

CP34 - Individual Report

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Clear Statement of Work Done

Statement of XP roles:

XP roles were allocated to the members of the team at the very beginning of the project. I have undertaken the XP role of the Customer for this project to help improve the project's efficiency and overall chances of success. In addition to this, I also maintained the roles of Manager and Tracker as I will elaborate down below in the 'Challenges' section; as there are times whereby group members are not able to attend the virtual meetings.

In the past weeks, undertaking the role of the Customer, I have communicated with the client constantly through the platforms of email, discord, and slack, to raise problems we have faced throughout the project and kept updated with the progress of the project. The User stories help the client and the team to have a clear picture of how the project moves progress and able to satisfy the client's requirements. For this role, I have ensured everyone in the project is well informed about the progress of the project and any outstanding issues that must be addressed.

In addition, I have also acted the role of the Manager to help set up the communication platform among all the parties involved in the project. This involved making sure that we can schedule dates and times for the team to meet up with the client. Ensure each meeting will be recorded and well documented for future reporting and analysis.

Furthermore, I also acted in the role of the Tracker for the duration of the project, whereby from time to time I will check on the team member with the progress of their given tasks: to ensure that each member will be able to deliver their task on time, and if there are any problems faced on their assigned tasks, I can raise it to the client and act accordingly with what the project objectives were.

Also involved the role of a Tester, to test the installation script for the client deployment, as we have to ensure that the handover of the project is done properly, we created an installation script to help the client install all the software and dependencies required for the project.

Contribution to Technical Development:

- 1) Model creation in the Gazebo simulator:
 - a) Creating simple models to represent charging stations and waypoints for the drone to land on; in the simulation.
 - i) Repository link:
https://bitbucket.org/DylDupe/comp3888_t15a_group1/commits/3709d8eebeaabbee912f4a1aad3be1a23f11db63

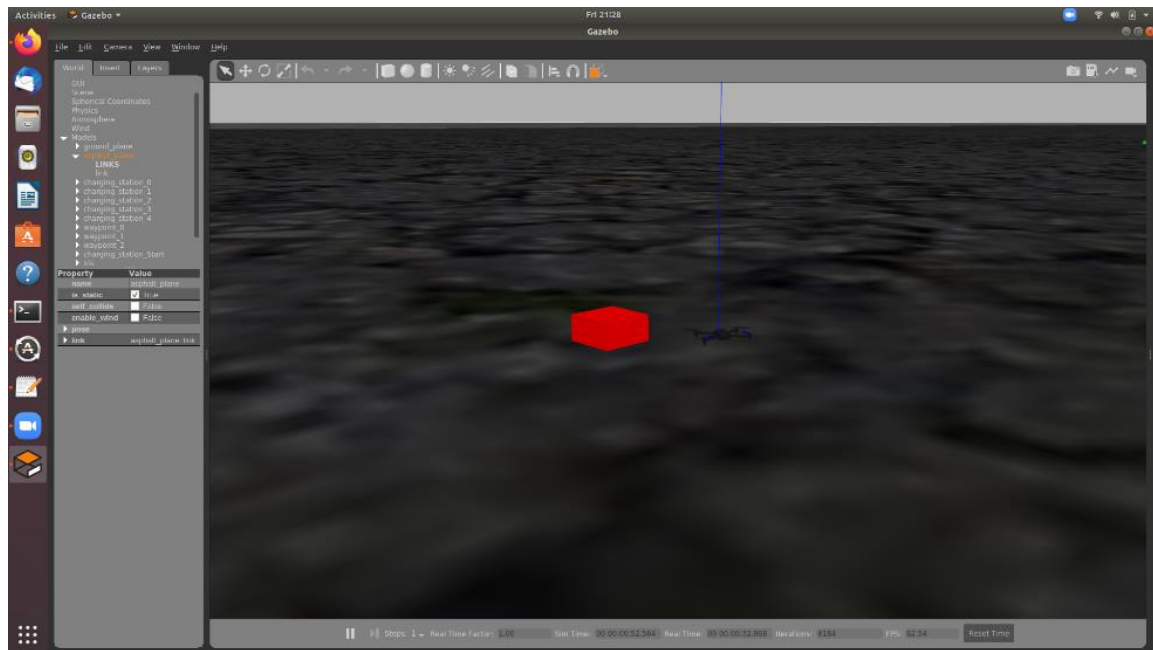


Figure 1: Screenshot of the charging model

- 2) Drone battery-related:
 - a) Find drone battery usage in vertical and horizontal distance, to get a more accurate unit in the simulation for the algorithm team to reference to.
 - i) Repository link:
[\(https://bitbucket.org/DylDupe/comp3888_t15a_group1/src/master/Battery_Simulation/\)](https://bitbucket.org/DylDupe/comp3888_t15a_group1/src/master/Battery_Simulation/)
- 3) Installation script:
 - a) Fixing errors in installation script for the client's technical deployment, using paired programming with allocated team members through online meetings, to debug the script in a new Ubuntu environment, to ensure the installation of the software and dependencies for the project can be installed in the client's computer environment.
 - i) Repository link:
[\(https://bitbucket.org/DylDupe/comp3888_t15a_group1/commits/c2aa36eb287c795ab6cbef42e6943a5479e73063\)](https://bitbucket.org/DylDupe/comp3888_t15a_group1/commits/c2aa36eb287c795ab6cbef42e6943a5479e73063)

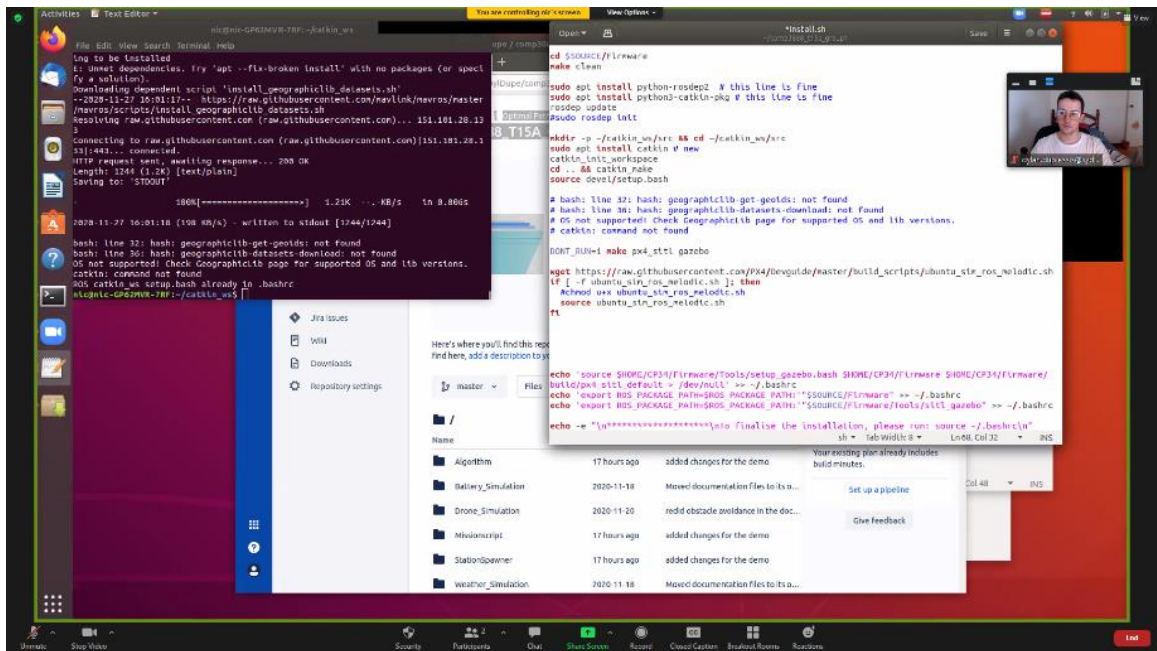


Figure 2: Screenshots of the paired programming

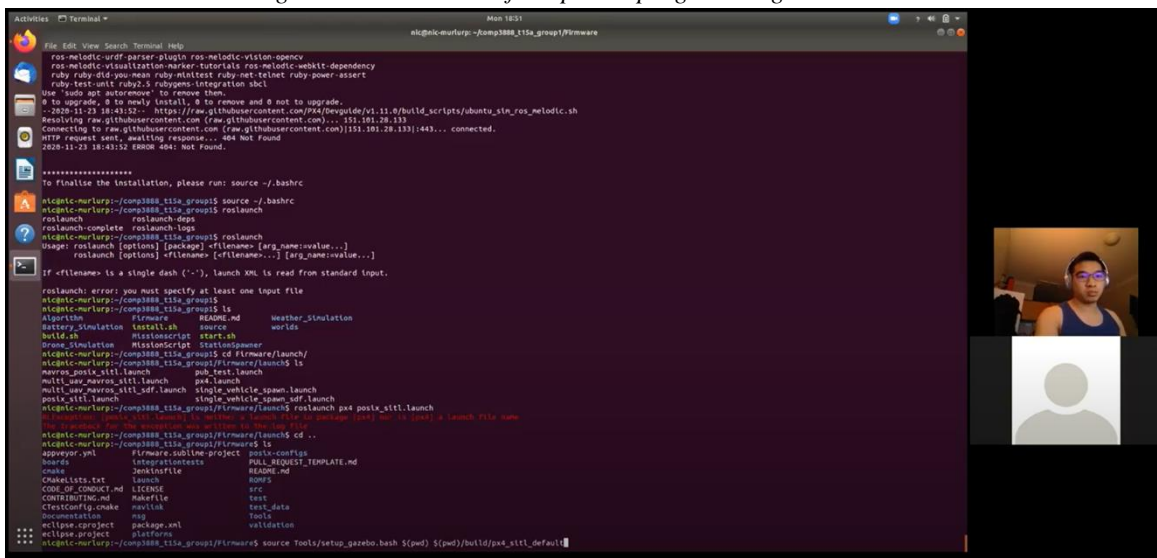


Figure 3: Screenshots of the paired programming

Weekly Plans

Week 7

Proposed Agenda:

- Prepare the presentation and a working demo at that current stage of the project to present to the client.

Events that had Occurred:

- As the XP role of Tracker, Customer, and Manager, I checked on the progress of each member's tasks. During team meetings, we ensured that the programs were able to work well together in the demo, based on the client's requirements. Made a presentation structure with a logical flow to showcase the tasks our team was able to achieve then.
- Repository link: First Client Deployment
(https://docs.google.com/presentation/d/1Dq_ZhCjCLjsC4mtmlesd24IWrwqW3VuGlKc6Roa4tA8/edit?usp=sharing)

Week 8

Proposed Agenda:

- Refine battery life calculation, to test how much battery percentage the drone will use to fly vertically and horizontally.

Events that had Occurred:

- There was a lack of documentation regarding the usage of the drone battery in the simulator, therefore I had manually tested and flew the drone to determine the battery usage within the simulator. To provide a better reference for the algorithm team to apply the battery unit and calculations in the algorithm.
- Repository link: Battery Simulation
(https://bitbucket.org/DylDupe/comp3888_t15a_group1/commits/3846878d3895874a6ce75c2b31c81e3f3c7dcacd)

Week 9

Proposed Agenda:

- Implementing the battery safeguard for the drone within the flight control software of the simulator.

Events that had Occurred:

- Unable to implement due to lack of documentation of the battery safeguard in the flight control software PX4 with simulator Gazebo. Raised the issue to the client and was able to find another alternative to present the battery life in the algorithm instead of in the simulator.

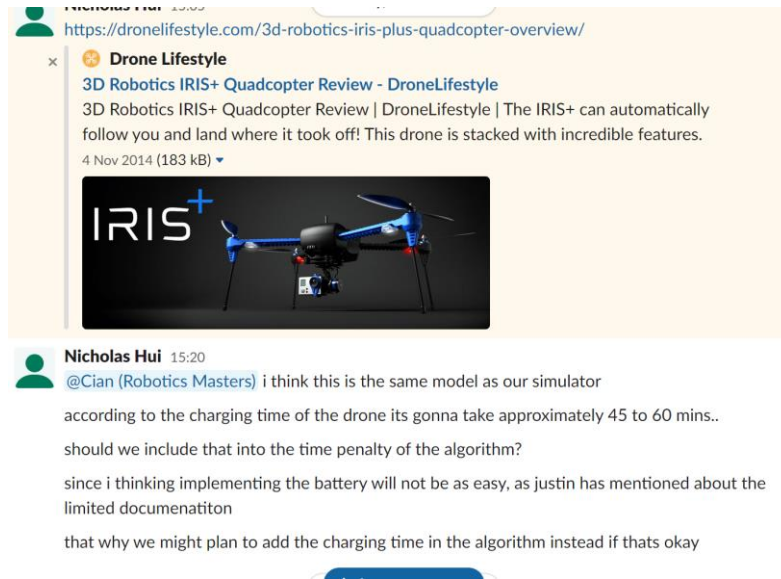


Figure 4: Screenshots of raising the issue to the client

Week 10

Proposed Agenda:

- Cleaning up the team's wiki, tidy up the wiki repository, research and implement obstacle avoidance for the drone in the simulator.

Events that had Occurred:

- Manage to add and clean up the Minutes in the Wiki. Communicated with another group that is working on a similar drone project to help implement such a feature for the project. I did not manage to implement obstacle avoidance for the drone in the simulator in my environment due to arbitrary path errors detected, therefore we followed and executed the same GitHub instructions, using another group member's computer through Zoom and managed to install the program, facilitating the ability to have a basic obstacle avoidance map loaded.
- Repository link: Minute meetings
https://bitbucket.org/DylDupe/comp3888_t15a_group1/wiki/commits/c1c3f4d1657ba4147f698c0d112ea8ec1bb2b441
https://bitbucket.org/DylDupe/comp3888_t15a_group1/wiki/commits/af5645c20ceabf9288d0aa434d0a8bd20de7897b
https://bitbucket.org/DylDupe/comp3888_t15a_group1/wiki/commits/608a35f8305e0d8e4701c031bddf993acc6f63c4

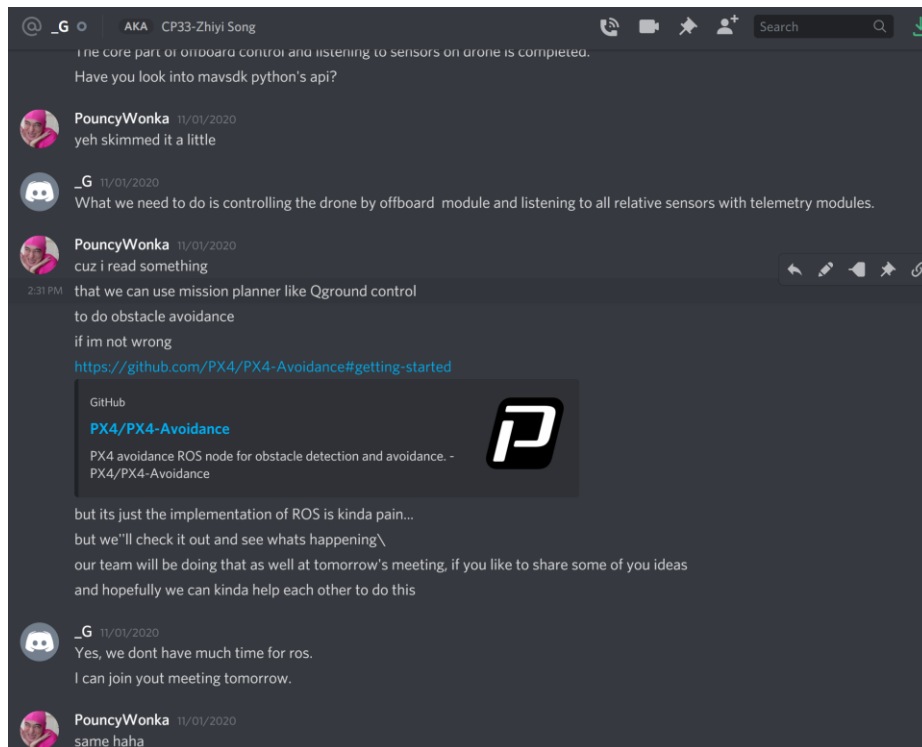


Figure 5: Screenshots of working with other groups to solved similar issues

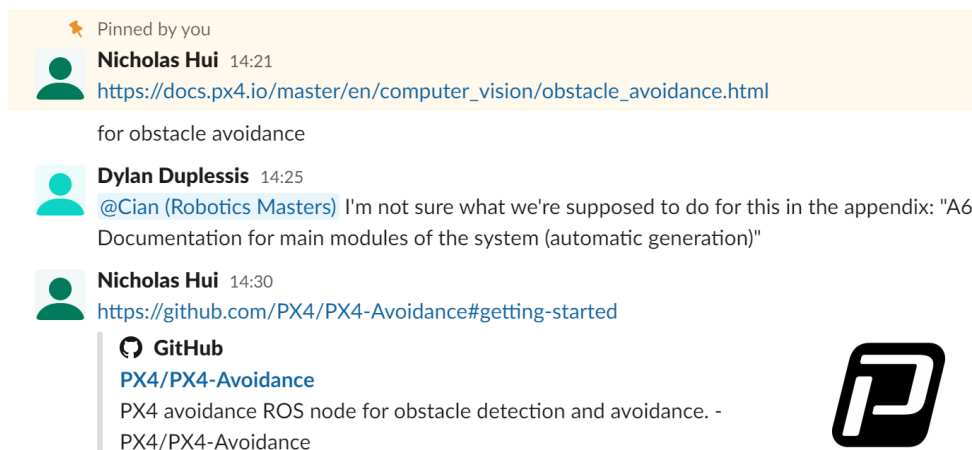


Figure 6: Screenshots of sharing related information about obstacle avoidance


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Activities Terminal Tue 00:06 mic-slurp@msl: ~/CP34/Firmware
File Edit View Search Terminal Help
The traceback for the exception was written to the log file
mic-slurp@msl:~/CP34/Firmware$ gedit
Command 'gedit' not found, did you mean:
  command 'gedit' from snap gedit (3.36.2+git3.8c9da67ab)
  command 'gedit' from deb gedit
See 'snap info <snapname>' for additional versions.
mic-slurp@msl:~/CP34/Firmware$ sudo apt install gedit
Reading package lists... Done
Building dependency tree
Reading state information... Done
gedit is already the newest version (3.28.1-1ubuntu1.2).
0 to upgrade, 0 to newly install, 0 to remove and 0 not to upgrade.
mic-slurp@msl:~/CP34/Firmware$ gedit ~/.bashrc
mic-slurp@msl:~/CP34/Firmware$ gedit ~/.bashrc
^?C
mic-slurp@msl:~/CP34/Firmware$ source ~/catkin_ws/devel/setup.bash # (optional)
bash: ~/home/mic-slurp/catkin_ws/devel/setup.bash: No such file or directory
mic-slurp@msl:~/CP34/Firmware$ source Tools/setup_gazebo.bash $(pwd) $(pwd)/build/px4_sttl_default
GAZEBO_PLUGIN_PATH : /home/mic-slurp/CP34/Firmware/build/px4_sttl_default/build_gazebo-
GAZEBO_MODEL_PATH : /home/mic-slurp/CP34/Firmware/tools/sttl_gazebo/models
LD_LIBRARY_PATH : /home/mic-slurp/CP34/Firmware/build/px4_sttl_default/build_gazebo-
mic-slurp@msl:~/CP34/Firmware$ export ROS_PACKAGE_PATH=$ROS_PACKAGE_PATH:$(pwd)
mic-slurp@msl:~/CP34/Firmware$ export ROS_PACKAGE_PATH=$(pwd)/Tools/sttl_gazebo
mic-slurp@msl:~/CP34/Firmware$ roslaunch px4 posix sttl.launch
... logging to /home/mic-slurp/.ros/log/7b5e9ffa-2d8c-11eb-8031-b0359f3adadi/roslaunch-msl-18279.log
Checking log directory for disk usage. This may take awhile.
Press Ctrl-C to interrupt
Done checking log file disk usage. Usage is <1GB.

Resource not found: gazebo_ros
ROS path [0]=/home/mic-slurp/CP34/Firmware
ROS path [1]=/home/mic-slurp/CP34/Firmware/Tools/sttl_gazebo
ROS path [2]=usr/share
The traceback for the exception was written to the log file
mic-slurp@msl:~/CP34/Firmware$ gedit ~/.bashrc
^?mic-slurp@msl:~/CP34/Firmware$ source ~/.bashrc
mic-slurp@msl:~/CP34/Firmware$ roslaunch px4 posix sttl.launch
... logging to /home/mic-slurp/.ros/log/a0720fd2-2d8c-11eb-8031-b0359f3adadi/roslaunch-msl-18318.log
Checking log directory for disk usage. This may take awhile.
Press Ctrl-C to interrupt
Done checking log file disk usage. Usage is <1GB.

Resource not found: gazebo_ros
ROS path [0]=/home/mic-slurp/CP34/Firmware
ROS path [1]=/home/mic-slurp/CP34/Firmware/Tools/sttl_gazebo
ROS path [2]=/home/mic-slurp/CP34/Firmware
ROS path [3]=/home/mic-slurp/CP34/Firmware/Tools/sttl_gazebo
ROS path [4]=usr/share
The traceback for the exception was written to the log file
mic-slurp@msl:~/CP34/Firmware$

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Figure 7: Screenshots of the path error when using roslaunch for obstacle avoidance

Week 11

Proposed Agenda:

- Preparation for the final presentation and checking on team members' progress of their tasks.

Events that had Occurred:

- Discuss the flow and structure of the presentation with the tutor, restructured the slides of the presentation to follow the guideline of the course. Checked on teammates' progress and mention parts we are not able to implement to the client before the deadline of the project, in this case, is the obstacle avoidance in the simulator.

Week 12

Proposed Agenda:

- Preparation for the final demo and presentation for the client and the tutors, and drawing of test case diagrams.

Events that had Occurred:

- Created slides for the final presentation with an approved structure and logical flow as the client required. Drew up diagrams for the test cases to help illustrate the movement of the drone according to the output of the pathfinding algorithm.
- Slide link: Final Group Presentation

(https://docs.google.com/presentation/d/1jhspC_VTzPFimZ6vA7ocGJytdCgQTIBLA bUWvoptvaw/edit?usp=sharing)

- Repository Link: Test cases diagrams
(https://bitbucket.org/DylDupe/comp3888_t15a_group1/src/master/Algorithm/test/expected_diagrams/)
(https://bitbucket.org/DylDupe/comp3888_t15a_group1/src/master/Algorithm/test/input_diagrams/)

Week 13

Proposed Agenda:

- Preparation for the final client deployment, presentation, and demo.

Events that had Occurred:

- Testing of the installation script for the technical client deployment with specifically Dylan and Justin team members, to fix the errors in it as mentioned in the Technical development section at the beginning. We can use the installation script in the client deployment. Finalised the client's presentation and the demo.
- Slide link: Final Client Deployment
Client: (https://docs.google.com/presentation/d/1Vjo40plf3y_EHcLhrXXdZ3Pc-D3rPPEqN4zePXJzkag/edit?usp=sharing)

Extent of that work

With the XP role of Customer and step in as the XP role of Manager from time to time. I became the point of contact between the client and the team. We have used the following platforms to communicate. And the User Stories based on the scope and requirements of the client. And all the Minute meeting reports with the client, tutor, and the team.

- Email History:
(https://bitbucket.org/DylDupe/comp3888_t15a_group1/wiki/Email%20History/Emails)
 - Slack channel:
(<https://app.slack.com/client/T019DALSMN2/C019YM4M5C1/details/pins>)
 - Discord channel:
(<https://discord.gg/We9YkExxar>)
 - Wiki link: User Stories
(https://bitbucket.org/DylDupe/comp3888_t15a_group1/wiki/User%20Stories)
 - Wiki link: Minute meetings
(https://bitbucket.org/DylDupe/comp3888_t15a_group1/wiki/Minutes/Minutes)
- Commits:

(https://bitbucket.org/DylDupe/comp3888_t15a_group1/wiki/history/Minutes/Minutes)

Quality of Technical Work Done

To ensure code and work quality in technical development, I was involved in the implementation of obstacle avoidance for the drone in the simulator and also the testing and error fixing of the installation script. This is where I also faced some challenges and complex problems as we have used paired programming in the two technical developments aforementioned.

Dylan, Justin, and I did a line by line code review to help pinpoint the error occurred in the installation script, in which it appeared to be a path error as we were installing the required software and dependencies. Performing a line by line code review helped us to understand more of the dependencies order for the project in its entirety. This allowed greater comprehension to design and create a better installation script for the client. Having an error-free, and working installation script is essential, as this allows the client to install all the required software and dependencies to many computers with ease such that the dependencies and setup will be unified.

As the project lent itself well to Agile principles, discipline knowledge from Software development was extremely useful. Adopting agile practices, such as constant Minute meetings, user stories, acceptance criteria, and scrum events, helped the team to remain organised and improved communication with the client. Requirements and results can be reviewed by the client continuously and the team can respond to the changes quickly according to the client's requirement about certain criteria of the project we are developing.

Other contribution to group processes

All group activities, contributions in group roles

- Participated in client, group, and team meetings
 - As mentioned in Extent of work with Wiki link and commits provided.
- Participated in group and client presentations
 - Link: Final Client Presentation
(<https://youtu.be/4YHGiK-3st8>)
- Drawing of the test cases diagrams
 - As mentioned in Week 12 with the Wiki link provided.
- Research related to the project, simulator, flight control software
 - Link: Research sites
(https://bitbucket.org/DylDupe/comp3888_t15a_group1/wiki/Research)
 - Pin sites on Slack channel

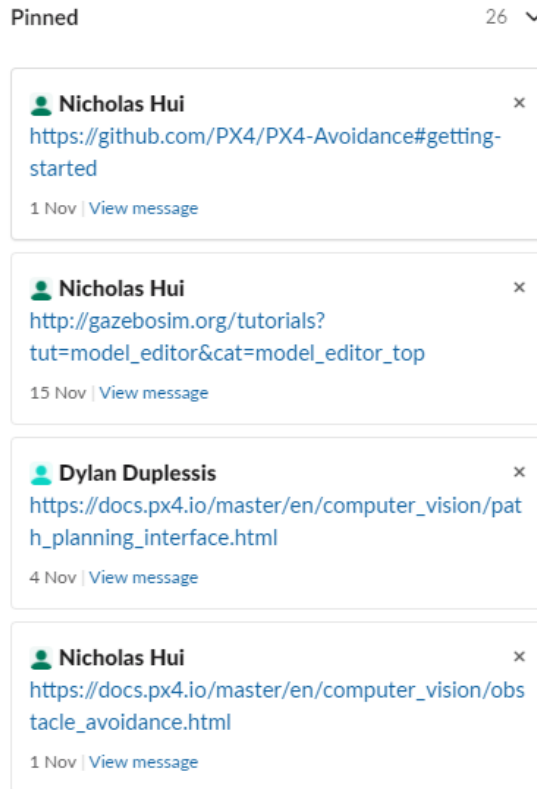


Figure 10: Screenshot of pinned sites on Slack channel

- The installation script and the implementation of obstacle avoidance
 - As mentioned in Contribution to Technical Development with links and screenshots provided.

Reflection

Reflections on version control, XP roles, and the challenges met in the project, and how these were tackled.

Version Control

For version control, at a point, we tried to upload an image of ubuntu into Git to help with the client deployment. After the upload of the image, the repository ran out of space, the team was not able to push any new updates to the Git repository. We had to reach out to Atlassian Support to help resolve this issue.

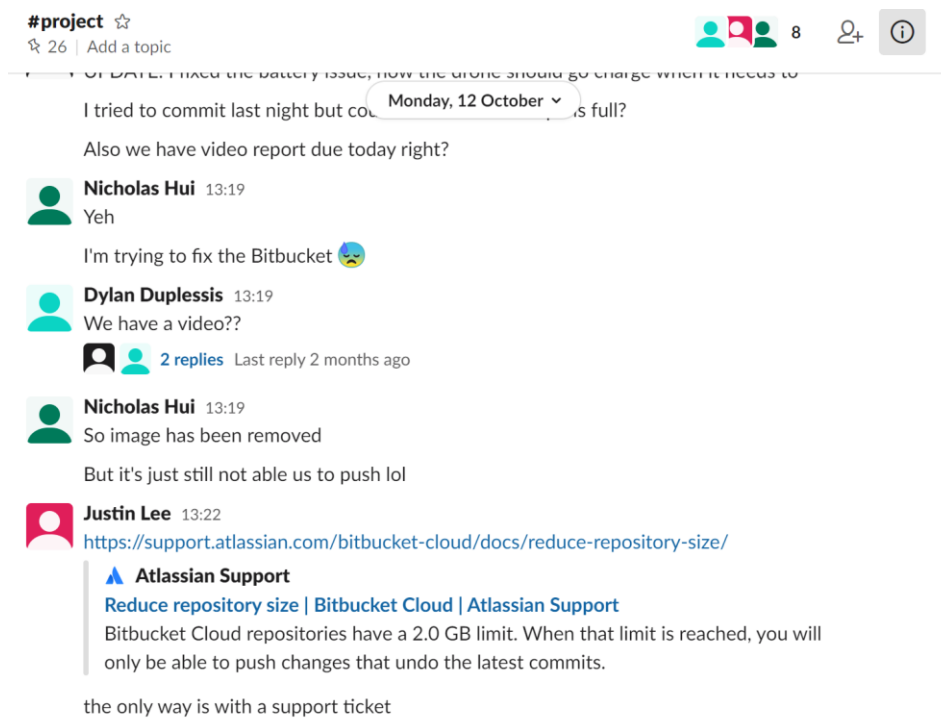


Figure 9: Screenshot of the bitbucket repository issue

XP roles

As the Customer, I was not able to fully understand some of the client's requirements, which lead to a change of design of the algorithm, causing a delay in some of the tasks that were planned for the following week.

As a Manager, although I was not able to have weekly meetings with the team to check on the progress collectively; I instead communicated with the members individually as this was seemingly more manageable and elicited better communication amongst each member. As then this pertained to less attention diverted towards finding suitable times of agreeable meeting times but instead devoted more attention towards updating other members and thus, to help accommodate the project as a whole.

Communication

Slack was the initial platform used to communicate, however, as the project progressed, some members were not as active on this particular software. Moreover, some members tended to still use Facebook messenger as a means of communication. This resulted in some issues that lead to some minor miscommunications and some potential version control issues. It is preferable to remain with one platform, and given the requirements of this project; a suitable alternative would be the platform Discord. As hosting meetings and displaying the on-going chatroom in one application becomes increasingly more manageable, as such, the client is more active on this platform as well.

Lack of Documentations and Knowledge Gaps

A lot of the implementation in the flight control software PX4 and the Gazebo simulator involves ROS. Many of the dependency packages have issues and are not able to integrate without fixing path issues manually. With the lack of documentation online, it is very

difficult for us to debug and find assistance to fix the error. As it is the first time using most of these software, as such, most of the team members had never done any research or application work related to this project. Hence, we have to spend a severely adequate amount of time debugging and familiarising ourselves with this software in addition to assuring that it will also work on the client's hardware.

General Feedback

The Final Project was delivered as expected, and that the team has worked well together to maintain organization and complete the project.

- We progressed very well, not being able to complete all the criteria within the scope and the added qualifications given by the client to our team. Although, we were able to negotiate reasonable terms with the client regarding deadlines and the requirements of the milestone.
- Everyone managed to perform their respective roles, and facilitate each task given; resulting in an appropriate foundation of the project upon handover to the client. This is indicative of the scripts for installations, the running of the codes for spawning, and the navigations with working pathfinding algorithms that were produced.
- Within the team, we should perhaps communicate better and understand more in terms of the project scope, and communicate this with the client to reduce any misunderstanding and facilitate efficiency and effectiveness. Moreover, it is preferable to also communicate with other groups working on similar projects as this can assist in issues incurred and similar resolutions of these issues.