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# EE/CprE/SE 491 WEEKLY REPORT #4

2/19 – 2/26

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

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## Weekly Summary

We are working as a group to decide what to do for our project. We held a meeting on Wednesday the 22<sup>nd</sup> to discuss that question. We are narrowing in on a project but have not reached a decision. We continued our research on potential project ideas that would solve rural/agricultural problems or improve the solutions that already exist.

## Past Week Accomplishments

Samuel Rettig: While finishing my re-read of *5G Mobile Networks: A Systems Approach*, I delved more into networks and how they interact with drones. An idea that intrigues me is how we connect to drones, and how 5G could be leveraged to improve this. Among other ideas of which I delved further into; I hope that what I have done will help contribute to the discussion of project ideas in our upcoming meeting with Dr. Hongwei.

Cristofer Espinoza: I continued reading *Computer Networks: A Systems Approach*, one of the documents provided from Dr. Hongwei at the beginning of the semester. I also presented issues found in [Crop Production and Global Environmental Issues](#) that I thought would be potential use-cases to apply drones, automation or XR during our meeting Wednesday. The main issues I found most interesting were soil contamination from heavy metals, industrial waste or effluents as well as harmful radiation, both of which affect crop yield. After discussing with the group, I have decided to focus personal efforts on research on soil contamination. I have started research on current soil

sensors and how data is extracted from soil in preparation for our meeting Monday.

Jake Roskopf:

This past week I spent most of my time researching some of the major agricultural issues. By gaining a better understanding of the issues in agriculture, we hope that we can create a better application for rural and agricultural areas utilizing the ARA 5G network. I research a lot on how proper irrigation and soil quality are becoming major concerns due to climate change and pesticides. This could potentially be improved upon by using new sensors and image feed to create better models and maps of the crop and what needs to be done to maximize the yield. I also reached out to some family members who are in the farm business to see if there are any areas that they wish to be improved upon in the farming industry. I also continued my reading of Computer Networks: A Systems Approach to continue my understanding of networking.

Vibhu Dhavala: I spent this week researching the feasibility of some of the ideas we came up with, as well as how 5G could improve the current landscape of said idea. One area I focused on was researching currently available sensors that are used with livestock or crops. One thing I learned about was LoRaWan, which is a low energy network that is currently used by a lot of sensors. One way 5G differs is that it can transmit much more data much faster. After learning this I went back to our ideas and tried to think of applications where large amounts of data are transmitted.

Caleb Kitzelman: This past week I investigated the process of soil sampling and testing, while keeping in mind possible ways to improve the process using 5G for agricultural uses. I also spent a bit of time looking into crop harvesting and measuring crop health. Looked through process of doing said things and tried to determine ways to improve efficiency and accuracy using 5G

Andrew: This past week I researched the possibility of using 5G to help farms deal with wildlife. I specifically looked into what current issues exist, and how they are dealt with. I also looked into the costs and limitations of these current solutions. I spent the most time looking into geese, which spread diseases and contaminate water quality and how they are dealt with.

## Individual Contributions

<u>NAME</u>	<u>Individual Contributions</u>	<u>Hours this week</u>	<u>HOURS cumulative</u>
Jake	Individual research and reading.	3	13
Samuel	More research into drones + ideas	3	14
Cristofer	Continued research on computer & mobile networks, and issues within ag communities.	3	14
Caleb	Research into crop harvesting, crop health, and soil sampling/testing	3	13
Andrew	I researched the possibility of using drones to help deal with wildlife issues on farms.	4	21
Vibhu			

## Comments and Extended Discussion

### Plans For the Upcoming Week

Samuel Rettig: I plan on continuing research into what ideas I find interesting/plausible.

Cristofer Espinoza: I plan to continue reading *Computer Networks: A Systems Approach*. I also plan on continuing more in-depth research on soil contamination.

Jake Roskopf: I plan to bring the research on rural communities to discuss in our team meeting Monday. I also want to investigate what are possible ways we can communicate with the network and what would be the best way to send data back and forth.

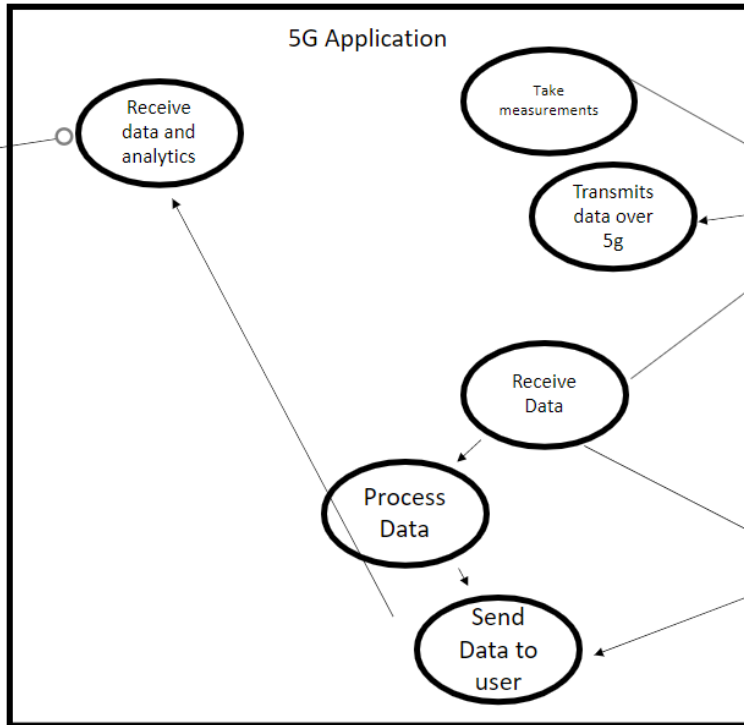
Vibhu Dhavala: I plan to further research how we can apply 5G in a useful way to our current project ideas as well as continuing to read the book given by Dr. Hongwei. After the team meeting I hope we will have a clearer focus for me to continue researching about in the upcoming week.

Caleb Kitzelman: Team meeting on Monday. Continued research of the agricultural process and techniques in hopes to 1: learn more about agriculture in general, and 2: find ways to improve already existing processes using 5G.

Andrew: Go to the team meeting on Monday. Continue my research on potential project ideas and if additional clarity comes through that meeting, I will tailor my research accordingly.



Bob the Farmer



Sensors

Server