

Maximizing Use of The Resources Available to You

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Who am I



- High School Senior
- 4th year in FRC
- Design, Build, Electrical Lead on FRC 2486

Why Should You Care

- Looking at and even copying what others are doing isn't cheating
- Collaboration and observation can really save you
- There is so much raw information just sitting out there ready to be consumed
- Can even help with sustainability

(Overview)

- What exactly is out there?
- How should I use it?
- How can it help me?
- Where does this apply?
 - Design, Build, Programming



Chief Delphi

<https://www.chiefdelphi.com>

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Chief Delphi

A discussion forum for the FIRST community.

Things that everyone should be looking at:

- Open Alliance Build threads
- RI3D, Everybot
- Your own team's or other team's previous seasons robots

CD Open Alliance Build threads

Did you know that teams from all over openly post the entire contents of their build season?!

Particularly look at: 6328, 3847, 3467, 4481, 4522, 111 / 112

PS: Some of these teams are even top 1% in the world

- 4522 won worlds last year
- 6328 was EPA rank 4 world-wide
- 6328, 4481, 4522 played on Einstein
- 3847 notably inspired the design of 1678 and 581



Build Threads Continued:

You will find tons of testing videos, strategy breakdown, CAD and Code

More importantly tho, you can use their build threads in CD to ask questions about what they are doing and even ask for help on your own ideas if you want to.

Turn on all notifications now and bookmark links to the 2025 threads you want to follow

FRC 6328 Mechanical Advantage 2025 Build Thread

FIRST ■ FRC Open Alliance frc6328



davepowers FRC6328, Littleton Robotics

2 7d

Dec 2024

1 / 16

Dec 2024

Welcome to the 6328 Mechanical Advantage #openalliance build thread for 2025! We're looking forward to this season and we're ready to step up our Open Alliance game!

This year, we're excited to compete at Week 1, GSD, and Week 4, UNH in the NE District. As has been the case for the past few years, we are aiming to build a reliable, relatively simple, robot that leans into our strengths in software to hopefully perform at a good level throughout the season.

This year, we're hoping to do weekly longer form posts, as well as short, picture and video based posts as cool and interesting things come up. If you have any feedback or questions about anything please reach out to us in the thread.

Team Links:

- 2025 CAD 139
- 2025 GitHub 25
- AdvantageKit 22
- AdvantageScope 14
- Website 15
- YouTube 24



What impact does looking (or not) at build threads have?

- Last year, we (2486) made a robot that worked okay, but had large issues due to overcomplexity that greatly restricted our maximum potential
- Our team (me more importantly) didn't know about or look at any of this stuff
- We could've been spared much restriction of our abilities and issues if we had

2486 2024 robot:



6328 original concept week 2 of build season:

But it was insane.

Here's where we left off with the CAD before the concept was shelved.

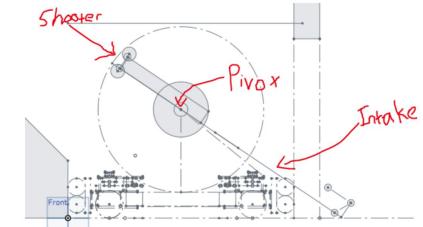


Mechanical Advantage 2024 Build Thread
en Alliance: operalliance:frx6328
We're pushing this development due to the following update.

Robot Architecture

We haven't talked much about the path the robot architecture is going to take this year. That's mainly because we didn't know what we were doing. We have two concepts that were chasing this year, the first was aptly named, "The Contraption", which was putting it lightly.

Here's the initial sketch for that.



The basic concept is a center pivoting shooter, with an intake that extends out from the back of the robot to intake pieces off the ground. The goodness in the intake had a similar...

Impact Continued

- I've found that a lot of times in build season it is easy to get carried away and all wrapped up in your design and it is easy to not see its obvious issues until too late.
- By taking a good long look at what other teams, especially other really good teams are doing can really help to point you in the right direction.

What information can I extract from these?

Prototypes:

- Ideas other teams came up with, actual prototypes and results, what things work, and what don't. – you don't have to try everything, if it's already been proven then go full steam ahead.

Robot Architecture:

- A lot of people get caught up in this one. Truth be told, you don't need to know right away. You should wait to this in until after prototyping and you have an idea of how each subsystem will look

The screenshot shows a forum post from the 'Team 581 Blazing Bulldogs 2024 Robot Reveal' thread. The post is by AdamHearn and includes a photo of a robot in a snowy environment. The post text reads: "We took inspiration from Larry Enticer and didn't test anything for this robot, just sent it. Did some minor iteration on intake roller material and trap exit geometry once built, but other than that was based on public info and intuition." The post has 22 replies and 22 upvotes. Below the main post, there is a reply from PayneTrain with the text "Trans Lives Matter" and a reply from AdamHearn with the text "intuition". The forum sidebar includes links for Topics, My Posts, More, Categories, and Tags.

Lots of other people are doing this already so join in

At first it may seem odd that teams as good as some of these share their stuff

Other really consistently good teams also use these resources and have been...

From 1678:

We also blatantly copy content posted by Everybot/OA teams. Some recent examples include:

- 2022 climber (5013)
- 2023 intake (Everybot)
- 2024 architecture (Spectrum)

These are just big examples, tons of small details/features on our robots year to year come from the information others post.

RI3D / Everybot

At the beginning of the season, these can be particularly useful to help spark ideas about potential paths your team should take.

Also extremely useful if you are unable to get started immediately after kickoff

Although these bots aren't nearly as competitive as the ones some OA teams end up making and sharing, it can help and be a resource for teams who might not be able to make something more complicated.



[2024 RI3D] Unqualified Quokkas Robot Compilation



Unqualified Quokkas
506 subscribers

Subscribed

460



Share



36K views 11 months ago

We are the Unqualified Quokkas, an RI3D team consisting of 10 mentors from across Australia with the common goal of bettering the Australian FRC scene.

...more

RI3D / Everybot continued

You could even build one of these bots at the very beginning of the season for early driver practice and programming, (like an alpha bot) or even as a backup to have for your first event in case your main design isn't working out.

Sometimes you will find that particular mechanism designs, or their architecture would work well for your team to use as a starting spot and modify.

3467 last year:

This manages to combine the amp, shooter, shooter angle adjustment, and potentially climber into one decently simple arm (It's fairly similar to [Unqualified Quokkas](#) 5 robot, but with an under-bumper intake (we didn't realize this similarity until we were reading the [build thread of our friends on 5459](#) 29 who came to a similar concept!). And luckily, we have some recent experience with arms!

Your own or others' past season robots (or mechanisms)

Another super helpful thing to do is look at past games and the good robots from past games.

If the game is a ball shooter, look at games where you needed to shoot balls and see if you can take inspiration from some of the shooters that year

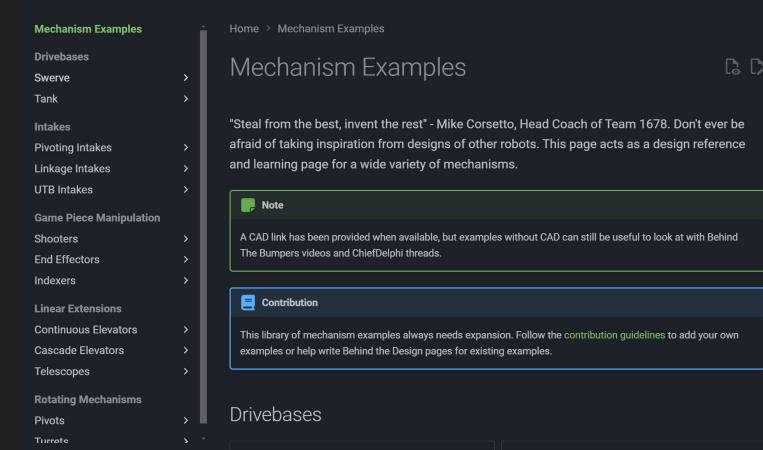
If your gonna use an elevator, look at years and teams that have done so successfully.

Same with arms, turrets, intakes, etc...

This is where FRCDesign.org comes in

Another new resource that I discovered this fall:

- It is stockpiled full of different mechanism designs from different teams from different years.
- Look here for inspiration about different mechanisms even if you are somewhat familiar with a particular mechanism you choose to utilize.



The screenshot shows a dark-themed website for 'Mechanism Examples' on FRCDesign.org. The left sidebar lists categories: Drivebases, Swerve, Tank, Intakes, Pivoting Intakes, Linkage Intakes, UTB Intakes, Game Piece Manipulation, Shooters, End Effectors, Indexers, Linear Extensions, Continuous Elevators, Cascade Elevators, Telescopes, Rotating Mechanisms, Pivots, and Turret. The main content area has a header 'Mechanism Examples' with a backlink to 'Home' and a note about the page's purpose. It includes a 'Note' section with a note about CAD links and a 'Contribution' section with guidelines for adding examples. Below the main content, a 'Drivebases' section is visible.

Mechanism Examples

Home > Mechanism Examples

Mechanism Examples

"Steal from the best, invent the rest" - Mike Corsetto, Head Coach of Team 1678. Don't ever be afraid of taking inspiration from designs of other robots. This page acts as a design reference and learning page for a wide variety of mechanisms.

Note

A CAD link has been provided when available, but examples without CAD can still be useful to look at with Behind The Bumpers videos and ChiefDelphi threads.

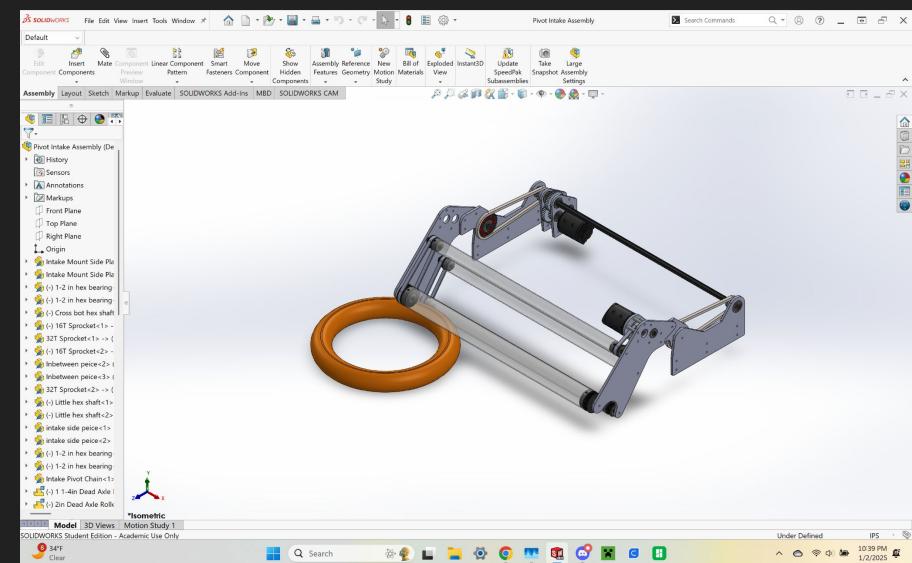
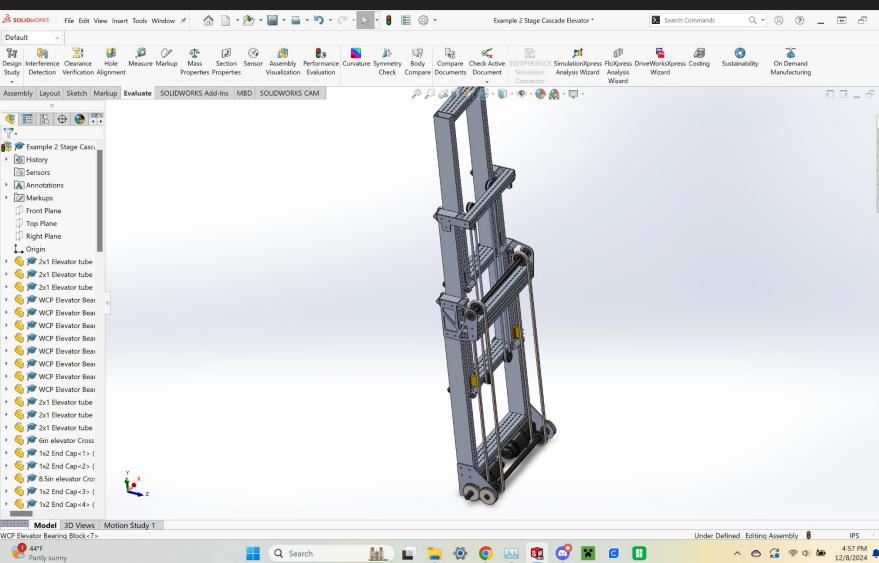
Contribution

This library of mechanism examples always needs expansion. Follow the contribution guidelines to add your own examples or help write Behind the Design pages for existing examples.

Drivebases

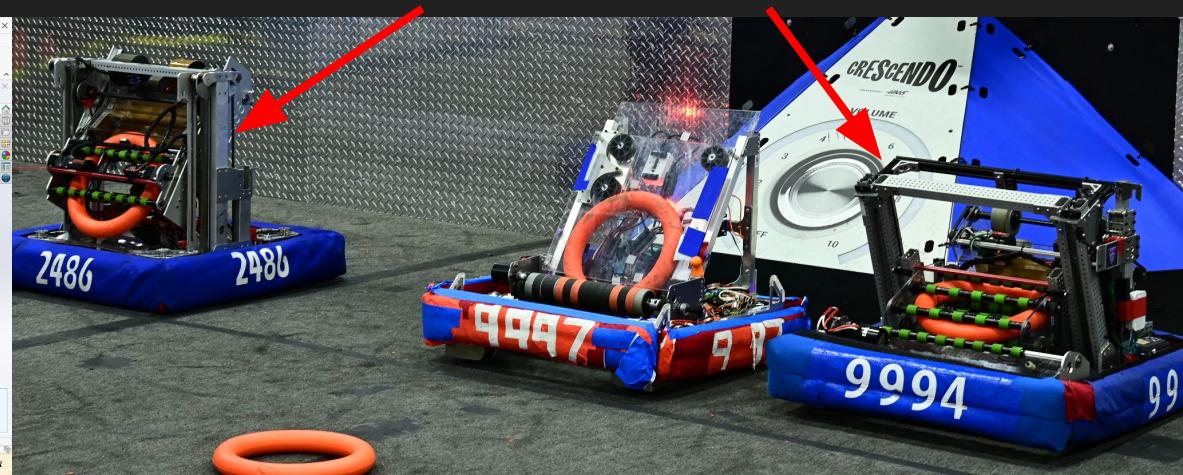
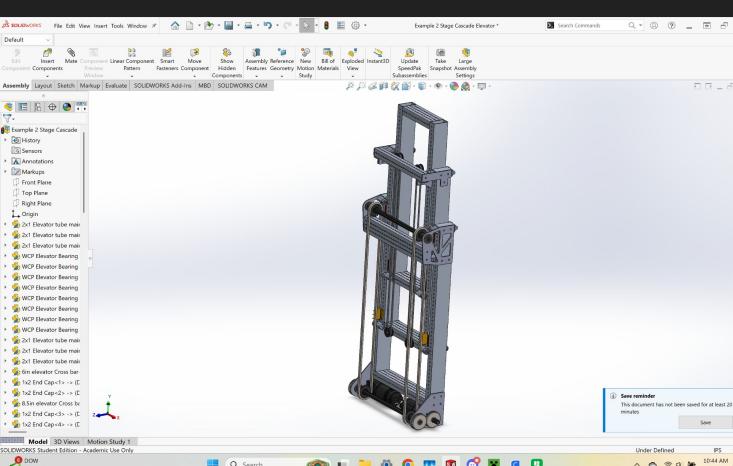
You can also do this on your own:

This offseason for example, one of the things that I and some of our other designers worked on is designing in CAD some mechanisms generic and specific that we haven't recently (or haven't done well at least)



Why did we design a generic elevator?

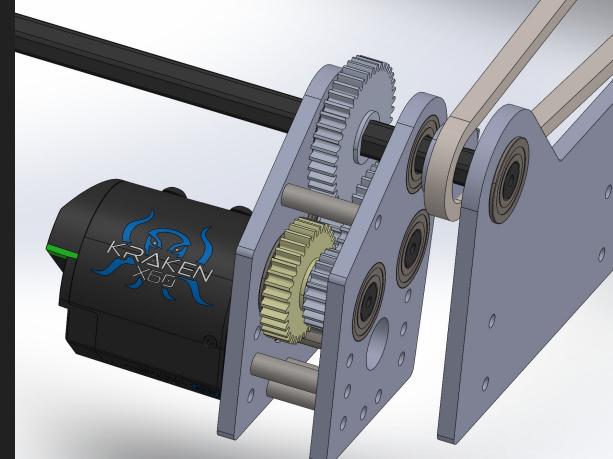
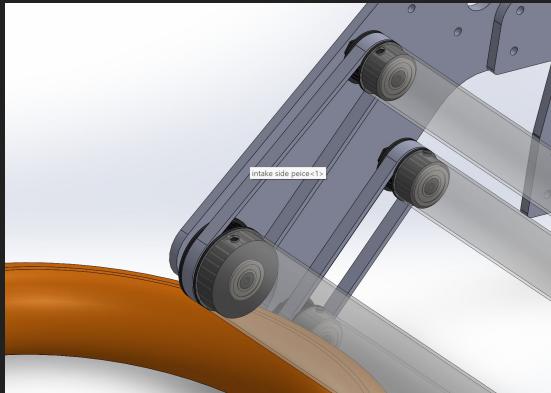
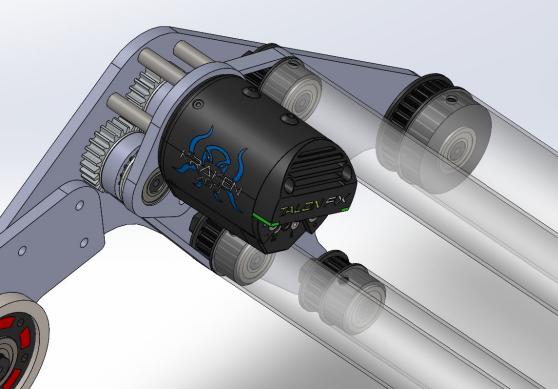
Although both our 2024 season robot, and our offseason freshman (sophomore) bot both utilized an elevator for amp scoring, I wanted more experience designing a generic multi-stage elevator in the event that one is deemed necessary this next year. Also due to the fact that both of these elevators were not made using ideal mechanism guidelines, and had issues throughout the season.



Why did we design pivot intake for this last year?

We wanted to design a replica of the 1678 2024 intake to get a feel for new to us design practices. Also because replicating part of the most advanced robot this year would be a difficult yet rewarding challenge.

- Dead axle rollers – heavily inspired by what 6328 did in season
- Designing a gear train for a Kraken – we historically used planetaries and ours are not compatible with the new motors.

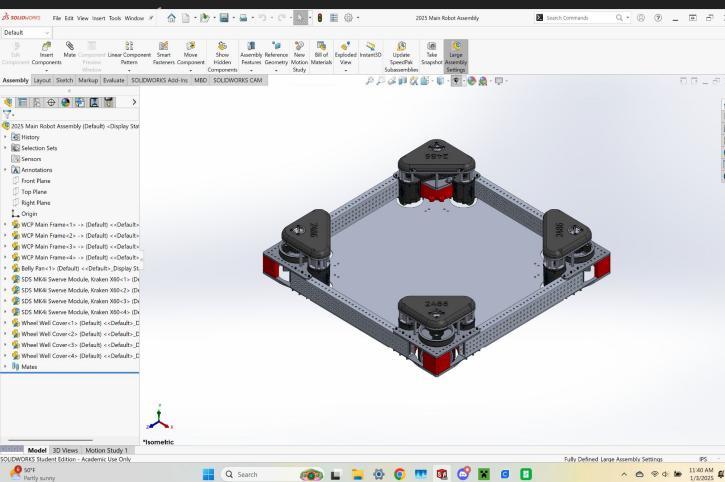


You can also start designing things you will prolly use

Design components ahead of time and even start building them

- remember to abide by R302

We've started designing our drive base and swerve customizations already and rebuilt our swerve modules from last year after cleaning and replacing damaged



How should this all be combined?

It's always a time thing – with such limited room for error and ability to take as much time as you want, it often feels hard to iterate through several different designs for a particular subsystem or even your whole robot.

- If possible try to keep things modular, such that they can be independently upgraded and improved upon based on things you see others doing.
- If something isn't doing everything that you want it to and you don't see a way forward, SCRAP IT. Don't waste time on something that is not going to help you or not be worth the time and effort your spending. Easier to restart with a clean slate, look at other ideas to make up for lost time.

What to actually do during build season

Test things early and often

- Try to begin prototyping right away
- Even if you find one thing that works, keep prototyping other versions of that mechanism, you might find something that performs better
- Try to develop prototypes for different mechanisms simultaneously
- By having things progressing at the same time it allows you to keep things on your robot modular, and keeps the door open for major changes down the line
 - The FRC rebuild meta is upon us, if you don't get on that train, you'll sadly be left behind.

What does this look like?

- Plywood prototype with drills
- Machine a couple of iterations out of more wood
- Assemble the practice/prototype mechanism
- If possible mount it on your frame for programmers and drivers
- Then go back through the mechanism and optimize it with their feedback
- Build the final version

Example: Testing videos from our offseason freshman bot



Summary

- Unfortunately, it's not a perfect process, even if you follow all of these it doesn't guarantee a competitive robot
- Your own effort is still required to make this all work
- Time management is key
- Keep your head up and eyes open

TLDR: Read Chief Delphi, look at previous mechanisms, share ideas with others

That was a lot of information

Sorry not sorry

Questions??