1. **Design and Development**

***At the start of the season, we went through several ideas to get to this final version. All of our designs start off on paper then move to cad to get the precise parts. A couple of early designs were a couple versions of a claw and later went to active intake. All of the designs were chosen strictly based on numbers as we believe that the numbers are the ground truth***

***a.*** ***Prototyping and Testing (what is a)***

***One of the first ideas that struck us was a single claw mounted on an arm. We initially drew out then CAD it and bought the parts necessary to build it. This idea was crucial for us to dosince we came to know the flaw with the claw and how precise we needed to be. Through the testing of this we came to our next design. It was an active intake with a grabber on a rack and pinion. After we went to this design, we realized a couple of things:Since the pixels were on the ground they could likely get caught on something and we could lose them . The next one we went to was an intake into a single pixel box. This was a really well proven design used till league meet 1 but later changed to a two pixel box which was found to be very effective (All the pictures are in the appendix along with the CAD).b.*** ***Modifications and Iterations***

***Usung the CAD designs we have been heavily iterating . We have about eight iterations of our two pixel box to make it as effective as possible .* 2.** **Analysis and Selecting the Preferred Design**

|  |  |  |
| --- | --- | --- |
| Name | Time to pick up (from hp) | Pixels scored (Backdrop) 2:00 min |
| Basic claw | 12 sec | 2 |
| Rack p claw | 8 sec | 3 |
| Single box | 4 sec | 7 |
| Double box | 2 sec | 9 |
| Final - | Double box | Chosen - most efficiency |

**3.** **Detailed Design**

**For the design of the dual claw, we sketched then CAD it out. We made the box a little bigger ten two pixels to allow for error. For the arm we used a motor and powered it through bevel gears to prevent excessive stress placed on the motor. We also used a extension powered by a linkage to allow us to reach higher. Through the addition of weight to the arm we faced a big issue . In our PIDF loops, we had to run a heavy amount of current. Due to this high amount we faced issues with the hub restarting. To counter act this we counter sprung the arm to make the arm like dead weight. To calculate the amount of tension needed, we used a simple formula. We used Hook’s law f=-kx to calculate (what).**

[**https://cad.onshape.com/documents/e2df1e251848d1c9a12e87cf/w/957c88f8fff3655d6907fbc8/e/9925aafd3e291e6bcf4b717c?renderMode=0&uiState=65a55210d282054fd4bbc8f0**](https://cad.onshape.com/documents/e2df1e251848d1c9a12e87cf/w/957c88f8fff3655d6907fbc8/e/9925aafd3e291e6bcf4b717c?renderMode=0&uiState=65a55210d282054fd4bbc8f0)

**Write about arm,intake, drone and hanging modifications and iterations**

**4.** **Materials and Components**

For the materials, we used a standard aluminum channel and aluminum extension seated on bearing guides. We used two servos on the arm. One for extension and another one for the wrist. For the extension, we used a gobilda torque servo and a speed servo for the bucket. The bucket was made from (Polyactide) PLA and used a high infill to keep it strong. Write about chassis, hanging, drone materials.