The Future of Delivery

334S - Milk Tea and Boba Fett
Los Angeles, CA

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Who is Zipline?

Zipline (founded: 2014 by Keller Rinaudo-Clifton) is the first effective airborne logistics company. Their mission is to serve everyone in the world equally. They started delivering blood and medicine to hospitals in Africa where the road infrastructure was inadequate. They now serve eight countries across four continents and have made 900,000 home deliveries. They have a long distance solution (Platform 1) for hospitals and one for precise home delivery (Platform 2).

We were amazed watching a Mark Rober video on Zipline and found other podcasts/interviews. Since we would be near Zipline after competing in the Berkeley OneWorld Showcase Event, we emailed Keller asking for a tour and ended up visiting to learn about the different platforms, their specific mechanical attributes, and Keller's personal story.


Meeting with Keller

Our team learning more about the drones

The Engineering Design Process

The engineering design process is used to find solutions and reach goals. Shown below is the process that we use in VEX: Defining the Problem, Research, Planning, Building, Programming, Testing, and Improving. After our tour, we realized that the Engineering Design Process is not only limited to technical aspects but is also used to produce a great business. Keller followed **the same process** to evolve Zipline.
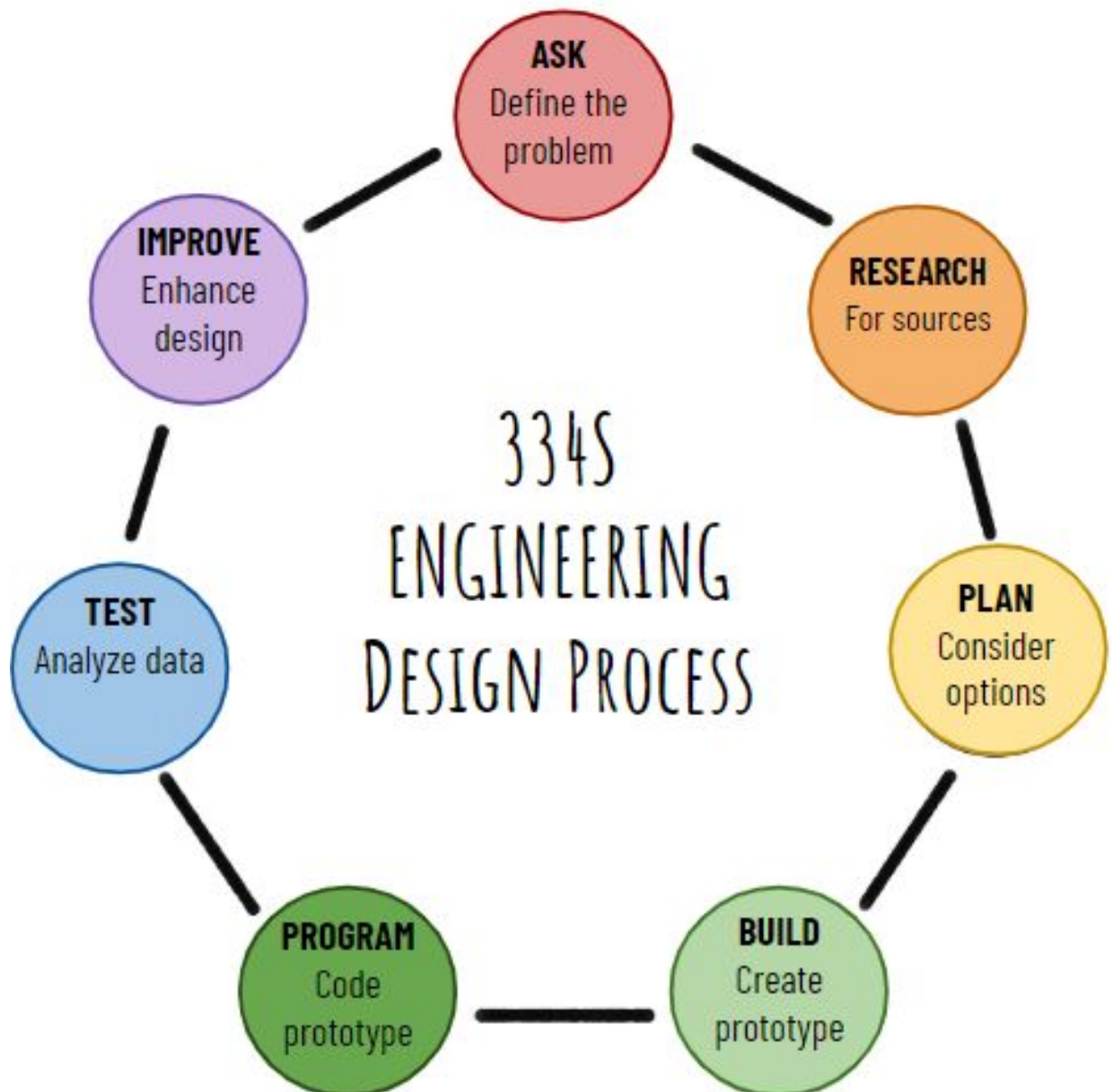
Step 1: Defining the Problem

Before Zipline, Keller was the founder and CEO of Romotive, which sold iPhone robot toys . Although the business was successful, it didn't affect people in a deep way and didn't accomplish Keller's goal of **changing the world**. He realized they needed to change their entire mission.

Keller's *First Company Romotive*

334S *early robot. We discovered our catapult was too slow*
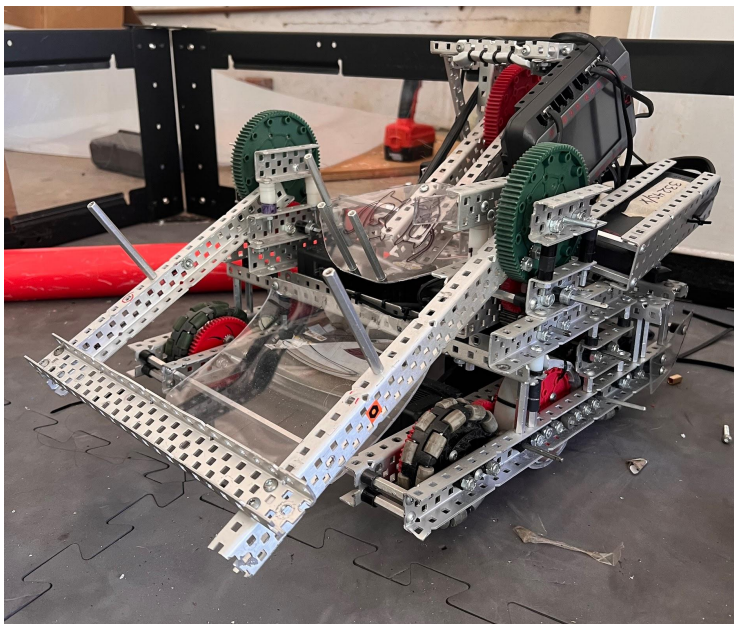
We identify our problems by testing and attending scrimmages. For example, after one scrimmage, we realized that our catapult design was too slow to accomplish our goals.

Step 2: Research

Keller visited Kiva, which had robots to move items inside warehouses. Keller thought this idea could be modified to deliver goods with drones. This would be both world changing and impactful. They then found a government official in Tanzania who had a real time database of medical emergencies, but didn't have anything to complete the second half of the task of transporting the medical tools to hospitals. Keller realized they could solve this second half.

Kiva's *Automated way of Transporting Goods*

We research different solutions to problems on our robot. For example, to brainstorm different intake ideas, we looked at other teams' robots like how Keller went to Kiva and Tanzania. This gave us ideas for our robot.

*Page from **334S** Engineering Notebook Researching Different Intake Subsystems*

Step 3: Planning

To plan logistics, Zipline went to many governments to seek permission to try their idea but were rejected by many people (trial and error) and were literally told it was stupid (required perseverance to continue). Finally Rwanda approved and let them test.

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When we plan our ideas, we first determine the logistics of our approach just like Zipline had to find a government before they could start. We use a chart (KanBan board) where we write everything that needs to be accomplished, what's in progress, and what's already finished. This lets us have a concrete plan and improves communication.
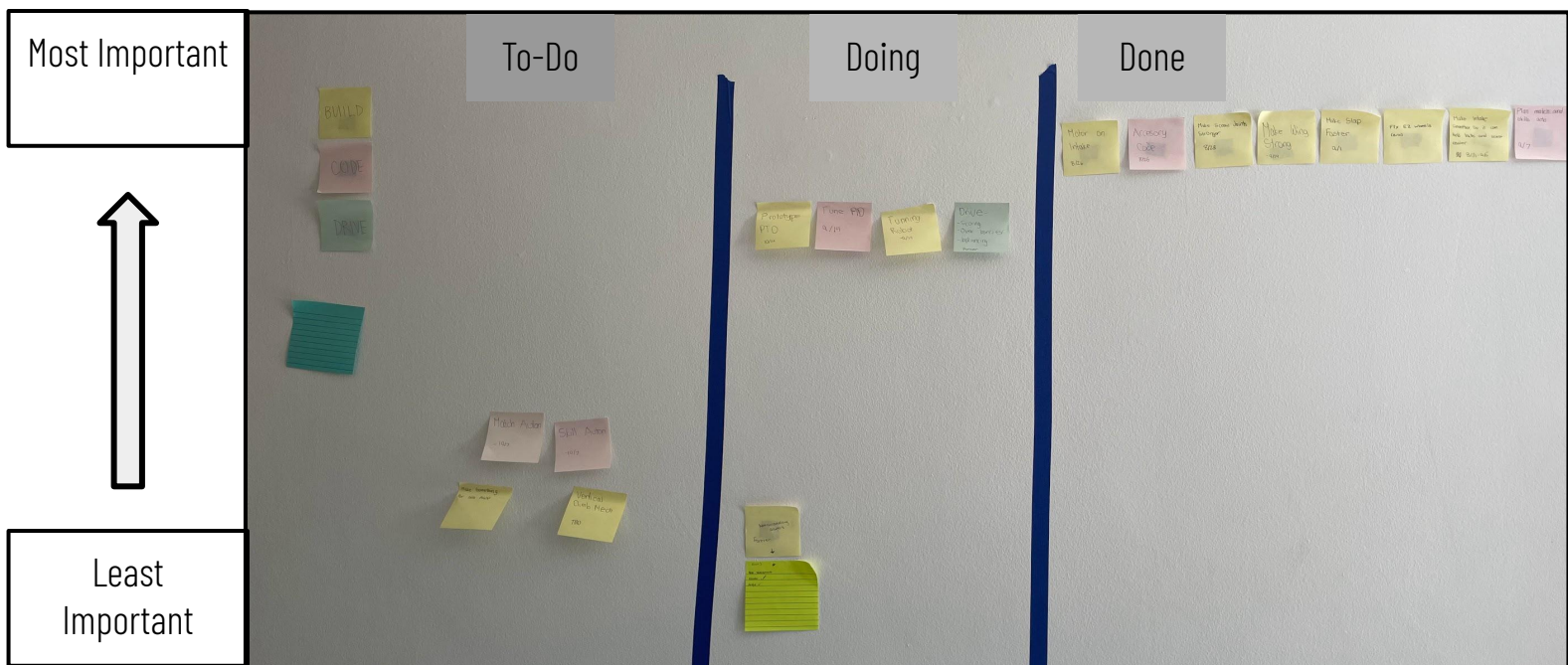
*KanBan board - color coded by category and organised from most to least important*

Step 4: Building/Programming/Testing

Zipline's initial design required lots of trial and error (even taking inspiration from Navy Aircraft Carrier catapult launching and tailhook capturing mechanisms) to make them efficient enough to deliver hospitals what they need before their patients die.
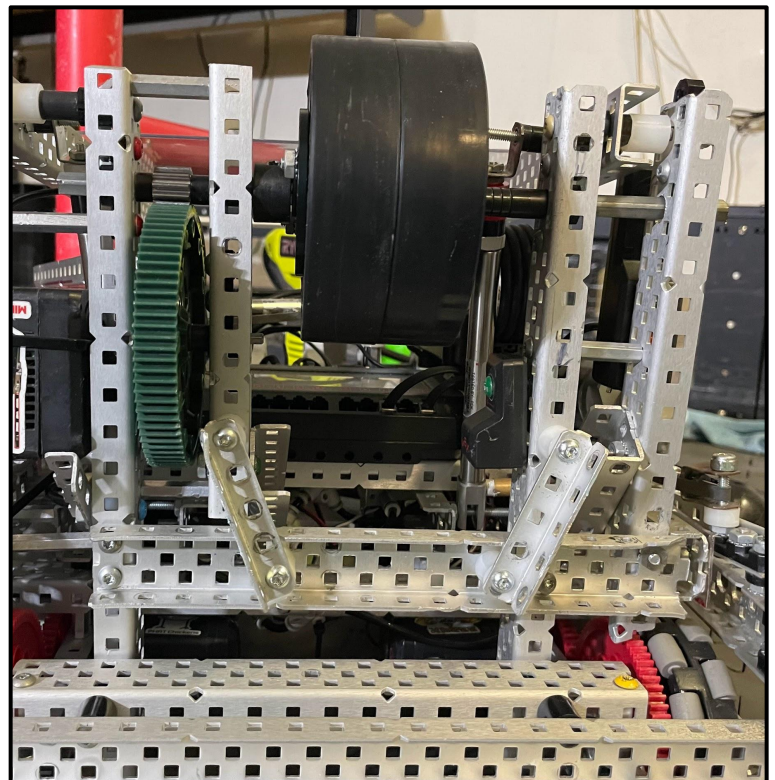

Zipline's Platform 1 Drone

We follow the same process of trial and error to determine the best mechanisms. For example, we built, programed, and tested multiple shooting mechanisms.
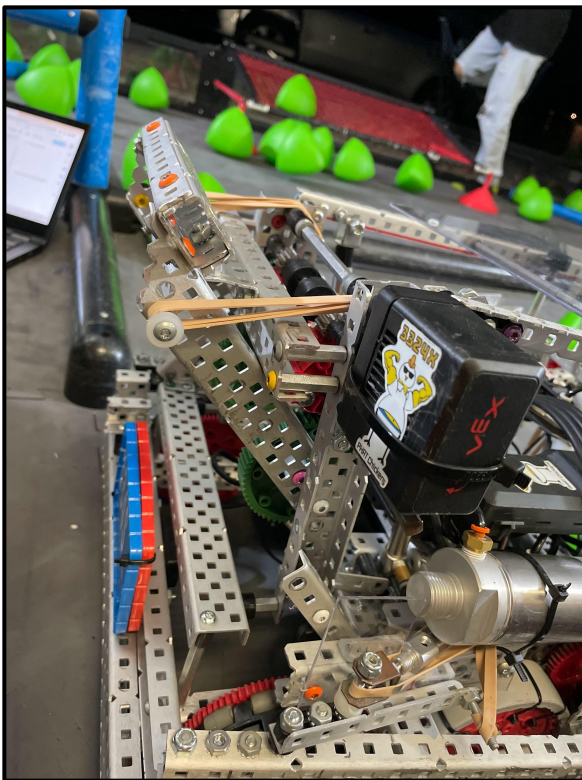
Our slapaupult mechanism


Our flywheel mechanism

Step 5: Improving

After perfecting hospital deliveries, Zipline realized they could expand to the general public and do door deliveries. This required an entirely new drone (Platform 2) to be able to deliver within a target area of a dinner plate. They are improving their new drones to be more efficient and faster than using cars.

Zipline's Platform 2 Drone

Just like how Zipline realized that they could expand their company, we realized that we can always improve our robot as the game progresses. Thus far in the season, we have developed four different robots as the game strategy has evolved.
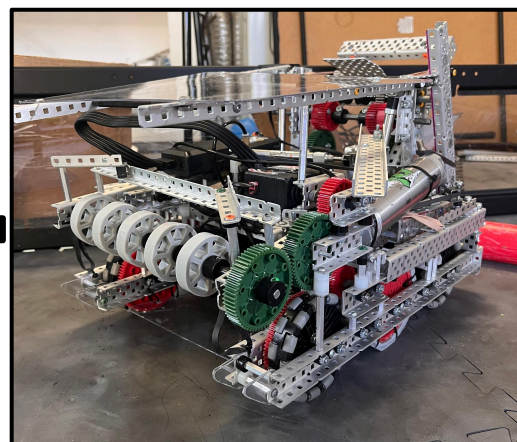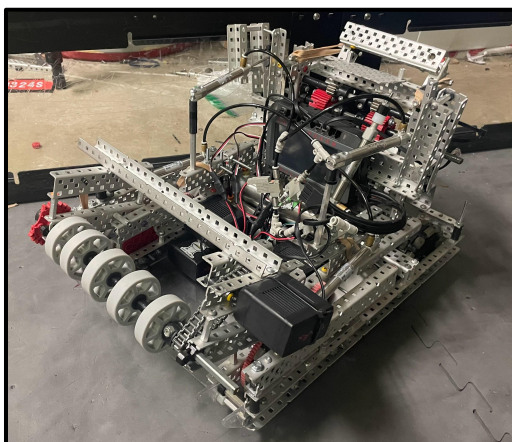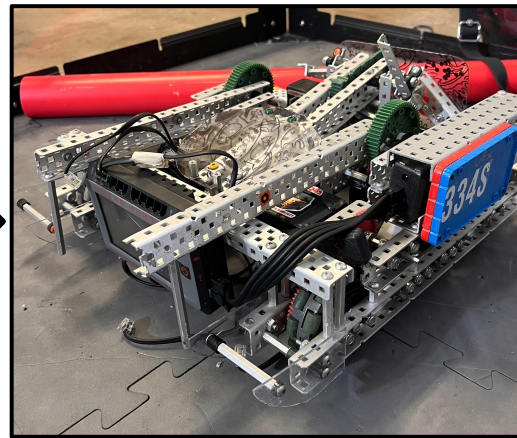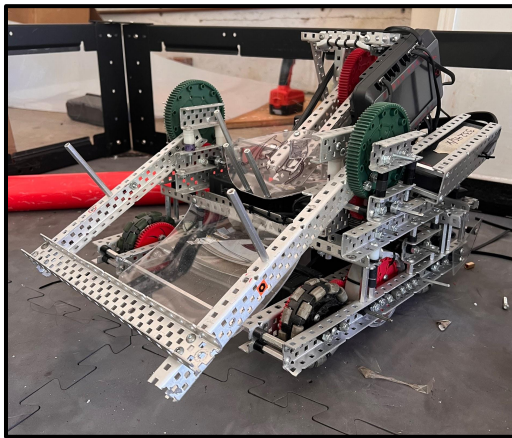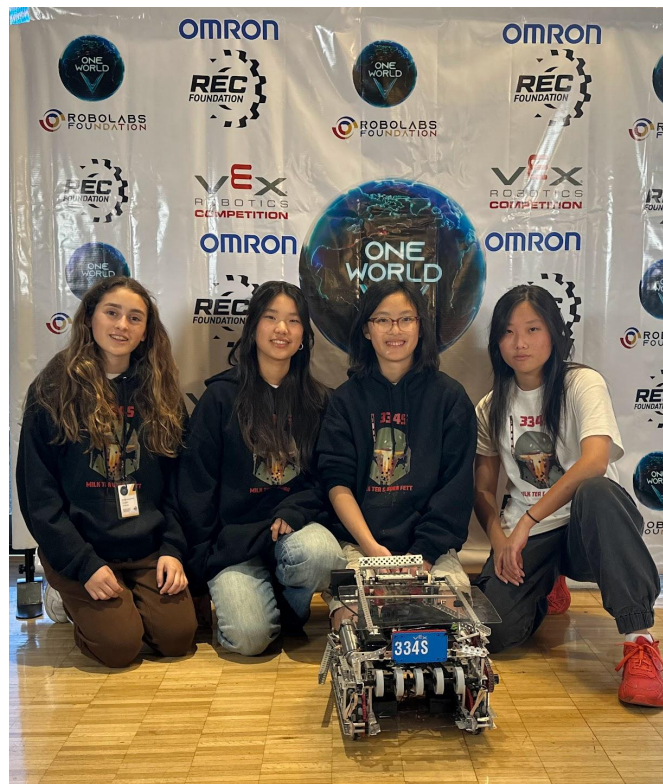
How VEX Prepares Us:

The VEX experience allowed us to connect our engineering design process to both Zipline's (a) **business story** and their (b) **technical designs**. Clearly identifying the problems will help us focus our initial directions as we start our careers. How else are we going to fix something if we don't know the problem? This is shown in Zipline's journey because clearly defining their mission allowed them to switch and accomplish what they have today. Continuing through the engineering design process, every aspect will help us in our careers especially trial and error and research.

VEX also teaches us **perseverance**. This is also shown in Zipline, as they were rejected countless times before having their idea approved to test. Without perseverance, we would not have their revolutionary company today.

Lastly, VEX has taught us how to **communicate** with others using the notebook and interviews. These are crucial skills that we will apply throughout our careers. All of us, with VEX, are getting prepared for the real world and developing skills that we will keep for the rest of our lives.

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