



# WESTERN ENGINEERING SATELLITE TEAM

Monthly Report

January 2021



<b>SUMMARY</b>	<b>3</b>
<b>OPERATIONS</b>	<b>4</b>
External	4
Internal	4
Marketing	4
Finance	5
<b>DESIGN</b>	<b>6</b>
Attitude Determination and Control System (ADCS)	6
Communications	6
Structures	6
Electrical Power System (EPS)	7
Command and Data Handling (C&DH)	7
Analysis	7
<b>FEBRUARY PROJECTIONS</b>	<b>8</b>



## SUMMARY

With a fresh year starting up, WEST has shifted its overall structure and goals towards producing tangible results by the end of the academic year. This pivot puts a focus on establishing base-level designs for the team to further iterate upon in the future. An emphasis is being placed on *getting it done* rather than *doing it perfectly the first time*. The goal is to have a finished design – whether it be a Printed Circuit Board (PCB), Computer-Aided Design (CAD), or proof-of-concept software – for each design team, by the end of the semester.

This will allow students to showcase tangible designs over the summer months and thoroughly evaluate the decisions that were made to determine if a better path can be taken. The motive is to *fail often and fail fast* in order to accelerate the learning process. While proactive research and tedious design can produce a satisfactory product, the act of failing is much more efficient in producing a learning experience for the team. Members sometimes joke by saying that the satellite will not be successful until we've made one million mistakes. While this is hyperbolic, it really showcases WEST's embracement of the engineering design process.

Some other key notes that will be touched on in this report include plans for purchasing team merchandise, acquisition of radio licences, and significant member retention milestones.

*“Failure is simply the opportunity to begin again, this time more intelligently.”*

- Henry Ford



## OPERATIONS

### External

In accordance with WEST's commitment to the community, the team organized a virtual speaker panel focusing on undergraduate experiences in STEM programs. Members discussed their experiences with highschool students to aid them in making decisions regarding post-secondary education. Although this panel consisted mainly of Western students, it also comprised students from Queens and Waterloo which diversified the information provided to attendees. Looking forward, the team hopes to further their commitment to secondary students by presenting to high school science classes this month. These presentations will focus on how WEST applies concepts from their course curriculums to nanosatellite design. In terms of licensing, WEST is currently taking steps to progress in the lengthy application process of obtaining a frequency allocation. In the near future, this will include organizing meetings to put together an informal advisory team.

### Internal

The internal team has launched a communication improvement initiative to improve member retention as well as combat the lack of in-person communication from the Covid-19 pandemic. Using Slack's analytics, the internal team has been able to collect data prior to the initiative to monitor improvement or trends. The internal team has since reached out to every single member individually on Slack – over 100 students – to monitor club involvement, and receive feedback for overall club improvement. By improving overall communication within the virtual slack channel, we are hoping to notice accelerated progress among varying design and operations teams.

### Marketing

This month the marketing team has been focused on developing team branding as well as assisting in the logistics of this year's team merchandise packages. In addition, LinkedIn's analytics indicated a 155% increase in unique visitors as well as 22 new followers this month and our Social Media indicating a 8.9% increase in followers this month. Our future goal is to track these trends which can then be used to improve retention rates.

The website is in the process of going through organization and design changes to adapt to our new logo which will also include our promotional video that has been completed. The



promotional video will be added to our social media outlets such as Instagram and Facebook, as well as sent to potential sponsors.

### Finance

The Finance team continued to see great success this month with a maintained focus on securing sponsorships from various companies and organizations. In the month of January, we received a financial contribution to the team's project from JMP Solutions and communicated with, and resultantly garnered promising interest from, multiple other companies in the robotics, automation, and electronics industries.

At this point in time, the Finance team has met WEST's predefined goals in terms of sponsorship and are prepared to continue reaching out to companies and organizations which could be potential sponsors. Moving forward, we will be making increased efforts to broadcast to companies that we are not solely interested in receiving monetary sponsorships. It will be iterated that we are also striving to connect with sponsors who may be able to provide the design teams with technical advice, prototype reviews, and product donations. We have our sights set high and are looking forward to utilizing the communication abilities and charisma of new members at WEST to continue funding the project!



## DESIGN

### Attitude Determination and Control System (ADCS)

January has brought some new members to the ADCS team! We are excited to have grown to a team of 8 and this has allowed us to split off into two groups: Attitude Determination and Attitude Control. With a divide and conquer mentality, the ADCS team is working on completing two tangible deliverables including a system schematic and a CAD model of our magnetorquers by the end of the semester.

The Attitude Determination Team is researching determination methods to inform the sensor selection process. The Attitude Control Team is developing a suitable actuator configuration and beginning to research about the process of designing and building magnetorquers. The ADCS team comes together to integrate their work with one another through weekly meetings and is collaborating with the Analysis subsystem for simulations and modelling.

### Communications

Communications has been lucky to welcome a wealth of new members to the subteam. The team is continuing with our goal of verifying our link budget with MATLAB simulations. Members are focusing on transceiver research so that we can start designing our transceiver board. The hope is to have a finished schematic by April.

### Structures

This month in Structures, the team redesigned the main chassis of the satellite, and continued to improve on the design to accommodate the spatial needs of all teams. The plan is to 3D print the new chassis to serve as a prototype by the end of the semester. The team also continued to work on the design of the sub-chassis – which is the antenna assembly and mechanism. After researching and reviewing different designs, the decision was made to pursue a measuring tape antenna mechanism. By the end of the semester, there should be a functioning prototype of the sub-chassis.



## Electrical Power System (EPS)

This month in the Electrical Power Systems Team we welcomed many new members to the team. After giving the new members a chance to get comfortable with electrical power systems, each member was assigned a role in the team. We are continuing our component selection process, focusing more on creating simulations and increasing the accuracy of our power budget. The EPS team is also looking into options for fault mitigation systems. We hope to complete our component selection by mid-March.

## Command and Data Handling (C&DH)

In January many new members joined the Command and Data Handling team. A lot of time is being put into ensuring that they have the resources needed in order to learn how to contribute to WEST's projects. The team is now focusing a lot of our efforts into PCB design. Many members are researching possible components for our onboard computer. As well, progress is being made on developing a running demo of Core Flight Systems.

## Analysis

The Analysis Team is currently focusing on collecting research documents to support the calculations required for the CubeSat. We are also working with the Electrical Power Systems Team to determine the amount of solar radiation that the CubeSat will experience. Within the next month, Analysis intends to create a simulation of the CubeSat in orbit to further support the requirements of other subsystems.



## FEBRUARY PROJECTIONS

February will be an interesting month for WEST as many tasks and goals may become actionable depending on the forecast for COVID restrictions and our ability to make purchases as a team. We hope to have team merchandise ordered in an attempt to upkeep member retention. The end of the month or into the beginning of March would be an ideal time to complete radio certifications but that is highly dependent on availability during midterm season. We would like to keep member engagement high during this period but we are realistic of the fact that academics takes precedence.

While the pandemic has not made life easier for anyone, we believe the team as a whole has persisted and showcased a high level of tenacity towards the project. While progress may be hindered, it is by no means halted, and we will continue pursuing greatness in our attempt to launch a satellite into space.