What’s Next Report

**William Minton – Project Manager**

When working on this project, we came across many issues that we had to fix in order to finish the whole assignment. Our design from the beginning was completely different from how our actual product turned out. Our product still had the same functionality and did everything it was meant to do, but we had to change things because ideas on paper work differently when actually trying to piece it together.

I say all of that to say that there are so many things that we could change on our project. While the project is finished and is working brilliantly, we are able to look back and see things that we could have changed in order to build the project better than it turned out.

In looking at the first issue at hand, we wish we could have made the project bigger. While we stated that the entire project is supposed to be made bigger, we really wished we could have just built the bigger model in order to present for the class. The problem with this was money and the amount of time it would take to get the products in. Even though we used a plastic bin, the actual idea was a thin and sleek waterproof housing that would protect all the elements from any weathering that could occur. The box we used came from Walmart since it was affordable, but it was way bigger in proportion to the components than what could actually be used to build a large-scale model. Also, we realized once we finished our project that recently that the tape measurer was a lot stronger than what we initially calculated. We also decide that if we had used two tape measures, we could have increased the size and extension exponentially due to the light weight of the fabric as well as the simplicity of the entire setup.

In looking at how we powered the project, the entire system was meant to work when connected to a car battery. Given that we were building a small-scale model, our logic board was not registered to be able to take that large of a voltage, so we had to find an alternate option which ultimately led to us plugging it into the wall.

When thinking about other ways that the project could be built, I had an idea that would be way stronger, work better, but it would be a larger object on top of the car and more expensive. This option would have involved linear actuators that would use air in order to push the fabric out while providing an indestructible frame. However, linear actuators cost more than motors which is why our idea would have not worked for this project. The reason that this option would have been larger is because many of the cheap linear actuators work on a pressure system such as an air pump. While they do make smaller air pumps, I am unsure of what size we would need in order to get two actuators to extend out over the car.

While we had several things we would want to change in the future on this project, the main important thing to take away from the project is what we learned for ourselves through it. I know that sounds different due to the fact of how we want to change in the future but taking away lessons from now is how we know what to change in the future. Being that I was the project manager, I carried a large part of the responsibility that was involved in the entire project. While it seemed as though I was constantly stressed, that was partly due to my own doing. A team leader is responsible for making sure that everyone is doing their part and completing tasks on time and in a timely manner. The issue came into play whenever I hadn’t ordered the parts soon enough or I didn’t schedule times for us to meet as group. While I used to look back on the project and wish that class hadn’t been cancelled, I realize that all of that free time was meant to teach us to take responsibility in a build. In the real world, there isn’t going to be someone who stands over our shoulder as engineers to make sure we are working. It is our job as individuals to take initiative and keep to a schedule to get things done whenever they are supposed to finish. In the future, I know to set a schedule and use the large amount of time given to my advantage as it spreads out the work load so that I’m not overly stressed at the end of everything.

As a person in engineering, while we may not get the position we want, we can always strive for a role that we would like to get too. My whole life, I’ve been a leader and it’s hard to say that without sounding arrogant or rude. I don’t mean that I’m a leader as in saying that I’m the best, I say it in saying that I enjoy working with others while driving them to an ultimate goal. In order to do a role like that, you have to be willing to be respectful to others, learn to critique kindly, and learn to interact with your team and offer them encouragement and support when needed. This project taught me that while I made mistakes now, over time, I could really find a place in a project manager position and I’m thankful that this class showed me that.

In the end, I was very pleased at the way that the project turned out. Of course there were things that we could have changed as that is the case with most prototypes. However, my group and I find pride in the fact that our project worked and served the purpose it was supposed to. Not sure about sweat and tears, but there is definitely some blood that went into the project, but that’s a story for another day. Thank you to Dr. Manning for this incredible opportunity and I looking forward to seeing where engineering takes me.

**Harsh Patel – Software**

Since we had a short amount of time to build this project, we had to build just a small prototype. We were also limited to our resource due to our budget. We didn’t want to spend so much money on a project that is small. If I had to continue working on this project, then I would. I would focus mainly on improving the project by making it faster and cheaper. I would do research on how to make Bluetooth connectivity faster, develop a new application, and how to make the actual project cheaper.

Bluetooth 5.0 is the latest Bluetooth connection we have. I would implement the project so that it supports Bluetooth 5.0. The main benefits of Bluetooth 5.0 are further range and faster speed. Bluetooth 5.0 has double the speed and quadruple the range than older Bluetooth versions. This would help when it comes to our project. I would develop a new application that supports Bluetooth 5.0 so it can be faster and can be used at a far distance when it is raining. The user can use it when he or she has parked their car so far away. I would also add a button in their car like a garage opener to open and close the product.

I would also implement a button on a key fob so that it’s with the user every time they drive somewhere. I would test it on one vehicle then eventually work for the company and implement it with them so that it can work for all the vehicles. I would develop a new circuit board so that it works for the system and remains the functionality of the car such as lock, unlock, trunk, and panic buttons. I believe users would find it easier than to pull out their phone or pull out a remote control when they can just pull out their keys and unlock or lock the car and open or close the product at the same time.

I would also add a way to make the product detachable so that it can connect onto the wheelchair using magnets or hooks. Therefore, whenever there is a high gust of wind, they can just detach it from the roof of the vehicle and attach it to the wheelchair so that their body does not get. It would also make them avoid getting an umbrella when this can detach from the vehicle and attach to the wheelchair. I would also add a heavy, wind resistant, transparent drape so that it covers the body and the wheelchair from the rain. I would also add a body sensor that can read the temperature from your body and put it to the body temperature you need.

Something that I have thought about adding is making the product not use a waterproof covering but rather use a jet that involves air flow. So it would take a battery and motor like we already have and add a fan to it. The fan would intake air and let out strong air so that the rain would just blow away from the center and basically show an invisible cover. It would eliminate the problems such as flooding when they leave the umbrella out to dry, the soaked fabric that it will cause, the fabric turning inside out due to huge gusts of wind, and collision when two or more people are walking with umbrellas. Charging this wouldn’t even be hectic. All the user has to attach back to the vehicle, and the battery from the vehicle will charge up the product. The only downside is I would have to figure the weight of the umbrella and the power of the umbrella. If it was raining hard, then I should be able to make it to where it can withstand the power of the rainfall and blow the rain away from the center of the umbrella. I believe it would be a nice challenge to work with. The idea of having that instead a fabric would be evolutionary. All the user has to do is to press a button and let air flow blow the rain away rather than just waiting on a waterproof fabric to come out.

Another aspect of software I was thinking about is making the product useable across multiple devices rather than just one. For example, let’s say a disabled person doesn’t have their remote control or phone with them. It would be great to have an extra remote or have someone else with you that has the application to use the product. It would also work for when the user can have one remote control at home and one in the vehicle. This would be easier since the user doesn’t have to go to the vehicle in the rain when they can use the remote control or application at home.

Being part of the software aspect in this project has helped me in other classes. I have taken Introduction to Programming last semester, and now I am taking Software Development. This semester has been good since I learned two topics at once. This project has taught me that without software, you cannot do hardware, and without hardware, you cannot do software. I needed to make a skeleton code at the very beginning of this project. It has also taught me that nothing is perfect at the first time. My group and I ran through some mistakes and fixing it was challenging. Later on in life when I start working for a company, and I have to work on software, I have to remember that nothing works for the first time. This project taught me to be patient with myself and also with other group members. Like I said earlier, I need hardware to work with software and vice versa. I cannot rush someone who is working on hardware so I can get my software done, and I also cannot rush someone who is working on software so I can get my hardware done. I believe computer systems engineering is a team-based major. I am glad that the project we worked on this semester turned out well. If I have to submit to a company to earn an internship or a co-op program, then I would, but I would first make the changes I need to make so it can be improved. I would like to thank Professor Benjamin Manning for assigning this project because it shows that later in life, we will be facing the same problems.

**Ayo Afon – Hardware**

While this is the end of the project, there is still room for it to be used in a better way in the near or future. The “Handibrella” that we have created for this project was only just a prototype but there could be things that can be added to it to make it even more efficient or better. The general idea of this engineering project was based on the issue of Dr. Manning’s struggles of getting out of a vehicle while it is raining. Dr. Manning expressed grief when it came to exit his car in the rain. He explained that it took quite some time to get his wheelchair out of the car. While we could not optimize the wheelchair or even the car, we decided to focus on a smaller centralized issue as we believe that even solving a few people’s problems is worth the work of the task. The idea of building a retractable roof umbrella came to us after discussing this issue. It would help all sorts of people including and not limited to older adults, people with disabilities, and even impractical uses such as using it for shade at outdoor events.

The Handibrella consisted of several components. We had the motor which would run of the car of the battery. This would allow the awning to be extracted and retracted with ease. The logic board was sort of the brains of the product and was used to trigger the motor whenever the button is hit on the receiver, along with adding Bluetooth connectivity in order to allow the device to be engaged from outside of the car. The prototype shows the umbrella in a folded up

position as well as shows the support rods which support the tension that is produced on the umbrella. While not able to be fully seen, all of the technology was covered by a slim waterproof awning.

The umbrella works by automatically wanting to come open as soon as it exits the housing. The idea is that the umbrella is spring loaded, and the springs will compress as the umbrella is pulled back in. This umbrella would attach to the roof of the car and could extended and retracted with the click of a button. This issue seemed complicated to solve, but the general concept of it seemed very easy with just a few obstacles to overcome in our own abilities and skills.

The remote would allow for quick and easy access to this and would save the person from getting wet. That is where the software aspect of the project comes into play. Overall, while this build seems simple, it will take some logic and problem solving to bring it all together.

The idea of this whole project was to come up with a prototype that would help the handicapped/disabled in one way. For our project, we came with a solution to prevent water from people that have a wheelchair coming out of a car. I think that this idea was great for not only a good solution for Dr. Manning, but also a great solution for the society. This prototype could not only prevent rain from getting onto your body but could also block the sun from getting into your eyes or face.

Although this was a prototype design , there could be things that could be tweaked in the near future. As the Hardware Engineer in this project, making the Handibrella prototype could be much smaller that it would not take much space on the top of a car or even outside of a house. Additionally, I think that making the whole prototype more portable would be a much better way of easily using it.

Overall, the Handibrella was a very innovative way of helping Dr. Benjamin Manning coming out of a car. Most importantly, this prototype could even be better by making it lighter and more efficient. I hope that it could positively affect others in need. Lastly, as the Software Engineer in this project, I hope to find other innovative ways that could help the handicapped along with other people in need.