student Signature
Elizabeth Andrews	
Alyssa Ferry	
Ryan Lane	
Jacob Johnson	
Mubarak	