EE/CprE/SE 492 WEEKLY REPORT 2

Jan 2023 – Dec 2023

Group number: 12

Project title:
Application Exploration of 5G-and-Beyond Wireless Systems and Rural Broadband

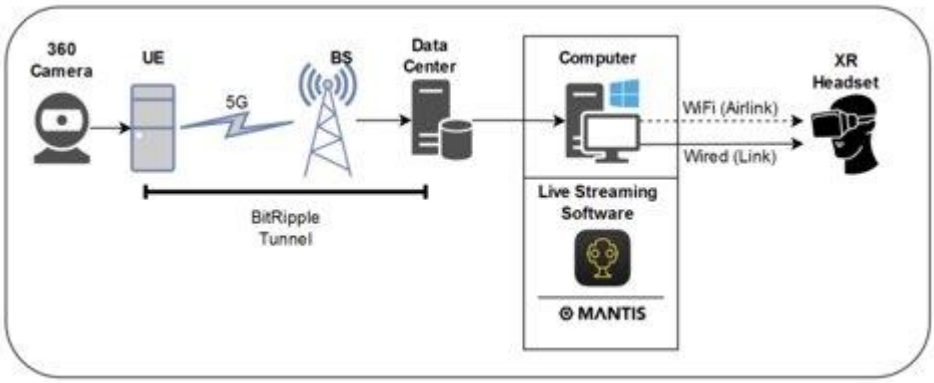
Client &/Advisor:

ARA Wireless/ Dr. Hongwei

Team Members/Role:
Vibhu Dhavala, Software Engineer
Cristofer Espinoza, Hardware Engineer
Andrew French, Hardware Engineer
Caleb Kitzelman, Hardware Engineer
Samuel Rettig, Software Engineer
Jake Roskopf, Hardware Engineer

Weekly Summary

We met with Evan Grossling and Elizabeth Adi, fellow seniors who are currently working with Dr. Hongwei and discussed their current implementation of XR using ARA. In the meeting, they covered that the XR application uses *Mantis,* a live streaming software, to currently host the use of the headset. The Flow goes like this for the current iteration:



Finally, we asked whether going forward if it was better to focus on data collection or improving the current XR iteration. They recommended doing the latter and creating an application within Unity as no further development can be done with Mantis.

In this meeting, we were able to define our goals for the semester. Our first goal is to be able to stream using RTSP protocol. This would allow for lower latency. At the moment, the system uses HLS

protocol. The UE is able to transmit data via RTSP protocol, but the team does not have an application that can receive and display this type of data. Our second goal is to create a Unity application as mentioned. This will include but is not limited to user interface, responsiveness, and rendering. This video is a great example of what we are expected to implement.

Live-stream player for Insta360 Pro, Pro 2, and Titan - YouTube

Past week accomplishments

Vibhu Dhavala – I spent these past 2 weeks researching unity development as well as how to stream RTSP with unity. I began a Unit project and figured out how motion tracking and modeling a 360 video is done. I haven't started working with a RTSP stream in unity, however I have investigated plugins that can help. I found the VLC for unity plugin and spent time learning that, and VLCsharp, a c# plugin that the unity plugin is based on.

Cristofer Espinoza – I familiarized myself with HLS and RTSP protocol. After our meeting with the graduate students, I stopped researching codecs and improving system efficiency via data compression options. The graduate students we are working with didn't have any say in that so efforts will be shifted towards streaming protocol and unity application development.

Andrew French – I researched HLS and RTSP video streaming, so I'm better versed for configuring the system.

Caleb Kitzelman – This week I took time to investigate the advantages and disadvantages of RTSP. I also took some time to research the data collection capabilities of Unity. There seems to be many add-ons that can be attached to unity applications to monitor different performance.

Samuel Rettig - This week I investigated XR in Unity as I have not personally developed an XR application. To prepare for the PIRM I also worked on the slides and looked more into the specifics that would be discussed

during the presentation.

Jake Roskopf - This week I looked at Unity UI design ideas and strategies that we could use. I also worked on the presentation slides for this week's review. Due to exams and multiple projects coming up, I did not have much free time to do much more.

Pending issues

Vibhu Dhavala - None

Cristofer Espinoza – None

Andrew French – None

Caleb Kitzelman – None

Samuel Rettig – None

Jake Roskopf - None

Individual contributions

NAME	Individual Contributions *(Quick list of contributions. This should be short.)*	Hours this week	HOURS cumulative
Vibhu Dhavala		6	50
Cristofer Espinoza	Research and presentation	3	39
Andrew French	Research on HLS and RTSP streaming.	3	61
Caleb Kitzelman	Research on data colleciton and RTSP + presentation work	7 (+6 from last report)	52
Samuel Rettig	Research + Presentation work/ research	6	52
Jake Roskopf	Research and presentation work	6	58

Plans for the upcoming week

Vibhu Dhavala: I plan to continue working on getting an RTSP stream as 360 video in unity and hope to receive a stream link from the grad students working on ARA soon.

Cristofer Espinoza: We had an environment set up for us in Coover to be able to develop a unity application. I want to be able to log in, install Unity and start messing around with the software. We are currently still waiting for the system to be replicated in Coover for us to be able to start working on using RTSP so we are limited to that at the moment.

Andrew French: Begin app development and continue research into RTSP and how the current system is setup.

Caleb Kitzelman: Become familiar with more of unity's features and begin application development. Look more into data collection tools for Unity and follow up with Evan and Elizabeth to get 360 camera set up (separate from field camera)

Samuel Rettig: Begin development for the Unity project as well as initial setup for version control via Gitlab. I really want to investigate native ways of getting data from the streams themselves, as I know that this feature is likely built into Unity as a platform.

Jake Roskopf: I plan on starting the beginning processes of our application and testing out some unity features. The specifics of what I do depend on how we decide to split up the application workload going forward.