

Team 5012 | Gryffingear



New Robot Cart

Due to many issues regarding the robot cart used for the seasons prior to the 2019 season, a new robot cart was very needed. Instead of simply looking up other teams' robot carts and replicating the design we found to be the best, the design team brainstormed ideas that would not only solve the problems the old robot cart did not fix, but add in some unique touches to the design as well. We prioritized what was needed first, and then sought to add in unique features that would also benefit our pit crew and drive team.

First, we analyzed the problems with the old cart, and we would then see what is really needed, and the things we wanted, but weren't needed.

List of issues with the old robot cart:

- The robot cart is too short in general, it would often hurt the pit crew's backs when reaching down to lift up the robot. This was a safety issue in addition to being very time consuming.
- Too small: The old cart is too small to hold anything other than the robot safely, and although this did not prove to be an obstacle at competition, the pit crew was in need of space to hold tools and the driver station.
- Not adjustable: Every year, we have to build a new robot cart that adjusts to the robot's size. This is very time consuming, and the cart generally ends up being unstable, hard to push/pull, etc.

The benefits of having a robot cart that can fix these issues:

- The pit crew/drive team can safely and quickly transport the robot to the field
- The pit crew can work in a more organized environment and can place tools in the cart that may be needed in the field.
- Overall better performance at competitions (Less time moving the robot from the cart to the floor, more organization)

After coming up with a list of the issues the old robot cart had, the design team came up with a list of functions the cart needed, as well as a separate list with things we wanted, but weren't completely necessary.

Robot Cart Needs:

What?	Why?	How many? (If applicable)
Stability	To hold the robot securely	
Proper Wheels	To transport the robot cart safely, without the risk of getting stuck over a wire or small obstacle.	4 total 6" Casters for easy transport
Adjustable Holder for Robot	To make sure robot doesn't fall off	2 (metal tubes) Changed to 2x1s (wood)
Tool/System check drawer	To keep work area organized	TBD
Tool Organizers	To keep work area organized	TBD
Work Area	To protect the cart from debris and damage that tools may cause	1 (Plywood sheet)
Space for batteries	To hold multiple batteries	2
Room for Driver Station	To allow for quick movement from the pit to the field.	1
First Aid Kit(s)	Safety	TBD
Tool boxes	Organizing Tools	2

Robot Cart (Want, not needed):

What?	Why?	How many (If applicable)
LEDs	Aesthetics	TBD
Fan Holder	Comfort and convenience for pit crew	1 (Adjustable)
Team Number, Name, School Name	Aesthetics	As many as possible



Final Decisions:

After organizing the functions needed for the robot cart and choosing what we wanted the robot cart to be able to carry in addition to the robot and some tools, the design team began working on concepts for the design of the robot cart.

To make sure the robot cart would fit through a door, the size limits on the robot cart were chosen (shown below):

- ❑ **Width: <29"**
- ❑ **Height: <40 <25"** (To keep the cart or robot from falling over and allow a tall robot to pass through doors easily)
- ❑ **Length: ~50" 42"** (To store plenty of tools and items)

Chosen dimensions:

- ❑ **Width: 27"**

This would allow the cart to easily fit through a door and would be able to carry the robot without the worry of having it tip over.

- ❑ **Height: 36 18"** (Bottom of wheel to platform)

This height would make it comfortable for the pit crew/drive team to lift up the robot without causing any back pain. The low height allows the pit crew when sitting on a chair, but may not be optimal for those standing. The height was lowered from 36" to 18" due to an obvious flaw - a tall robot (At least 44" in height) would not be able to go through most doors.

- ❑ **Length: 42"**

With the relatively large list of tools and items the cart should carry, a large carrying capacity was necessary. A 50" length provides plenty of storage space without making the cart difficult to move around.



Additional Dimensions Needed (For reference):

- ☐ **Average Door Dimensions:**
 - ☐ 30" Width
 - ☐ 80" Height
- ☐ Driver Station: 1
- ☐ Water Bottle: 2.5" Diameter, ~7" Height
- ☐ Batteries: 4 max
- ☐ Tools
 - ☐ Hammers and Mallets
 - ☐ Drill & Batteries



Final Design



Can theoretically fit ~140 water bottles on the lower level

