

Period 2- Mechanical Design

Team Name: Dohasecb.

Team Number: 0284.

Drivetrain

1. Description:

The picture on the right presents our LEGO robot “FLARE” drivetrain. We built the base by fixing LEGO pieces to the normal iron KIPR chase then mounted these treads on LEGO and connected it to the motors using few gears.

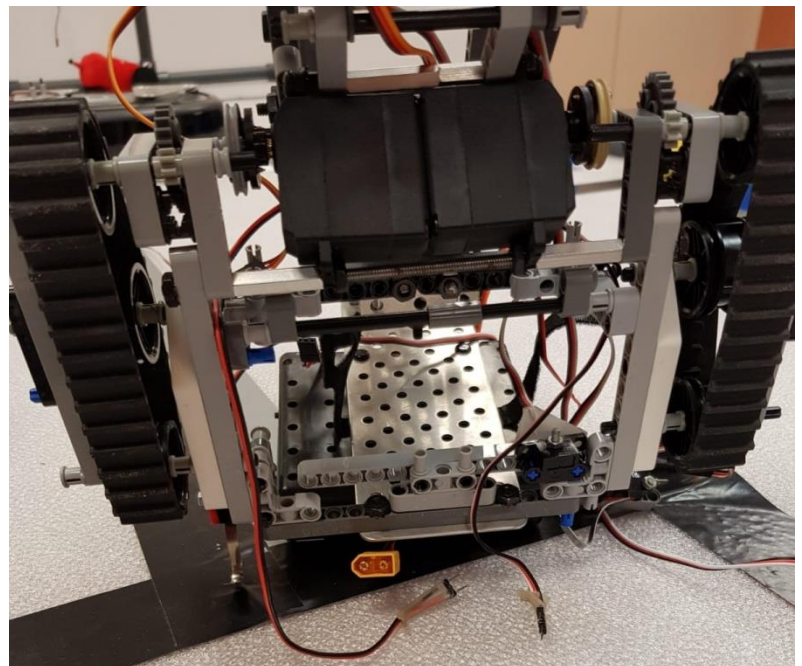
2. Comparison:

Our Flare robot drivetrain got a lot of different points from any other drivetrain:

- Using treads instead of normal wheels.
- Building 90% of the Flare robot base using LEGO pieces instead of iron bars.
- Using only one normal iron KIPR chase in the middle of the base instead of two chases on the sides.

3. Reasons for choosing this type of drivetrain:

- treads give more stability to the Flare robot on the 90 and 180 degrees turns.
- We decided to build the base mostly by using LEGO to make the Flare robot light and fast.
- We used only one normal iron KIPR chase to free some space for the gears that transfer the motor power to the treads.



Effector

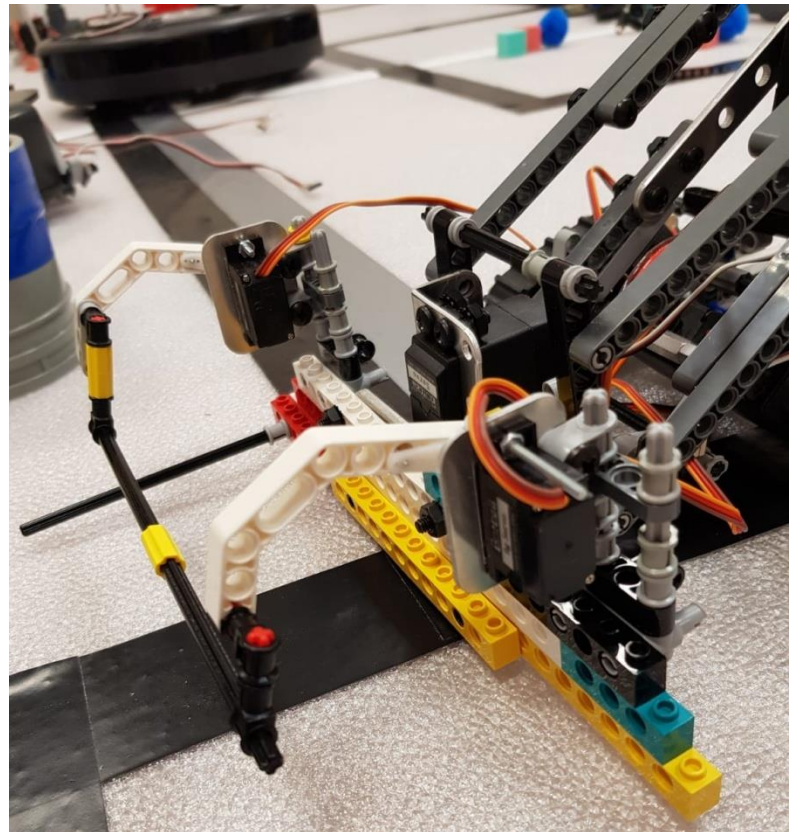
1. Description:

Here the picture presents the Flare robot (LEGO) effector that we designed using two servos one on each side and LEGO pieces to complete the effector designed.

2. Comparison:

Here are some points that differentiate between our Flare robot effector and any other normal effector:

- Using one servo on each side instead of using one servo for both the sides.
- Using a LEGO axle on bottom right to keep a certain level for the effector instead of making the effector short.



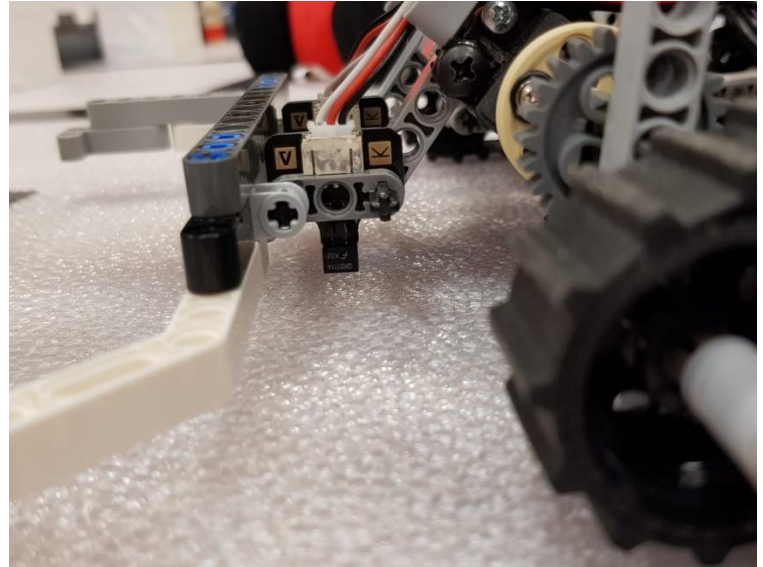
3. Why we chose this effector:

- Using one servo on each side decreased the load on the servos and increased the effector speed.
- Using a LEGO axle on bottom right gave us the chance to make a longer effector and prevented the effector from hitting the ground.

Sensor Mount

1. Description:

The red arrow in the picture on the right points at the reflection sensor of our Flare (LEGO) robot. Here we mounted the reflection sensor to LEGO pieces in the middle of the base and on a certain height that allows it to read the reflection of the lines perfectly.



2. Comparison

Here we are listing some points that differentiate between our Flare robot sensor mount than any other sensor mount:

- We mounted our reflection sensor in the middle of the base instead of mounting it on the side.
- We surrounded it with LEGO pieces instead of mounting it freely.

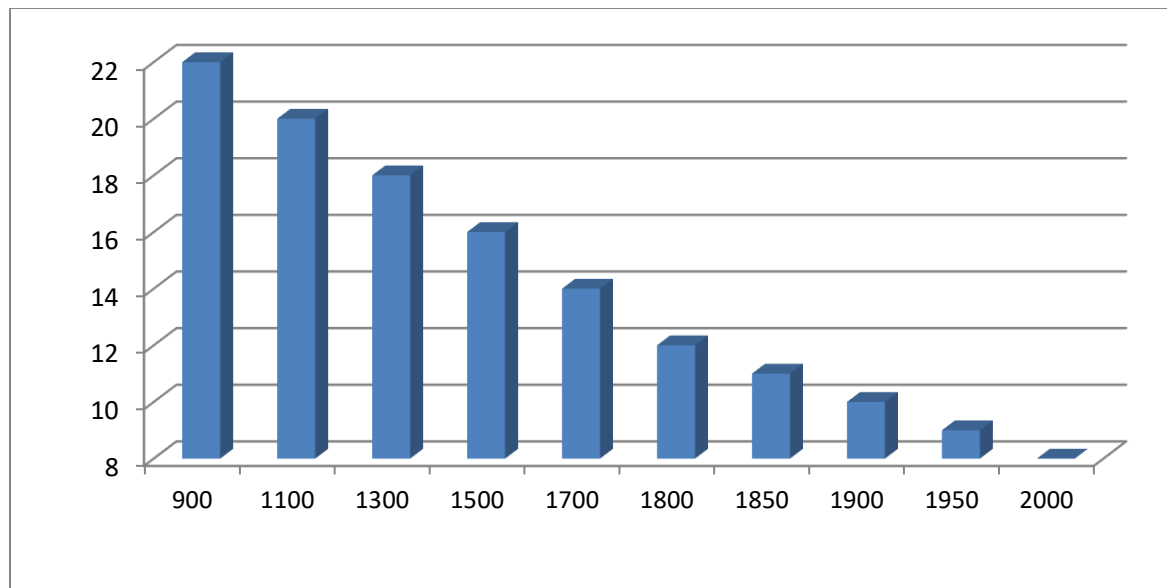
3. Why we chose this type of sensor mount:

- We mounted our Flare robot reflection sensor in the middle so that the robot body is centered on the line when the reflection sensor reads the line.
- We surrounded the reflection sensor with LEGO pieces so that the outer light reflection does not affect the reflection sensor readings.

DATA

ET-Rangefinder Measuring Distance

Distance Needed
(in cm)



**ET-Rangefinder
Distance**

We set up the ET-Rangefinder in the middle of the Create base, exactly under the arm to make sure that the arm is centered in front of the tower then the programming team programmed the ET-Rangefinder and performed 10 attempts each on a different distance to observe which is the perfect distance needed for the Create to get the Botguy.

Data Evaluation

The data in the chart is representing the accuracy of the ET-Rangefinder to reach the specific tower, it also shows the distance needed to reach the tower.

Here we observed from the data in the chart that the range to reach the tower is between: 1800-1900 (10-12 cm).

The conclusion from this data is that we need a high level of accuracy to reach the tower otherwise the Create robot may stop way too far from the tower or way too close from it.

Accordingly, we have two options, the first one is to make the Create effector longer so if it stops away from 1800 (12), it will still reach the tower. The second option is that to use the reflection sensor to reach the line in front of the tower.

Modified System

1. Describing the change:

As shown in the picture on the right we decided to add another rubber part to our Create robot effector on the upper side of the bar.

2. Reason for the changes made:

The extra rubber part made the effector catch the gas valve in a way that it does not swing while the Create robot is moving.

3. Testing:

We will keep testing the effector after the change we made by changing the angles of catching the gas valve to make sure that the gas valve will not fall down if the Create robot caught it from any angle.

