Career Readiness Project

The Galactic Girls Tour Luminar and Learn More About STEM!

By Emily, Ella, Ava, and Alexis (AKA The Galactic Girls)

70207A, Tavares, Florida

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WHAT IS LUMINAR?

LUMINAR

Luminar, a company that develops LiDAR and machine perception technologies primarily for self-driving cars, was founded by laser expert Jason Eichenholz and a 17 year old student he was mentoring, Austin Russell.

They wanted to make a LiDAR that could see further than any other LiDAR on the market to make vehicles safer and create an uncrashable car.

GALACTIC ANNOUNCEMENT!

When touring the facility, they let us know that there were some 'Luminar secrets' that they didn't want to be public. They were very kind to let us take pictures of some parts of the company, but they asked that these pictures don't get shared on social media. We apologize if there are some things that we cannot talk about or show pictures of. We were very thankful that we got the amazing experience of touring Luminar, and we want to follow their rules and be respectful. Thank you for understanding.

WHY WE CHOSE LUMINAR

We chose to research and visit Luminar, a company that builds autonomous software and sensors for cars, for the opportunity to learn how their company and VEX have a similar design process.

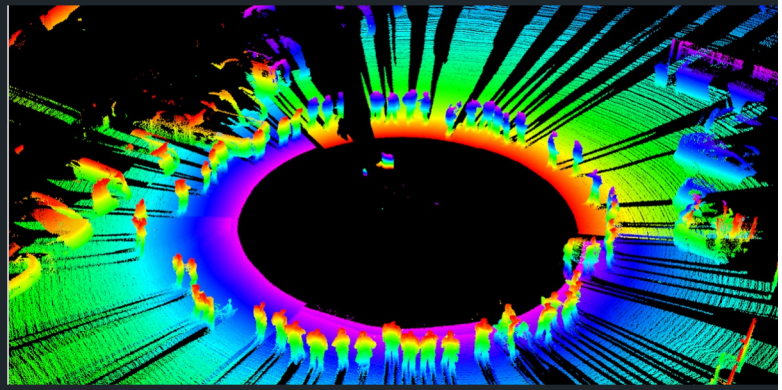
We thought it would be a great opportunity to learn about self-driving cars, 3D printing, CAD, and more, and seemed similar enough to VEX Robotics to be comparable.

Luminar has many types of engineering processes that were interesting to each of us. For example, Ella was interested in Test Engineering, Emily was interested in the 3D printing, Alexis was interested in the autonomous code, and Ava was interested in the Lasers and how the people at Luminar work as a team.

Here we are, in front of a self-driving car at Luminar which was interesting for all of us. What we learned improves our robotic's teamwork and could possibly help prepare us for future careers.

What is LiDAR?

LiDAR is a ‘car echolocation system’ that uses lasers to see in a 3D perspective. LiDAR allows the car to sense where things are and stop in time to not run into the object. LiDAR officially stands for Light Detection and Ranging.



The prefix in LiDAR,

***LI** means*

light.

The suffix in LiDAR,

***AR** represents RADAR.*

INSPIRATION

Jason Eichenholz, one of Luminar's founders and laser expert with many patents, took time to talk to us about what he learned as a founder of a new company who was trying to solve hard new problems and meet new challenges (like we do every year in VEX).

Jason Eichenholz's advice for us:

"Don't give up, keep trying new things and reworking your design until you get what you want."

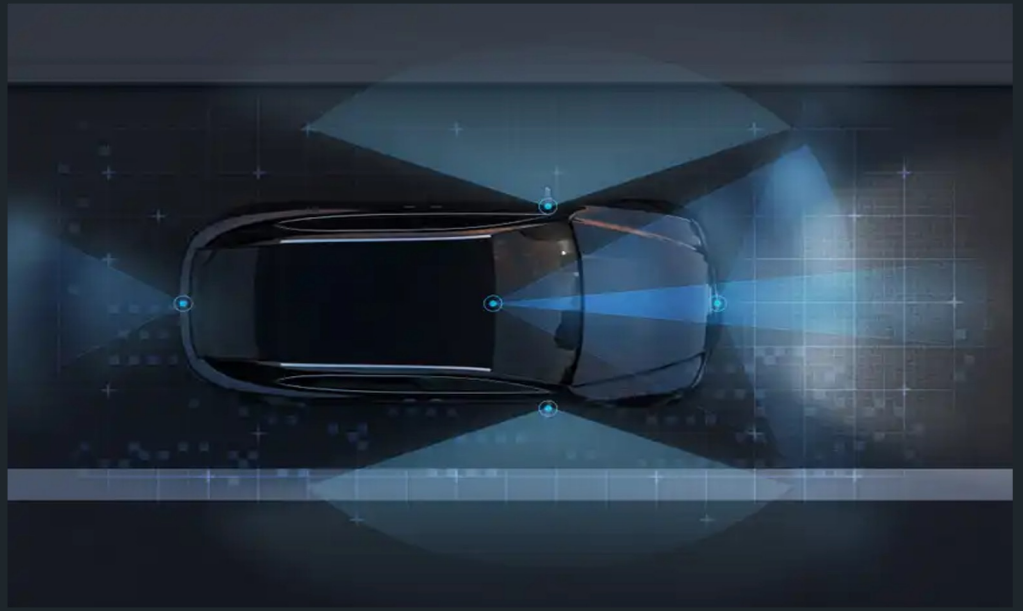
"Don't be afraid to fail."

AUTONOMOUSE DRIVNG

Luminar's founders decided that they wanted to use their LiDAR to help make driving safer by using their LiDAR to give "echolocation" to self driving cars.

They now also make self driving software that uses their LiDAR.

They sell to big automakers across the world, including Volvo, Mercedes, and Polestar.



LUMINAR'S ENGINEERING PROCESS

Since Luminar has many different types of engineers working for them, we were able to talk various types of engineers to compare their process to ours.

We will compare different parts of our process to the processes used by:

- Vehicle Build Engineers
- CNC Machinists
- Manufacturing Engineers
- Software Engineers

ENGINEERING PROCESS STEPS

Define the Problem 

Research 

Prototype 

Build 

Test 

Improve 

Share Results 

DEFINE THE PROBLEM

Luminar

Luminar defined the problem by thinking about why accidents happen and how they could make LiDAR better to prevent them. They thought if they could make a LiDAR that could recognize small objects farther away, they could prevent accidents by giving the car plenty of time to stop or avoid it.

Galactic Girls

The Galactic Girls are given a challenge at the beginning of the year and have to find a way to use the VEX parts (motors, etc.) within a certain size to solve the challenge.

As you can see, Luminar and VEX both approach the problem in a similar way.

RESEARCH

Luminar

Luminar does research constantly on new technologies to make their LiDAR see further, be more accurate, and easily recognize objects/people. They hire many experts with a PhD in different areas to help them research various related things.

Luminar has a marketing team that looks at what their competitors are doing, to see what they can use from that to make their LiDAR better.

Galactic Girls

The Galactic Girls research different machines and mechanisms and how they can be used on their robot to solve that year's challenge.

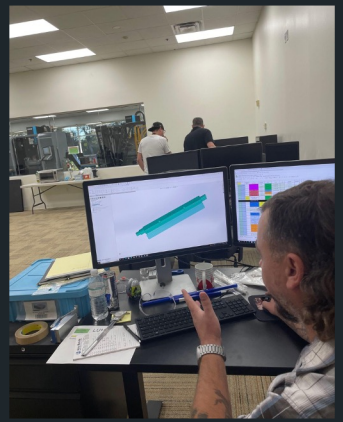
In VEX, during competitions, the Galactic Girls scout out how other teams are solving problems with the year's challenge to get inspiration for things we can do on our robot.

As you can see, Luminar and Vex both approach the research in a similar way.

PROTOTYPE

Luminar

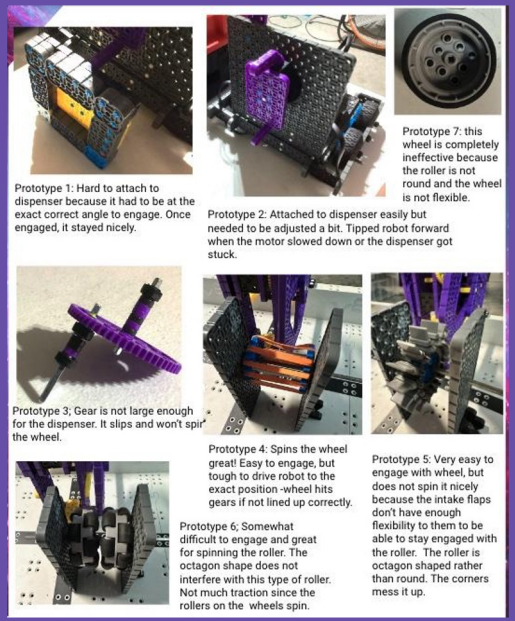
Luminar has a CNC Machine (like a giant 3D Printer) that they use to build parts to test new ideas.



While Luminar and Galactic Girls both make many prototypes, Luminar 3D prints their prototypes, and the Galactic Girls make their prototypes out of VEX parts.

Galactic Girls

The Galactic Girls build mechanisms to test different ideas that they think might work well for certain parts of the challenge.



BUILD

Luminar

Luminar assembles and tests new ideas on vehicles to see how they perform.

Sometimes they even use simulation to test new ideas that are hard to test.

Building is very similar; however, it is most likely easier for The Galactic Girls to build than Luminar.

Galactic Girls

The Galactic Girls put their prototypes together on a robot to see how well it performs.

VEX has a simulation program, VEXCode VR, that can be used to test new robot designs virtually.

TEST

Luminar

Luminar has a team of Test Engineers that test new designs to make sure they are safe and reliable and do what they need to do.

"You never know if something is going to work until you build it" -Daniel

Galactic Girls

The Galactic Girls have a field with the challenge and are able to test new designs to see how well they can complete the challenge.

We test many times in a row to see how consistent our design is and to make sure it is stable.

Testing is very similar, but Luminar has a team of Test Engineers while the Galactic Girls must test their product themselves.

"There is always room for improvement."

Both Daniel and VEX teams use this every day!

-Rich Gunnel

IMPROVE

Luminar

Luminar uses their research to keep building new prototypes of new ideas and to see if it will be an improvement to the last design.

As you can see, Luminar and Vex both approach improvement in a similar way.

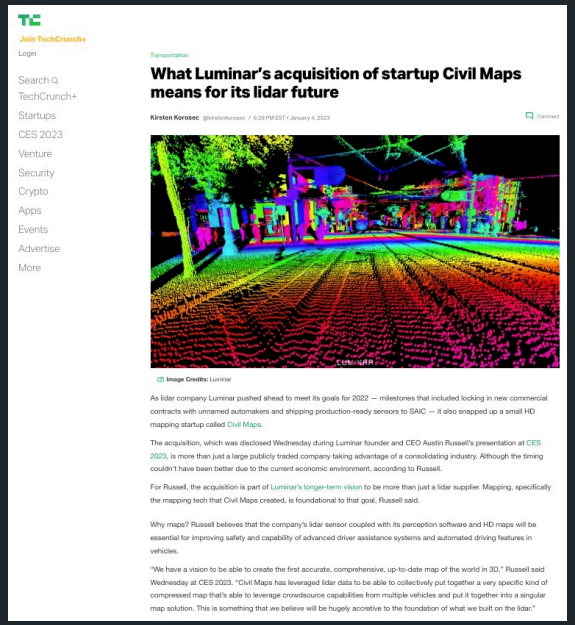
Galactic Girls

The Galactic Girls are constantly looking at new ways to improve their robot to get even more points from doing a new part of the challenge.

COMMUNICATE

Luminar

Luminar uses driving demos and advertising to show the world their new ideas and products.



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What Luminar's acquisition of startup Civil Maps means for its lidar future

Kirsten Korosec @kirstenkorosec / 6:28 PM EST • January 4, 2023

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Image Credits: Luminar

As lidar company Luminar pushed ahead to meet its goals for 2022 — milestones that included locking in new commercial contracts with unnamed automakers and shipping production-ready sensors to SAIC — it also snapped up a small HD mapping startup called Civil Maps.

The acquisition, which was disclosed Wednesday during Luminar founder and CEO Austin Russell's presentation at CES 2023, is more than just a large publicly traded company taking advantage of a consolidating industry. Although the timing couldn't have been better due to the current economic environment, according to Russell.

For Russell, the acquisition is part of Luminar's longer-term vision to be more than just a lidar supplier. Mapping, specifically the mapping tech that Civil Maps created, is foundational to that goal, Russell said.

Why maps? Russell believes that the company's lidar sensor coupled with its perception software and HD maps will be essential for improving safety and capability of advanced driver assistance systems and automated driving features in vehicles.

"We have a vision to be able to create the first accurate, comprehensive, up-to-date map of the world in 3D," Russell said Wednesday at CES 2023. "Civil Maps has leveraged lidar data to be able to collectively put together a very specific kind of compressed map that's able to leverage crowdsource capabilities from multiple vehicles and put it together into a singular map solution. This is something that we believe will be hugely accretive to the foundation of what we built on the lidar."

https://techcrunch.com/2023/01/04/what-luminars-acquisition-of-startup-civil-maps-means-for-its-lidar-future/

Galactic Girls

The Galactic Girls talk with many teams at the competitions to get new ideas. We also reach out to new and struggling teams to help them get better prepared for a competition.

While we both communicate with people in the STEM field, we don't have the same audience as they do.

How VEX Has Prepared Us for the Future

For this project we were given the opportunity to tour Luminar in person and talk to:

- one of the founders of the company
- different types of engineers from across the company

We got to compare their engineering process to ours. It was very interesting to learn that, even within the same company, different types of engineers perform the same engineering cycle, even though they may do it in slightly different ways. Much like Luminar, the Galactic Girls are also different types of engineers, and we perform the same engineering cycle.

As you can see through this presentation, VEX and Luminar have very similar design processes which means that ***we are prepared for the future****.*

CREDITS

LUMINAR

THANK YOU

A huge thank you to Jason, Matt and Daniel, and all the engineers and technicians who took time out of their workday to talk with us and share with us how your team works through the design process.

A special thank you to Natalie for arranging this tour for us and taking time to help us learn more about Luminar and how your company communicates and some of your ‘secrets of success’.