EE/CprE/SE 491 WEEKLY REPORT 2

2/5 – 2/12

Group number: 12

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

Client &/Advisor: Hongwei Zhang

Team Members/Role:

Caleb Kitzelman - Undefined
Cristofer Espinoza - Undefined
Andrew French - Undefined
Jake Roskopf - Undefined
Samuel Rettig - Undefined
Vibhu Dhavala – Undefined

Weekly Summary

As a group, we met on Wednesday February 8th in the senior design lab to discuss our plans for the advisor meeting with Dr. Hongwei next week. We touched base on the research we had done, ideas we came up with, and questions we had for Dr. Hongwei.

Past week accomplishments

Jake Roskopf: This week I finished up the reading material and did some independent research on more applications of 5G and networking. I found some interesting areas that are being researched right now such as remote driving vessels and smart farming that might be applicable once ARA wireless is up and running. I also discussed with Dr. Sang Kim about a possible project using cognitive radio and energy harvesting to create a sustainable spectrum monitoring system.

Vibhu Dhavala: This week I continued to read about 5G technologies and began thinking of projects to apply them to. As I thought of project Ideas I further looked into what aspects of 5G would provide benefit for use in these projects.

Cristofer Espinoza: Since the last project report, I have finished the document provided by Dr. Hongwei "5G Mobile Networks: A Systems Approach". The document is specifically made for people

like us, looking to catch up on the overall architecture of the Internet, cloud services and mobile cellular network, specifically 5G. It covers aspects and technologies in the RAN and Mobile Core that is used to connect User Equipments (UEs) to the internet. It was a great resource, and which was very different to anything I have ever focused on when it came to 5G. Previously I had done research on advanced antenna systems, but this showed me that our project may instead be more cloud or software focused. I have also done some brief research on potential projects. A lot of the more applicable and feasible use cases for 5G revolved around augmented reality (AR, examples include Snapchat filters, PokemonGo, or google translates live translation feature). Ideas I had come up with included using AR for finding buildings on the MyState app, finding book locations at Parks, or using an AR in an EE lab to identify equipment and provide helpful links.

Samuel Rettig: This week I read over parts that I understood less in the book "5G Mobile Networks: A Systems Approach". This was all in order to better understand what concepts I previously lacked on. Our goal as a group is to decide on an idea for the final project- as thus I have been mulling over which sounds the most interesting.

Andrew French: I started reading through "Computer Networks: A Systems Approach" because system networking seems like a major part of the 5G system.

Caleb Kitzelman: This week I continued looking into how 5G really works, with a focus on finding out ways 5G improves reliability for users, especially in both heavily populated areas and rural areas. I also began looking into numerous different 5G applications in hopes of finding inspiration to use for our project. Some applications include (but are not limited to): satellite internet, security and surveillance solutions, healthcare applications, smart farming applications, industrial internet of things, etc. I also did some research on cognitive radio with an energy harvesting system after hearing about Jake's potential idea.

Reference page provided by Dr. Hongwei Zhang: https://docs.google.com/document/d/13lR-8zwkiUcjAJ-IBZ4p2xflygXDRrl8/edit (for internal ARA project use only)

Pending issues

We have yet to define our project. This past week we have collectively tried to research applications and come up with potential projects. We are hoping to run our ideas across Dr. Hongwei and hash out more specifics in the upcoming meeting and week. Once we have an idea of the project, we can start to determine roles, timelines, and have overall more direction.

Individual contributions

NAME	Individual Contributions	Hours this week	HOURS cumulative
Jake	Research	3	6
Samuel	Research	4	7
Cristofer	Continued research and proposed potential projects.	4	6
Caleb	Group meeting, 5G applications research	4	7
Andrew	Research on Computer Networks	6	14
Vibhu			

Comments and extended discussion

Plans for the upcoming week

Cristofer Espinoza: In the upcoming week, I hope to start reading and complete the other text that Dr. Hongwei had recommended we read, "Computer Networks: A Systems Approach". I want to continue finding possible project ideas and with the team hash out what we want to focus on. We intend on asking Dr. Hongwei for other professors who are currently doing research involving 5G applications to do get inspiration of possible applications or unpursued projects.

Samuel Rettig: I would like to learn more about 5G and how it works. Once we meet with Dr. Hongwei and have a better idea of what our project will be, it will make it much easier to narrow down my search for relevant information.

Andrew French: After the meeting on Monday, I am planning on switching my research to a topic more closely related to our project. Besides that, specific research, I will find areas in 5G where I need to improve my baseline understanding and research that.

Jake Roskopf: I am continuing to read more of the reference material to gather more understanding of the material. I am hoping to find out more about what the potential project with ARA wireless is and how our group could help with the beginning of the network's development. Also, after finding out much more about 5G, I am hoping to gain a better understanding of if we are focusing on the actual networking itself or the applications that can now be developed due to the more advanced networking technologies. I just hope to get more clarifying information to help us move forward!

Vibhu Dhavala:

Caleb Kitzelman: I plan on continuing to research 5G applications and brainstorm possible project ideas. I will try to focus on project ideas related to the ARA wireless lab. I also plan to continue learning about 5G as a whole to get a better understanding the technology. After meeting with our