BADGERLOOP

New Member Guide

Competition IV

Last Updated: January 2019

Welcome to Badgerloop!

My name is Mark Swartz and I am the President of Badgerloop. On behalf of the team, welcome! The work we do is challenging but very rewarding.

There are two things I want to emphasize as you begin to learn more about who we are and what we do. First, *anyone who has the desire to help the team can join*, regardless of prior knowledge or experience. We pride ourselves on being an organization that can offer tasks for anyone. Most of our members are engineering majors, but we also have members with majors ranging from Economics to Management to Biology.

The second thing I want to emphasize is that *the more you put into Badgerloop, the more you will get out.* What we work on can be time consuming, but the more time you spend, the more you will learn and the more you will enjoy the experience. When I joined Badgerloop as a third-year student, I intended to be a casual member who would help out here and there. It wasn't until I committed further that I started to learn more, develop new friendships, and really enjoy the new experience.

This packet was designed to get you up-to-date on us as an organization, but it might leave you with questions. If this is the case, feel free to ask me, our outreach and recruiting team lead Cade Geldreich (geldreich@wisc.edu), or anyone else on the team. We have our own tasks inside of Badgerloop, but outside, we're all just UW students who are more than happy to talk about things— whether they are related to Badgerloop or not.

Break a pod!

Mark Swartz
President
mwswartz@wisc.edu

Directory

General Info/Team History

Badgerloop was formed in 2015 with the goal of competing in SpaceX's first-ever Hyperloop Pod Competition. The competition was established based off of the hyperloop concept first detailed in the [Hyperloop Alpha white paper](). In this competition, teams from all around the world design and build fully function hyperloop pods and then travel to the SpaceX headquarters in Hawthorne, CA to compete against one another.

In previous competitions, our team found quite a bit of success. First of all, we are one of nine teams worldwide to be invited to all three competitions. Additionally, our pod designs won innovation awards at Competitions I and II. For Competition III, we set our sights on making it into the vacuum tube (only six teams have ever done this) therefore prioritizing a functional pod over a revolutionary design. Despite unexpected challenges during testing week, we were one of only four teams selected to present our design to the other teams, media, and other attendees and proved ourselves as one of the best hyperloop teams in the United States.

As this spring semester kicks off, we are looking to put the finishing touches on our Pod 4 design and to start building. We hope the lessons we have learned from the previous competitions will give us a leg up on the other teams. At the time of writing this, the specific details of Competition 4 are yet to be released, but we expect it to take place early in the summer of 2019.

Benefits of Joining Badgerloop

Time is a precious resource for college students. Here's a few reasons why our members choose to spend some of theirs with us.

1. ***Getting hands-on, real-world experience in college.*** The point of many college classes is to prepare you for post-grad work. Badgerloop offers its members the chance to work on post-grad systems as a college student. While we start to build Pod 4 this spring, the private company *Hyperloop Transportation Technologies* will begin their work building their own commercial version, set to transport passengers in 2020.

2. ***Becoming part of an internationally-competitive team.*** Badgerloop is 1 of 9 teams from around the world to have been invited to compete at Competitions I, II & III, and we have been a top-10 team in every single competition. Additionally, we have found this success as a primarily undergraduate team (many of the opposing teams are primarily graduate students).

3. ***Setting yourself up for future success.*** Our members have gone on to work for companies such as Apple, Boeing, The Boring Company, Microsoft, SpaceX, Tesla and more. Simply put, employers value the experiences that Badgerloop is able to provide. We also won the Dean's Award of Excellence in 2017 given to the best UW-Madison student organization.

Sub-Team Overview

Badgerloop is comprised of a number of smaller groups that all work together to design, create, market, fund, and test our pod. We recommend that new members start out as a "member" of just one or two of these sub-teams. Below is a list of all the leadership positions on Badgerloop. Contact info for all of these directors/team leads can be found on Slack.

Executive Board

President: oversees the team and handles all external communication	*Mark Swartz*
Electrical Director: oversees & directs the Electrical Teams	*Ethan Link*
Mechanical Director: oversees & directs the Mechanical Teams	*Mitch Wall*
Operations Director: oversees & directs the Operations Teams	*Emma Krueger*

Mechanical

Analysis: providing feedback on components via FEA & CFD, creating run profile.	*Bryan Tanck*
Braking: create the pod's braking system	*Chris Rushmore*
Fabrication: assist electrical and mechanical teams with fabrication tasks	*Matt Horan*
Propulsion: create the mechanical portions of the propulsion system	*Nathan Berg*
Stability: create the pod's suspension system	*James Ewald*
Structural: building composite structures.	*Helena Van Hemmen*

Electrical

Battery: creating a high voltage system to power pod's electric drive	*Shelby Riggleman*
Controls: building the pod's embedded system by writing microcontroller code	*Ezra Boley*
Low Voltage: working with sensors, data acquisition & pod actuation/harnessing	*Kevin Guenthner*
High Voltage: designing & fabricating an electric motor drive system	*Wyatt Dvorak*
Software: creating the pod's dashboard for external pod communication	*Eric Udlis*
Testing and Safety: manage pod testing and safety concerns	*Brandon Hahn*

Operations

Communications: working to manage social media & market our brand	*Kevin Chukel*
Feasibility: analyzing the practicality of hyperloop technology as a whole	*Utkarsh Maheshwari*
Finance & Supply Chain: managing our funds & materials purchases	*Vito Gerlach*
Industry Relations: obtaining monetary & materials donations needed to build pod	*Jack Swanson*
Outreach & Recruiting: educating the public about us & recruiting new members	*Cade Geldreich*
Virtual Reality: making VR/AR tools & experience	*Nick Stoffel*
Website: maintaining & developing **www.badgerloop.com**	*Liam Mahoney*

Communication

Most conversation between Badgerloop members happens through the team communication platform Slack. If you do not have access to Slack yet, follow these steps.

1. Go to https://slack.com/ and click "Sign In"
2. Type "badgerloop" in the team domain box and create a new account

3. Follow the directions as given by the confirmation email and you're ready to go!

Communication is divided into several different channels for different topics. Each sub-team has its own channel and there are also #random, #opsteam, and #tech channels for general purpose discussion. Feel free to join as many channels as you would like! Keeping up to date with other teams is always a good idea.

Slack's DM feature is also highly useful for reaching out to one specific member. If you'd prefer to email or text/call them, their Slack profile will have that information as well.

Last but not least, after you've made your account, join the #introductions channel and post a brief introduction about yourself! We want to get to know you as a person, and this will help streamline that process.

Documentation

Slack

It is possible to upload files to Slack but please avoid doing so if possible. Small files such as pictures or snippets of code are alright, but CAD files or videos will rapidly deplete our allowed storage space. When the team's collective storage is surpassed, files will be deleted so be wary of losing important files. Files uploaded into Slack DMs are also at risk of being lost.

Box

Badgerloop's primary file storage system is Box. To use Box, you will need to sign in with your @wisc.edu email. Once you are in, please follow the filing system as best as possible. There is also a search bar to quickly find what you're looking for.
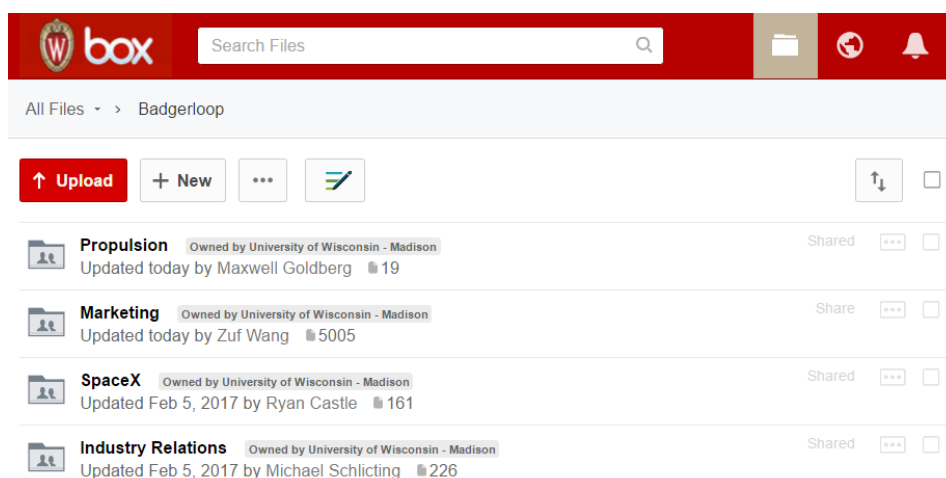
What Box should look like with full editing permission

CAE *Drive*

Badgerloop has a group drive accessible through CAE computers. This folder is primarily for CAD files and FEA results. Because the folder is shared between all members, be careful with file naming and updating model versions.

Resources

As a member of Badgerloop, you have access to tons of resources to help you learn and create!

Workspaces

Badgerloop has two primary workspaces. They are often referred to as **MEHQ** and **OpsHQ**. Machining is primarily done using the COE Student Shop in the basement of ECB. The student shop requires a green permit to use and we highly recommend obtaining one if you would like to do any machining for the team. OpsHQ is not used for machining or design, but rather as a meeting space, typically for Ops members.

As the names suggest, MEHQ is our mechanical headquarters where the pod is assembled. It is located in **Engineering Research Building room 133**. This space requires a signed contract to use so be sure to accompany a team lead upon first working here. No fabrication work is allowed without at least one other person present and all other contract guidelines must be followed.

OpsHQ is in the **Student Activity Center (SAC) room 4430**. The room is locked, and you will need Wiscard access to gain entry. If you are interested in getting access, contact Emma Krueger (ekrueger6@wisc.edu). Even after you have Wiscard access, there will be a few steps that you will need to take each time you wish to unlock the office. For more information on this, please contact Emma Krueger, Jack Swanson or Vito Gerlach.

Software

No matter what team you are on, you'll likely be using software to help you work. Luckily, most of these programs are easily accessible on COE computers. If you prefer to work from your own computer, CAE offers

remote VPN access for some programs. Check out the following links if you want to set up remote access.

https://remote.engr.wisc.edu/vpn/index.html

https://kb.wisc.edu/cae/page.php?id=32730

If you are not an engineering student, library computers also have a variety of non-engineering programs such as the adobe creative suite. Some software is open source or free to students such as Autodesk Maya.

Don't let software limit you! If you need access to something, Badgerloop will find a way!

Learning how to use new software can be time consuming so use what you already know when you can. In other cases, ask team members and team leads to get you caught up. They will gladly get you started and provide more resources such as our NX or Altium tutorials. https://www.lynda.com/ is another great resource (free with your wisc.edu login) with interactive video tutorials on a large variety of software used by Badgerloop.

Expectations

As a member of Badgerloop, you are expected to act and perform to a certain standard. While we are still in school, we hold ourselves to a level of professionalism that would be acceptable at any standard business. We work to promote ourselves, the school, and the advancement of technology.

Members are encouraged to put in as much work as you are able, but our organization is much more involved than others and requires worktime outside of meetings. Keep in mind that school takes priority and all members should organize a schedule that you can maintain alongside Badgerloop. Make sure to fit in time to relax and stay active and keep a reasonable balance between all of your responsibilities.

Badgerloop Vocabulary

The purpose of this is to get you familiar with some of the terms/acronyms commonly used at meetings, on Slack, etc.

MEHQ: Our headquarters in between the Mechanical Engineering building and Engineering Research Building, room 133

SAC HQ: Our headquarters in the Student Activity Center, room #4430

E Hall: Engineering Hall

ME: Mechanical Engineering Building

ERB: Engineering Research Building

Slack: our online messaging platform www.badgerloop.slack.com

Box: online storage provided by the University

PDB: Preliminary Design Briefing that we submit to SpaceX early in the competition

FDP: Final Design Packet that we submitted to SpaceX after completing PDB

Hawthorne: the city SpaceX HQ is located in California

CAE: computer aided engineering, could be the building or log-in or shared drive

Commonly misspelled words: Badgerloop (no space or capital L), hyperloop (lower case H, unless you are specifically referencing the SpaceX Hyperloop Competition), pod (lower case)