



# WESTERN ENGINEERING SATELLITE TEAM

Monthly Report

November/December 2020

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## SUMMARY

The Western Engineering Satellite Team (WEST) has quickly adapted to the changing circumstances of our present situation to continue providing an exceptional learning environment for students interested in aerospace. WEST underwent a name change and a rebranding to continue looking fresh as always!

The design teams have been hard at work researching the fundamentals required to design and construct a satellite in Low Earth Orbit (LEO). Weekly meetings have provided an opportunity for students to present their work in a collaborative environment.

The operations teams have been discovering new ways to support the team and reach out to the community in a purely virtual manner. This includes seeking partnerships with industry partners, revamping team branding, and planning community outreach.

While the short-term future of the team is still tightly coupled to the present worldwide situation, the long-term future of WEST is firm in place: send a satellite to space. The team is still incredibly excited to embark on this journey to build an extremely complicated and technologically difficult vehicle.

The following document outlines the second and third month of The Western Engineering Satellite Team.

*“When something is important enough, you do it even if the odds aren’t in your favour”*

- Elon Musk

# OPERATIONS

## External

This month we reached out to the London Amateur Radio Club (LARC) and became acquainted with Michael Cook (President) and Doug Elliott (Education Coordinator) who will be working with WEST to obtain amateur radio licenses for select members. To help the members prepare for the examination, a study package was put together and distributed.

## Internal

The administrative side of WEST was still in full swing as Western students were eager to find out what this new design team was all about. Many new members were on-boarded and introduced to various subsystem teams. Further, the administrative team worked to find space on campus for the club and began planning for design reviews.

## Marketing

This month in marketing many goals that were set out in September were realized. We were able to gain over 300 followers on Instagram, and we were also able to publish our website after the finance team acquired enough funding. The marketing team has also been working on updating our logos and merchandise after our name change to WEST. New edits to the website such as a news post were set up to encourage our community to keep up with what we are working on. The marketing team has also partnered with the finance team to create promotional videos for our social media outlets such as Instagram and Facebook as well as potential sponsors.

## Finance

The finance Team has continued its work on sponsorship throughout the last two months. The sponsorship package has been updated to include a new sponsorship tier and we have been reaching out to engineering companies to foster new connections. Payments have been made through the club account to purchase a domain name ([westernengineeringsatelliteteam.com](http://westernengineeringsatelliteteam.com)) and a one year subscription to Weebly for the WEST website. The first order for design components from Digikey was paid for and received.

In addition, WEST completed an application for a grant from IEEE and received \$1500 USD to support our project.

## DESIGN

### Attitude Determination and Control System (ADCS)

The ADCS team selected sensors and actuators in December to move our design forward. We plan to use coarse sun sensors, a GPS, a gyroscope, earth horizon sensors and a magnetometer for attitude determination. Magnetorquers will be used to stabilize the CubeSat during detumbling and a combination of magnetorquers and reaction wheels will be used during other phases.

An ADCS power budget was created using COTS components for reference to determine power requirements during various phases of orbit. The team is compiling a detailed list of available components for each sensor and actuator. After this list is completed, we will conduct a component selection to identify feasible components to purchase as we move forward in the design process.

### Communications

The communications team has been hard at work compiling relevant research. We have been finding new mathematical models to help us develop our simulations, mainly about path loss and atmospheric attenuation. We have also started learning about software defined radios. We were able to program our SDR to pick up local amateur radio signals. Next steps would be for us to finish our simulations and start verifying them.

### Structures

The structures team began work on early CAD models of the cubesat chassis, designing a 3U structure for the basis of the satellite. We also began work on a design for the antenna deployment system with a focus on extreme reliability. The goal is to first 3D print these designs to allow for thorough testing and easy iteration before finally manufacturing the models into actual flight hardware.

### Electrical Power System (EPS)

This month in EPS, we have been working on figuring out exactly what information we needed to choose components. This included updating our power budget to include more up to date and accurate information. Using this information, components were selected based on the amount of estimated power needed throughout the mission. Other systems were

chosen for power management and distribution based on the power budget. We have also created a team for error mitigation which will lead the coding behind our electrical power systems.

## Command and Data Handling (CD&H)

We started developing control area network drivers in order to have all the subsystems able to effectively communicate with each other. The final goal is to have all subteam PCBs running the same drivers to maximize compatibility. After creating the power budget for the onboard computer, we decided that it offers many advantages to select components that have a 3.3V supply voltage. We ordered multiple Nucleo STM32 development boards so we can start testing the code that we're developing.

## JANUARY PROJECTIONS

While WEST is still in its infancy, bold plans are beginning to take shape as we work towards our first prototype. While 2020 was mainly focused on shaping the team and recruiting members, 2021 is the year where WEST will embark on manufacturing its first round of flight hardware. The goal is to “fail fast and fail often” in order to rapidly iterate new designs. While many may see failure as an area to avoid, WEST embraces unsuccessful attempts as they present new areas to learn and provide a framework towards an eventual successful design.

COVID will make many of our short-term plans very difficult to accomplish but that has not deterred any of the team members as we always place an emphasis on tenacity and persistence.

The future for WEST both in January and for the rest of 2021 look very bright and promising. We look forward to expanding our knowledge into the local community and welcome the opportunity to work with our new industry partners. Our ever-growing collection of dedicated and passionate students will stop at nothing to achieve the goal of launching a satellite into space.