

Project Plan

Project Management/Tracking Procedures

Project Management Style:

The agile project management style has been adopted as the team needs the ability to revise different steps along the way. With different function groups and majors, it may be best to adapt an agile project management style to insure productivity for different specializations.

With the adoption of the agile project management style, the following applications and software will be utilized:

- Discord, GitLab, Google Drive, and Clickup

Task Decomposition

Task 1: Research and excavate through several educational resources to find relevant information

We have been supplied with countless resources within the field of 5G to get a better understanding. What we need to do is: find the information that is applicable to us, and not random factoids.

Task 2: Sort which of the relevant information is specific to ARA project and its use cases

Once we have identified which information is relevant to us, we must discern which of this information is applicable to the ARA project, and how one can begin using and testing within the ARA landscape.

Task 3: Demonstrate and teach how to test 5G servers via srsRAN and powder wireless

We test servers using SRSran and Powder Wireless. Powder wireless is an end-to-end wireless research platform that can be used for mobile research. This will be included in our documentation and we will teach users how to use these resources.

Task 4: Have college undergraduates (Juniors) to use and test our resource and website

In order to make sure that these resources work well, and actually help the users be able to get a desired level of understanding, we will be testing the educational resources on Juniors and then receive feedback from them based on the performance of the website and the information presented by the documentation and educational aspect.

Task 5: Code/organize website structure

We have to make sure that the website is user friendly and easy to navigate.

To complete this task and make the website useable, we have to organize our documents and resources into specific categories so that users know what the information is for

Task 6: Add all resources to website

We must then compile all of the resources that we selected and collected, and then place them in the designated organized locations.

Project Proposed Milestones, Metrics, and Evaluation Criteria

Task

- **Milestone**
- Research and excavate through several educational resources to find relevant information
 - We have been supplied with countless resources within the field of 5G to get a better understanding. What we need to do is find the information that is applicable to us, and not random factoids.

- Sort which of the relevant information is *specific* to ARA project and its use cases
 - Once we have identified which information is relevant to us, we must discern which of this information is applicable to the ARA project, and how one can begin using and testing within the ARA landscape.
- Demonstrate and teach how to test 5G servers via srsRAN and powder wireless
 - We test servers using SRSran and Powder Wireless. Powder wireless is an end-to-end wireless research platform that can be used for mobile research. This will be included in our documentation and we will teach users how to use these resources. Successful 5G server testing will include a latency ping test.
- Get Juniors to use our resource and website
 - In order to make sure that these resources work well, and actually help the users be able to get a desired level of understanding, we will be testing the educational resources on Juniors and then receive feedback from them.
 - In terms of teaching effectiveness, quizzes monitoring the user's score will be analyzed and should be expected to be above 70%.
- Review feedback from testing
 - Once we have reviewed the feedback from the Juniors about our resources, we can determine which ones will be implemented into the website, and then begin designing it.
 - After reviewing feedback, we will hoist another test with a small sample size of users and hopefully expect an increase in quiz scores of about 5%.
- Code/organize website structure
 - We have to make sure that the website is user friendly and easy to navigate.
 - To complete this task and make the website usable, we have to organize our documents and resources into specific categories so that users know what the information is for.
- Add all resources to website
 - We must then compile all of the resources that we selected, and then place them in the designated organized locations.

Project Timeline/Schedule

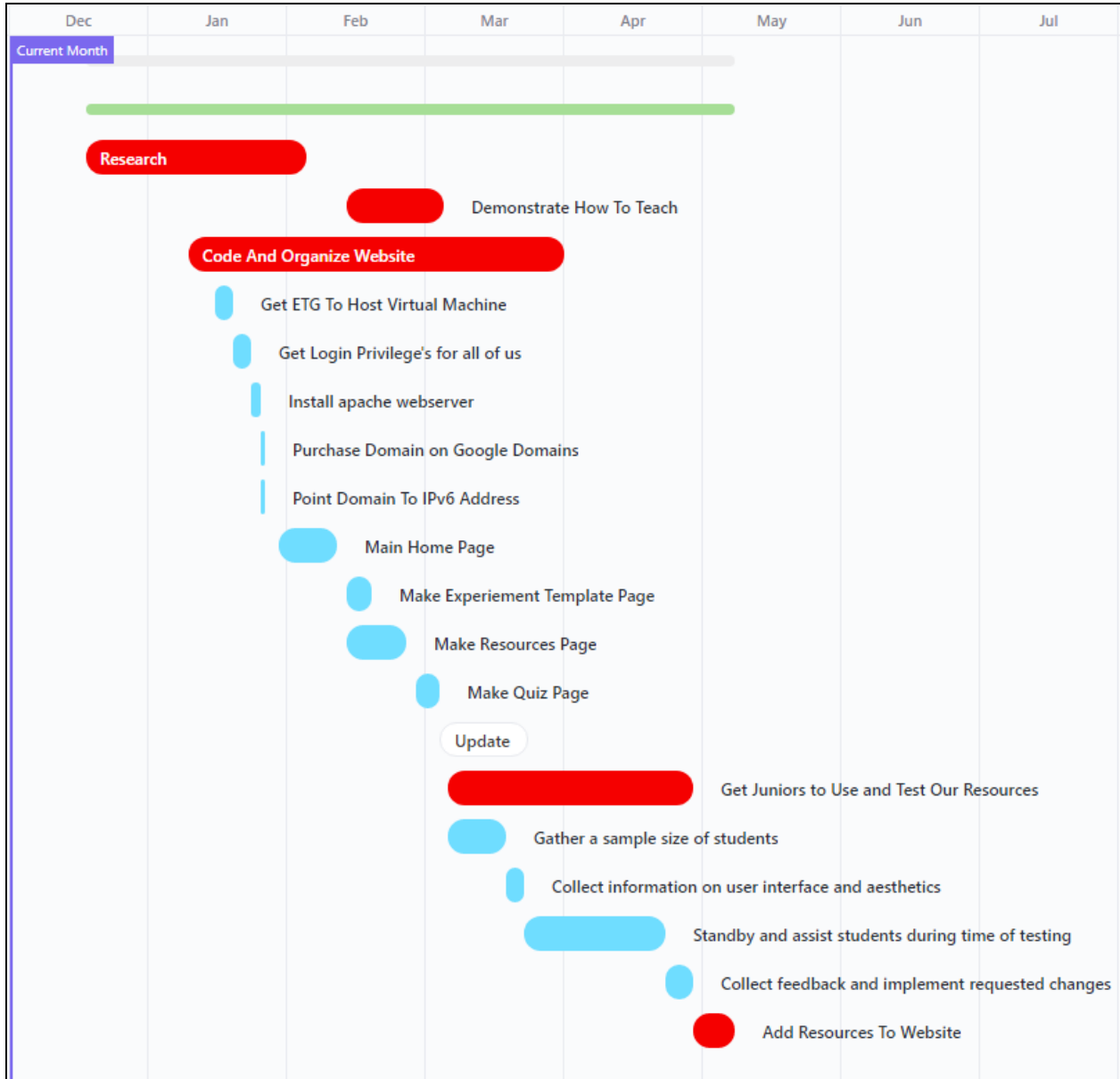


Figure 2. Gantt chart representing timeline structure for project development

Risks And Risk Management/Mitigation

Task 1: Research and excavate through several educational resources to find relevant information

- We are at risk of finding information and determining resources valuable when they are actually not
- Risk Probability 0.3

Task 2: Sort which of the relevant information is specific to ARA project and its use cases

- We are at risk of finding information and determining resources relevant to the ARA project when they are actually not
- Risk Probability 0.3

Task 3: Demonstrate and teach how to test 5G servers via srsRAN and powder wireless

We are at risk of users failing to understand how to test these 5G servers, and them not being able to set it up

- Risk Probability 0.3

Task 4: Have college undergraduates (Juniors) to use and test our resource and website

We are at risk of not having a large enough sample size to determine how our resources will affect the general public, and not just a few individuals

The time it will require for the testing process on college undergraduates may hinder results

- Risk Probability 0.6
- Risk Mitigation Plan:
 - As our project is mainly based on the effectiveness of having users being able to apply fundamental knowledge about 5G networks, there will have to be a large sample size of students to determine effectiveness of the project.
 - There will be an emphasis on gathering potential users months prior to completion of web development in order to have a large sample size of students. Incentives for completion of website learning programs may be in order.

Task 5: Code/organize website structure

We are at risk for having bad functionality for the website and not being able to access/use certain features.

- Risk Probability 0.6
- Risk Mitigation Plan:
 - We first are going to make sure our website is functional on localhost before releasing it to a public server. We can do this by utilizing our various tests such as unit tests which will help us develop our website code and functionality.

Task 6: Add all resources to website

We are at risk of not being able to add resources to sections based upon our initial organization techniques

- Risk Probability 0.2

Personnel Effort Requirements

Note: Specific details regarding task numbers can be found in the above statements. Values used within the table are based on an hour scale.

Team Members	Task 1	Task 2	Task 3	Task 4	Task 5	Task 6	Total Hours
Benjamin	2	4	3	3	3	1	16
Zach	2	4	3	3	3	1	16
Danny	2	4	3	3	3	1	16
Adam	2	4	3	3	3	1	16
Ethan	2	4	3	3	3	1	16
Total Person-Hours Estimated to Complete	10	20	15	15	15	5	80

Other Resource Requirements

Note: We have assimilated a small collection of some of the resource requirements that may be required or of use for the project use and as such, have noted these below.

Center for Wireless; Communities and Innovation:

- [WiCI](#), [Projects](#), and [Positions](#)

ARA Project:

- <https://arawireless.org>

LTE and 5G

- Larry Peterson and Oguz Sunay, [5G Mobile Networks: A Systems Approach](#), open-source book
- <https://ebookcentral.proquest.com/lib/iastate/detail.action?docID=4603091>
- <https://www.sharetechnote.com/>

Computer Networks

- <https://book.systemsapproach.org/>

Predictable, real-time wireless networking algorithms for control and AR/VR:

- UCS cellular scheduling:
<https://www.ece.iastate.edu/~hongwei/group/publications/UCS.pdf>
- LDP real-time scheduling: <https://arxiv.org/abs/2101.01768>
- PRKS: <http://www.ece.iastate.edu/~hongwei/group/publications/PRKS-TWC.pdf>
- pktRT: <http://www.ece.iastate.edu/~hongwei/group/publications/pktRT-TII.pdf>
- [pktR](#): predictable per-packet communication reliability guarantee (which is a foundation for ensuring sub-ms URLLC services in 5G and beyond)

srsRAN Application and Software:

- Website: <https://www.srslte.com/>
- srsRAN at Github: <https://github.com/srsran/srsran>
- Documentation: <https://docs.srsran.com/en/latest/>

Openair Interface Application and Software:

- Overview: <https://www.openairinterface.org/>
- Getting started: https://www.openairinterface.org/?page_id=25
- Tutorials: <https://gitlab.eurecom.fr/oai/openairinterface5g/wikis/OpenAirUsage>
- Emulation: https://www.openairinterface.org/?page_id=791
- Physical layer and MAC layer design:
https://www.openairinterface.org/docs/workshop/3_OAI_Workshop_20170427/training/oai_L1_L2_procedures.pdf
- OpenAirInterface PHY abstraction layer:
Section of interest starts at slide 66: <https://slideplayer.com/slide/10035385/>

- Installation tutorials for OAI: <https://gitlab.eurecom.fr/oai/openairinterface5g/wikis/home>
- large_scale_simulations' branch (includes PHY abstraction):
https://gitlab.eurecom.fr/oai/openairinterface5g/tree/large_scale_simulations
 - Once this branch cloned (requires git software) make sure you are in v0.5.2 and not v.0.6.
- Mailing List: <https://gitlab.eurecom.fr/oai/openairinterface5g/wikis/MailingList>

Open Networking Foundation (ONF):

- Mobile projects: <https://opennetworking.org/onf-mobile-projects/>

Open RAN:

- <https://opennetworking.org/open-ran/>