



WESTERN ENGINEERING SATELLITE TEAM

Monthly Report

February 2021



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SUMMARY

The month of February has brought great challenges and even greater successes to the Western Engineering Satellite Team (WEST). The team has only grown in size and increased member development despite the pandemic. With an effective strength of over 50 members, WEST continues to demonstrate excellence and provides an outstanding platform for undergraduate students interested in aerospace.

This month, the design teams have been working diligently towards their goals of completing early prototypes by the end of the semester. This includes 3D printed models, CAD completion, and PCB designs. The operations side of the team has continued to provide support both financially and administratively while promoting the project to the greater community. With the financial support from the school, team members, and industry partners, WEST has been able to order branded merchandise so members can feel a part of the team. There is also a strong emphasis on development and education both within the team and in the community. With concrete plans to host an event for high school students, the team is excited to promote the aerospace industry to a younger audience.

A recurring theme has been mentioned in these reports: the members of WEST will stop at nothing to achieve our goals. A global pandemic, the stress of school, the difficulties of the project at hand - none of it deters the motivation behind these inspired students. The remainder of this report outlines the achievements of such like-minded students over the course of February 2021.

“Ability is what you’re capable of doing. Motivation determines what you do. Attitude determines how well you do it.”

- Lou Holtz



OPERATIONS

External

With the help of contacts at the London Amateur Radio Club, WEST will begin preparing members who wish to obtain their amateur radio operating certification for the examination. This will consist mainly of self-study paired with weekly group review sessions to ensure that all members are progressing through the study package without difficulty. Additionally, we are continuing to take steps to progress in the application process of registering our satellite and obtaining a frequency allocation.

Internal

As the Covid-19 pandemic continues, many students are less enthusiastic about staying online for extra-curricular activities. This was seen in declining unique users through Slack's analytics. The Internal team made an effort to personally communicate with each member active on slack to: 1) increase engagement and 2) get personalized feedback for areas of improvement. There were many members interested in generalized work periods that are less formal in nature. Since they are perceived as social events, it helps combat disengagement brought on by the pandemic.

The internal team is going to move forward with improving communication and generating opportunities for feedback, to improve the experience for members while increasing productivity.

Marketing

This month the marketing team has been quite stable in branding as well as assisting in the logistics of this year's team merchandise packages. In addition, LinkedIn's analytics indicated 31 new visitors this month and our Social Media indicated that our profile has reached 378 new accounts. Also, a total of 3272 times our posts/stories have been seen this month on instagram alone. Our future goal is to continue staying active on these platforms with quality updates which can then be used to improve retention rates.

The website was completed this month however there is still plenty of room for improvement and growth. The promotional video has been in the process of editing this month and hoping to be released in March on all our social media platforms.



Finance

Progress within the Finance subteam this month remained steady and consistent with multiple companies and organizations having been reached out to within the industries of aerospace, robotics, technology, and engineering. Establishing contacts and yielding support (both financial and educational) within these fields is vital to the continual functioning and success of WEST.

The Finance team has also been coordinating with the Marketing subteam to help order and finance the merchandise packages that have been designed by the latter team. Due to previously acquired financial contributions from various sources, many of these merchandise items are being offered for no additional charge to current members.



DESIGN

Attitude Determination and Control System (ADCS)

In February, the ADCS team made some collective progress on our simulation as well as some actuator calculations. The Attitude Determination Team improved the modelling of sensors and actuators within the simulation and is aiming to complete this over the next month. The Attitude Control Team researched disturbance torques and created a spreadsheet to calculate the magnitude of each unique disturbance torque. This spreadsheet can be continuously updated as new information is found. A maximum disturbance torque will be used in the process of estimating the power consumption of magnetorquers. Overall, February provided opportunities for ADCS members to learn from an external contact and take part in productive team discussions.

Communications

This month Communications has continued to focus on our goal of designing the transceiver printed circuit board. We're in the process of developing learning resources for transceiver ICs so that new members can get a running start in helping with the PCB design. As well we continue. We have decided that we will be using a half duplex system with a dipole antenna, which will help us narrow down our design.

Structures

This month in structures we designed the third iteration of the satellite chassis. Notably, this iteration has an updated rail system using L-channels and updated walls to accommodate the rails and PCBs. We are putting together a budget to allocate space for all sub-teams within the chassis and to determine remaining space available for a secondary payload. We have just started printing our antenna mechanism for testing. The main chassis along with our antenna assembly prototype should be 3D printed by the end of the semester.

Electrical Power System (EPS)

This month the Electrical Power System's team has been hard at work selecting components and starting our simulations. It was found that our best option for simulations would be to simulate all of the necessary components in the system and switch out different architectures. The simulations are being done in MATLAB and Simulink. The EPS team has also been working with the analysis team to figure out exactly how much power could be



produced in one orbit using body mounted solar panels. If it is found that not enough power can be generated in one orbit using body mounted solar panels, deployable panels will then be tested.

Command and Data Handling (CD&H)

This month Command and Data Handling made some progress on cFS. We have a version running on a Raspberry Pi board and our next goal is to add features to this program, such as reading from various sensors. We have made a lot of progress in developing a framework for the secondary controller. Soon we will have a development package tutorial so that all the sub-teams can easily integrate the secondary controller framework into their projects.

Analysis

This month Analysis has worked closely with EPS to begin estimating the power generated by the CubeSat's body-mounted solar panels. A simulation of the CubeSat in orbit is in progress and will assess the solar power output for various attitude scenarios. The data generated by our model will be used by EPS to determine the solar panel configuration. In the upcoming weeks, Analysis plans to evaluate the orbital lifetime and investigate guidelines for mitigating space debris. We will also be analyzing aspects of the satellite's ground station.



MARCH PROJECTIONS

March is an exciting month for WEST as midterms should be mostly complete and students will have some free time before finals season. The merchandise that has been ordered will be delivered to students and the radio certification curriculum will be underway. As well, testing on the antenna deployment system and component selection for most sub-teams will be completed.

While London, Ontario is progressing down in severity on the Covid framework, Western is restricting teams access to campus until there is a safe method to do so. Although this restricts WEST ability to conduct activities in person, most of our development is research and simulation based so we remain largely unaffected. We don't anticipate access to campus will be granted until after March - most likely not until the summer or later.

March will be heavily focused on tangible updates. Each sub-team has an end goal to produce a physical design and the bulk of the work will need to be done before students begin to focus on finals. This means the throughput of work on WEST is only increasing and we are eager to share our results with the world!