Curtis McClelland

Manning

CSEE 2210

21 April 2019

Teammate Role Report Analysis: John Watson

For this project, John was an integral part of our team. He served as the generic concept idea man and played a vast part of our brainstorming in regard to what product we would create on our way to creating “A Better Ear.” I would consider John to be the overall head of research and background information for this project. He did a fantastic job consolidating our information and creating a simple task list that we needed in order to stay on top of things. John was integral in our decision to make an audio pickup system, as he experienced a consistent issue in our shared Discrete Mathematics course wherein the teacher consistently couldn’t hear his questions, and he consistently couldn’t hear bits of her lecture. The lecture hall in particular is large, and has a lot of absorbent material present in the classroom that inhibits the ability of students to hear the professor. From this issue, John was able to perceive how much harder it would be for a student with disabilities to hear the professor, and our idea was born.

John did extensive research in regard to the shape of a room, the acoustic patterns of sound waves, and how this might affect our experiment. He was able to determine that we would encounter some issues in regard to the absorbent materials in the room, and that this probably factored into why we had issues hearing the professor in the first place. He also determined that as long as our microphone was placed equidistant from each side of the room, we would have an accurate experiment, as the room is reasonably symmetrical.

John did much when it came to explaining and detailing the uses and implementation of our software and hardware. He delved into several different solutions that the system could provide and explained them in depth. John explored the possibility of implementing earpieces for the students to be able to hear the lecture concurrently, or as it went on, and he also looked into a system with an interactive app or device that could help the student or professor pick a certain mode that would allow for different functionality. This application could include features such as speech to text, text to speech, audio playback, projection of audio, and even a buzzer that could inform the professor that a student had a question.

John was instrumental when testing the product. I would inform him of the tests that we needed to accomplish, we met up on time for a scheduled period, and were able to quickly and constructively finish our recording of information and video recording for the sake of the demonstration video that we are required to complete. He served as the student and the teacher in several tests in order to give us example audio to use for recording decibel input for the microphone at different ranges and different setups.

Finally, John explained how our project will be able to be improved upon after this semester. There are many different ways that different features could be added to our system, if there was more time and greater funding. For example, there is the potential for more microphones to be created, for the application to be mutated in order to implement concepts such as TurningPoint, an interactive classroom application that allows for polling of students. In essence, there are ways that our product could be expanded past the realm of handling disabilities, and extend into improving overall classroom environment. John did an excellent job of brainstorming and presenting these in a concise and detailed manner.

Curtis McClelland

Manning

CSEE 2210

19 April 2019

Personal Role Report

Together, John Watson and I have come together to create “A Better Ear” for students in the classroom. The purpose of “A Better Ear” is to help those who have hearing impairments or ADHD and cannot hear or focus on lectures in class. It is also meant to help teachers in regard to hearing the questions of students in large lecture halls. During the course of this project, John served more as a background research and generic implementation director, and I served as the test engineer, designing and running experiments based off of John’s research.

I took our idea from the roots and decided to find a way to implement the concept with actual hardware and software solutions. The main issues we faced were those of attempting to find a system wherein audio would be recorded appropriately, ignoring physical objects that could block recorded sound. Additionally, we needed a microphone with recording software in order to conduct our tests. The microphone we decided on was the Samson – Go Mic Portable USB Microphone with Software. The Software included was AudioDesk 5.0. This application allowed us to record audio clips and play them back. These audio clips could then be fed into some sort of transcription service, such as Transcribe, which has been used by several renowned programs, including *The Guardian*, *NPR*, and *TED*. These transcriptions and recorded audio could be distributed to students who are hard of hearing concurrently or post lecture, in order to allow them to review the same material multiple times, thus allowing them to have the same absorption opportunities as students without disabilities.

After figuring out the hardware, software, and logistics of the tests for this project, I proceeded to test the actual audible range and usefulness of our mic setup. I organized a total of 12 tests, run twice and averaged, that would demonstrate decibel pickup increases and overall usefulness of a microphone system. I decided there were 12 specific solutions to our problem that could be presented. I devised several different location tests to determine what ranges were optimal for audio pickup.

The first set of tests were engineered for the purpose of improving the Teacher experience. First, we tested the decibel pickup of a student asking a question with the mic at 0 meters and the student at 10 and 20 meters away. Then we tested the microphone being at 10 meters, with the student at either 10 meters or 20 meters. Finally, we tested the microphone at 20 meters and students at 10 meters and 20 meters away. The measurements were all given value as a distance from the teacher’s desk.

I then proceeded to setup my laptop at different ranges with the microphone attached, using the AudioDesk program to measure the decibel pickup. I would have John behave as the student in this situation, and I would look at the laptop to record what decibel value remained constant while they spoke. We would run each test twice and average the decibel values for higher accuracy. By interpreting this data, we could see which microphone location provided for the best overall pickup of student audio in a lecture hall setting.

Second, we tested different mic locations for pickup of teacher lectures, in order to demonstrate how a microphone being on the professor’s desk greatly improved the volume of the lecture that students could hear, either in a recording or concurrently as the lecture progressed. We tested the microphone being at 0 meters with the teacher facing the classroom and facing away, 10 meters with the teacher facing the classroom and facing away, and 20 meters with the teacher facing the classroom and facing away. I recorded these decibel pickups and created an excel spreadsheet to demonstrate how much of an improvement the microphone placement was in regards for recording audio. I can then interpret this information in order to show that having a microphone system is a significant improvement for students than not having one.

Engineering Assessment Report (for Curtis)

Curtis played an integral role in the development of “A Better Ear”. He was in charge of the logistics of the microphone tests and had many positive ideas on the development of the presentation. He was able to use a decibel meter to measure the distances from the microphone along with their respective amount of sound. This was very helpful for me being able to write about sound drop off. This also allowed me to continue to research sound in the classroom and learn more about what types of materials and microphone placement will allow ADHD students to prosper. At the end of the day he exemplified the idea that both of us declared for the project. This idea was to design a system that allows a student with ADHD to get the same classroom experience as any other student.

He was also critical in the initial research into the two different types of ADHD. Before this project began, I did not realize that the disorder was divided into two groups. I was able to learn information and cues into the lives of people with ADHD and at the end of the day it is the thing that I am most happy to have learned. Curtis explained that there are many differences between inattentive ADHD and hyperactive-compulsive. Now that I have the research behind me, I can begin to identify the cues in my day-to-day life and do a better job to help a student with this disorder.

Another positive that our group had was organization. About the midway point in the project we decided to make a google slides presentation, which was a large boost to our ability to complete our goal. We were able to put in hours without being together the whole time, and this fit our tight schedules much better. We were able to post links at the end of the presentation for the other member to use in their research. Curtis was able to provide more than one extremely powerful sources for me to continue my search for information.

There is nothing more important to a successful group than communication and Curtis and I did very well presenting our ideas. He was honest with his opinions on my information and I hope he did not expect anything less from me on my comments. We have continued to concentrate on pushing the project forward towards reach goals because it is important to us to see out the project the best we can. Both of us contributed to ideas in the presentation now and future ideas such as speech-to-text and text-to-speech programs so that students can get more help after class. These systems may also help students’ studying habits if they are able to get text versions of lectures so they can reread them. Curtis was an important part in the development of these ideas.

In the making of the video, Curtis played a very valuable role again. Not only did he begin by setting up the parameters of the task at hand (such as setting up distances from the mic or front of the classroom), but he was able to feed the voice output from the different areas into the microphone and measure the decibel level at any given time with the meter on his CPU. We were able to use this to have accurate decibel readings that ultimately decided how our data would look when we finished the project.

Finally, Curtis was the man in charge of video editing. He chopped up many clips to fuse together the make the video, adding pauses and words when necessary. I was able to record an introduction for the clip, but Curtis put that part in the video along with all the data from the trails of the microphone in our classroom. I would have been unable to complete this project without him.

Role Report Engineering (John)

My role in the creation of “A Better Ear” spanned across every dimension of this project. Being in a group of two people increased the workload dramatically for both Curtis and I. My first contribution to the project was the prototype delivery. I was able to come up with the idea that a larger number of microphones must be present for the system to be successful. I contacted my professor about what should go into the project version of our system and was able to determine we only really need one for the demonstration. I was also able to do research on sound and sound travel and combined these ideas with the goal of the system. I determined that larger panels of wood with cloth should be put on the walls to ensure sound dampening and to combat reverberation. It was extremely interesting learning about how sound impacts the classroom setting, the professor and especially the students. Students learning is not only impacted by sound but a classroom with well-tuned sound can enrich a student’s learning and shift their perspective on the material they are learning.

The next department of the project that I had an impact on was the communication between teammates and between the group and the professor. I contacted Curtis whenever I had an issue, learned about the issues that he was having and wrapped them up into a video call or an email to the professor. Communication between students and professors, especially in a class setting like the one presented to me, is crucial to the success of the project. I would have been unable to submit the correct information without contacting the professor and am thankful to get information about the project when I needed it.

The “A Better Ear” system has a goal to help students with ADHD thrive in the classroom, and my work that I have submitted is proof that I am dedicated to its success. After the project is completed and submitted, the scope of the project can be expanded. I was able to make a basic idea of what the project in the future can becme. The basic setup for the system plants speakers at different areas of the classroom that are hooked up to the teacher’s microphone. It is estimated that a percentage of students with ADHD cannot concentrate because they cannot fully understand the material. My research into sound delved into reducing negative noise and project useful sound. When a teacher or professor speaks too quietly or is too far away from a student, this significantly hinders their ability to gain the material being taught. I know myself that it is extremely difficult to pay attention in a class where I am unable to hear correctly. Students with ADHD should not have to suffer through this and deserve the same rights for schooling as the next child. Sound in the classroom is the medium for student development, so we must do everything we can to make sure students receive quality sound.

The video submitted with the project deals with Curtis and I’s joint effort to explain what exactly the system performs. In the video I explain what aspects of the classroom are designed well versus the parts that could use improvement. In the video, the viewer will also see the sound drop-off with the demo microphone. I am hopeful that after viewing the video that viewers start to understand the difficulties of a student with ADHD in the classroom due to the inefficiency of classroom sound and the inability of lectors projecting their voice in an appropriate way. Through the system of “A Better Ear”, every student will be able to receive a top-class education.