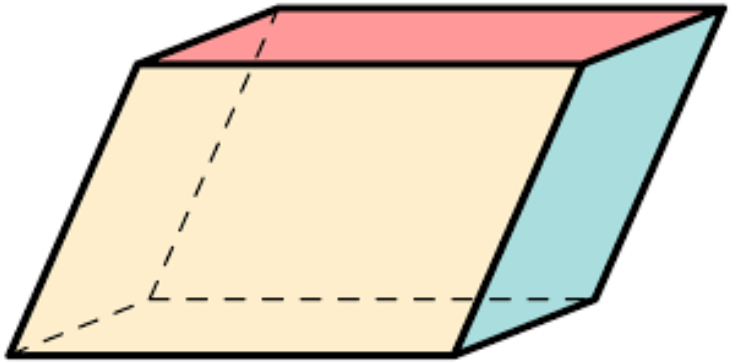
Rotating Shifting Parallelogram

Authored by:
Luke Paul Sprouse
Co Authored by:
James David Murray
Owen Wesley Keith

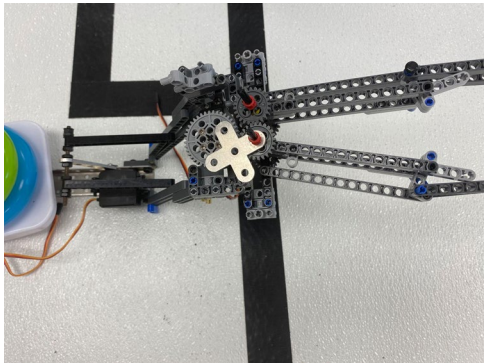
What Is A Shifting Parallelogram

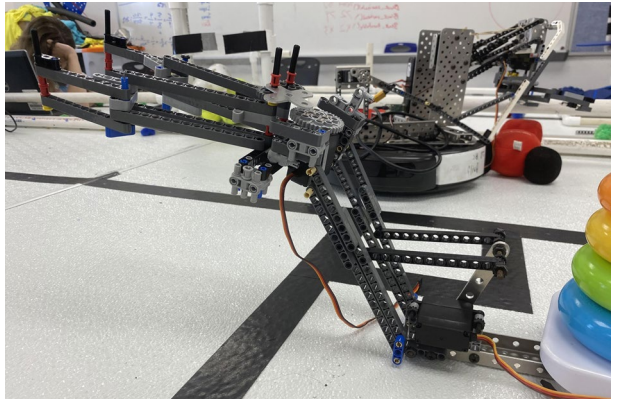
A shifting parallelogram is a three dimensional parallelogram that will change its shape to be able to reach a objective in a horizontal or vertical orientation. A shifting parallelogram(s) opposing sides are equal and parallel like a regular parallelogram.



How its used relating to botball

A shifting parallelogram is one of the most used structures in botball. It can be used at any level of botball from a beginner team to an advanced team. The only thing that changes between a beginner and an advanced team is its purpose. A beginner team might use a shifting parallelogram for low level points such as poms on to a specific side on the board, while a advanced team might use a shifting parallelogram for the horizontal ring stand as well as the airlock.





Why did we need this?

The motivation for this project is that the rings score for all ring horizontal and unsorted is 3200 points. This was enough points to get us 1st place overall in the Oklahoma botball tournament. With this shifting parallelogram any run is possible in the game of botball dealing in horizontal or vertical points . This idea is not limited to any team(s), all it takes is practice, dedication, and your own imagination.

Other inspiration was the lack of projects and points we could score with a single run. The team needed at least one viable project until other bots were up and running.

Strengths and weaknesses

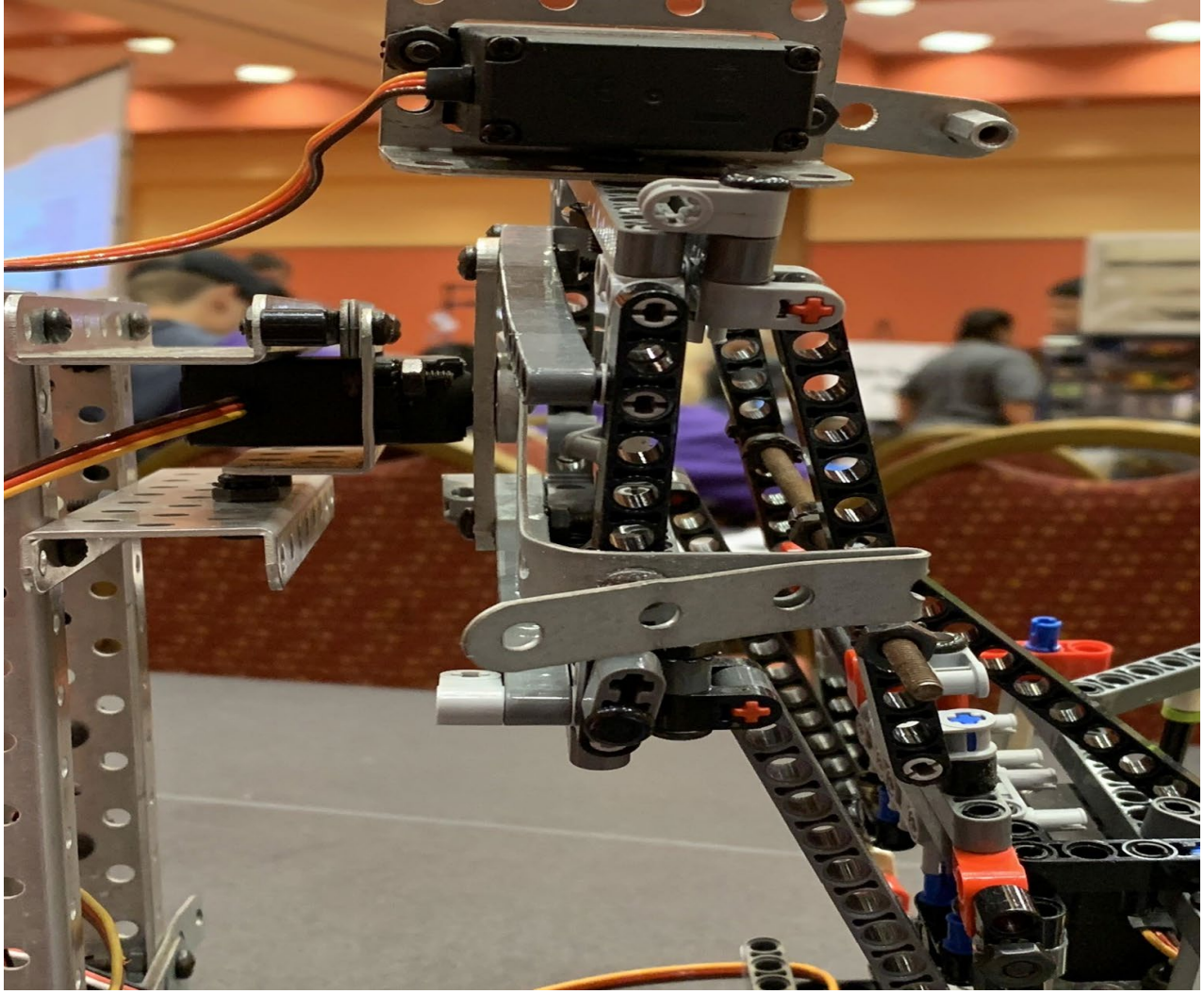
The strengths of the free shifting parallelogram is its ability to go from vertical to horizontal with one motor, also it has the ability to save pieces instead of having two separate shifting parallelograms.

The Weaknesses of a rotating parallelogram is that it has one point of connection and its stability can only be improved by a larger one point of connection. Another disadvantage is the the weight of the parallelogram. The weight of the parallelogram when in a hortizonal plane can make the bots center of gravity go off course causing it to tip over.

Solutions to design flaws

A problem we had was the lack of support from one servo. We created a solution by extending the servo attachment with a piece of bent metal. That piece attaches to the base of the shifting parallelogram and goes across the whole of the base.

Another problem we faced was with the design caused a lack of consistency due to the amount of weight. The weight changed our turns and made it so we were not always in a consistent position. This caused us to lose points during three events. We overcame this with extenders of our base that made it harder for the bot to tip over when turning or during horizontal movements



Future applications

Future applications may apply to future robotic claws that will replace repetitive, and simplistic work across industries. Other applications include construction work and how transportation on a work site will work. Future applications could be any number of things in need of transferring objects vertically and horizontally.

Questions?

We will now be accepting questions about our presentation.