



**NORTHERN ARIZONA
UNIVERSITY**

College of Engineering, Forestry & Natural Sciences

**Northern Arizona University
Go-Baby-Go wild thing! Project**

Clients:

**Dr. Kyle N. Winfree & Dr. Cole Galloway
Design Review 3 Documentation**

Prepared by:

**Ali Mohammad
ajm773@nau.edu**

**Abdulla Almutairi
aa3272@nau.edu**

**Ali Albaloushi
aja422@nau.edu**

**Hakem Almutairi
Haa266@nau.edu**

March 7, 2019

2





Table of Content:

- Introduction..... (3)
- WBS Overview..... (3)-(4)-(6)-(7)
- WBS Activities/Tasks..... (7)-(8)
- WBS Deliverables..... (8)-(9)
- Risks..... (9)
- Challenges..... (10)
- Resolutions..... (10)
- Conclusion..... (10)



Introduction:

It's mentioned in the project description that children with limited mobility often do not receive the much-needed exposure to socialization thus existing research shows that enabling young children with self-control of their own environment can have meaningful impacts on the long term outcomes given such impairments as cerebral palsy or muscular dystrophy. As a result, The Go-Baby-Go team is working on a car that allows kids with mobility issues to socialize, improve posture and reduce depression. We are implementing the function of a pinball flipper applying it on the wild thing thus allowing kids with mobility issues to socialize and play games with children at their age range.

As for the work breakdown structure (WBS) it is deliverable oriented hierarchical decomposition of the work to be executed by each team member in a team to accomplish the goals and the objectives of the project according to the required deliverables. Furthermore, a (WBS) is useful because it organizes the work thus eliminating confusion, it provides a visual representation of the entire tasks thus showing the responsibility of each team member also, it allows the team to identify risks thus having a better progress track. In this report, we will be discussing the activities, tasks and deliverables that are assigned to us thus explaining each task in detail.

WBS Overview:

WBS	Activity/ Task	Deliverable	Description	Other People
1. Ali Mohammad	Hardware			
1.1	Brushless Motor	Will act as the force thus pushing the ball	Motor will rotate 360 degrees	
1.2	Linear Servos/Actuator	Will act as a force thus pushing/kicking the ball	Linear motor that allows back and forward motion	



1.3	Force pull type Solenoid with electromagnet	Will act as a force thus pushing/kicking the ball	Linear motor that allows back and forward motion	
1.4	DIY Reprorecorting motor	Will act as a force thus pushing/kicking the ball	Linear motor that allows back and forward motion	
1.5	Switching Power supply	Switches the power	Controls the power flowing through the motor	
1.6	Speed Controller	Control the speed	A rotating contact to control the speed	
2. Ali Mohammad	Arduino Code			
2.1	Brushless motor code	Controlling the speed and direction of motor (left/right)	Code that sets up the voltage levels	
2.2	Linear actuator/servos code	Controlling the speed of linear motor	Code that sets up the voltage levels	
2.3	Joystick button code	Giving the signal thus rotating the flippers or moving the shovel	A joystick or a button that will allow the motor & actuator to function accordingly	
2.4	On and off button	To allow the power flow.	Switching on and off to allow the power to flow in	
3. Ali Albaloushi	Designs			



3.1	Design 1	<ul style="list-style-type: none"> • Kicking the ball • PVC Pipes • Flippers • Testing the design 	Function of pinball into wild-thing	
3.2	Design 2	<ul style="list-style-type: none"> • Hold the ball • Plastic shovel • Kick the ball • Testing the design 	Shovel attached to the wild-thing (will be in the bottom) to hold the ball while driving	
3.3	Design 3	<ul style="list-style-type: none"> • Hold the ball • PVC pipes • Kick the ball • Testing the design 	Holding the ball and a motor acting as a force to kick the ball	
4. Hakem Almutairi	Wild Thing			
4.1	Seat	Seat for sitting	Allowing the child to sit comfortably in the wild thing	-
4.2	Controllers	To control flipper/shovel	Allowing the shovel to move forward and backwards	Whole team
4.3	Captures	Capture the ball	Allowing the wild thing to capture the ball while	-



			moving	
5. Hakem Almutairi	Driving			
5.1	Team driving	Driving the car.	Test drive for safety.	Whole team
5.2	Leanna driving	Leanna will drive the car.	Leanna's using the car	-
6. Abdulla Almutairi	Ordering/ Hardware Material			
6.1	Linear Actuator	Follow the order with ASHWEJA to make sure deliver on time	Linear motor that allows back and forward motion	
6.2	Motor	Follow the order with ASHWEJA to make sure deliver on time	Motor that will rotates 360 degrees	
6.3	Linear Servos	Follow the order with ASHWEJA to make sure deliver on time	Linear motor that allows back and forward motion	
6.4	Force Pull type Solenoid Electromagnet spring Return	Follow the order with ASHWEJA to make sure deliver on time	Linear motor that will allow back and forward motion with the assistance of force from the spring return	
7	Presentation			
7.1	PowerPoint Presentation	All team members will be assigned for a section to complete	Present assigned section	Whole team
	Writing Report			



8	Papers			
8.1	Project Report	Will be assigned for each team member	Complete assigned section	Whole team
8.2	Testing Report	Will be assigned for each team member	Complete assigned section	Whole team
9. Hakem Almutairi	Website			
9.1	Website	Uploading the content and pictures on the website.	A site on NAU server to introduce the project.	-
9.2	Update the website	Make sure everything updated to date on the website.	Update the website with a new content about the project.	-

WBS Activities/Tasks:

There are many activities for our group WBS each team member is assigned to a specific activity thus finishing multiple activities in a timely manner also, making the project easy by having an equal distribution. For example, Ali Mohammad will be focusing on hardware and software. As a result, I will be responsible for putting it all together. For example, I will be the one to write the code for the motors thus serving their function. Also, I will be the one adding on the wild thing thus connecting the motors to the car. On the other hand, Hakem Almutairi will be responsible about the three main parts including parts of the car (seat which we will support it with a cushion, controllers means the team will add flippers to the car so it can controlled by the controllers and capture like shovel to hold the ball while driving), testing the car many times as it's important to deliver the product in a good shape and satisfactory for both the clients and the family, also the last part will be updating the website with any new information about the project. As for Ali Albaloushi, He will be focusing on the design's part. For instance, he will be dealing with the measurements of the PVC pipes that will be implemented in the car "wild-thing".



Moreover, trying to make the designs be safe for the children, and trying to figure out a way to fit our parts into the wild-thing. Also, he will be responsible to test the designs to make sure all designs works perfectly. As for Abdulla Almutairi, his task is to follow up with Ashweija for the orders of hardware material. In addition to that he is also asked to make sure of the orders is on time. He was looking for the Hardware Material online to get a basic idea what it looks like and to see the correct measurement. He is responsible to receive the orders, to make sure that they are in the correct size. Abdulla is also responsible to see if the hardware materials is a good quality or if it is damaged. It is important to have a great quality because the hardware materials builds our entire project.

WBS Deliverables:

The team is required to provide the clients and the family with a lot of deliverables that should be satisfied for the user of the wild thing car. Because each task has a unique deliverable which is mentioned in the WBS overview.

For the first activity which is **Hardware** its deliverable will be:

- Brushless Motor: Will act as the force thus pushing the ball.
- Linear Servos/Actuator: Will act as a force thus pushing/kicking the ball.
- Force pull type Solenoid with electromagnet: Will act as a force thus pushing/kicking the ball.
- DIY Reprorecorting motor: Will act as a force thus pushing/kicking the ball.
- Switching Power supply: Switches the power.
- Speed Controller: Control the speed.

The second activity is **Arduino Code** and the deliverable will be:

- Brushless motor code: Controlling the speed and direction of motor.
- Linear actuator/servos code: Controlling the speed of linear motor
- Joystick button code: Giving the signal thus rotating the flippers or moving the shovel.
- On and off button: To allow the power flow

The third activity would be the **Designs** and the deliverables for this task would be:

- Design1: This first design is designed to kick the ball using the flippers we made (Function of pinball).
- Design2: This design should hold the ball by a plastic shovel attached underneath the car “wild-thing”.
- Design3: For this design we have to build a circle design in order to hold the ball



and then a motor should act as a force to kick the ball.

The fourth activity would be **Wild Thing** and the deliverable for this task would be:

- Seat: To allow the children sit comfortably in the car “wild-thing”
- Controllers: This should be controlling the forward and backward motion of the flippers/shovel.
- Captures: This should catch the ball while the car “wild-thing” is moving.

The fifth activity will be **Driving**, and its deliverables as listed below:

- Team driving: Driving the car.
- Leanna driving: Leanna will drive the car.

The sixth activity is **Ordering/ Hardware Materia** and the deliverables for this task would be:

- Force pull type Solenoid with electromagnet: follow the order with Ashweija to make sure deliver on time.
- Linear actuator/servos: follow the order with Ashweija to make sure deliver on time.

The seventh activity is **Presentation** and the deliverable for this task would be:

- PowerPoint Presentation: Will be assigned for all team members to complete a specific task.

The eighth activity is **Writing Report Papers** and the deliverable for this task would be:

- Project Report: Will be assigned for all team members to complete a specific task.
- Testing Report: Will be assigned for all team members to complete a specific task.

The last activity is **Website and** the deliverable for this task would be:

- Website: Which is uploading the documents we have for our project into NAU servers.
- Upload the website: Updating the website with the new contents we came up with.

WBS Risks:

There are many risks that can occur with this project such as, falling from the car, getting hit by the motor, hitting the wall while driving. Furthermore, having too much voltage which can cause failure due to overheating in the circuit.



WBS Challenges:

We believe that most of the challenges that we will face are concerning software meaning implementing the code and uploading it on the Arduino. For example, we are currently trying to make the brushless motor to work, but we are trying to figure out how to operate the motor Driver 2A Dual L298 H-Bridge. In addition, the second challenge that we are facing is trying to make the linear actuator operate.

WBS Resolutions:

We believe that our main resolution is allowing Leanaa to play and socialize with other kids at her age range because the socialization aspect is really important in our project. In fact, we believe that our team will be adding a new idea in the market for Go-Baby-Go car. In accordance with the completion of the process of the project, the Go-Baby-Go car shows estimating results of hitting the target. Helping Leanna to socialize and communicate with others in her age is the main goal of succeeding this project as the team has put enough amount of efforts to improve Go-Baby-Go car to function well without any negative effects like technical, mechanical, or electrical issues.

Conclusion:

In conclusion, we believe that the WBS will allow us as team to divide the work evenly thus finishing the tasks accordingly. In addition, as mentioned before that the WBS is useful because it organizes the work thus eliminating confusion, it provides a visual representation of the entire tasks thus showing the responsibility of each team member. Furthermore, in this document we have discussed the WBS activities/tasks, WBS risks, WBS challenges and WBS resolutions. Finally, we believe that this document will assist us in keeping track of each activity/task thus knowing where we stand in the project.