Day1:
This morning's learning content is the technical terms of mechanical names, divided into components and accessories. There are also names for various shafts and accessories, such as bearings and motors. In the second part, I learned the use of AutoCAD, including the drawing of various patterns and a variety of operation techniques. After that, I first imitated the template drawn by others to familiarize myself with the operation process. When I was more familiar with it, I designed the first half of the excavator by myself. Although I was still not skilled enough in design, I got familiar with the operation of the laser cutter.

Day2:
This morning I continued to finish the excavator. The latter part of the drawing is smooth because I am familiar with the drawing operation. In addition to some imperfections, the rest of the basic is completed. In laser cutting, I was not familiar with the operation of typesetting, so the teacher patiently explained it again. After the laser cutting was completed, I learned how to use the hot melt adhesive, successfully assembled the accessories, and completed the assembly of the excavator. In the afternoon, I started my formal contact with the design and theory of the snake robot. After watching a lot of literature, papers, and video materials, I put forward an innovative scheme based on the original scheme. And think about how to implement the new plan.

Day3:
Today I completed the design of the head of the mechanical snake. The head should be fixed to the servo and the body module. In the morning, I thought about the position of the servo in the clapboard and drew drawings for reference. To achieve the bionic purpose, the triangular partitions Ire replaced with a circle and the wheels Ire removed so that the mechanical snake could twist on the ground with the help of friction like a real snake. In the afternoon, I continue drawings. Based on the morning, the first laser printer, and then the three steering gears Ire installed separately. It was found that I forget to design the hole through which the spring line could pass through the partition. And, because it was designed to be completely round, the mechanical snake could roll over on its side. Finally, it is found that the spool of the wire does not need to be attached to the servo but can be directly fixed on the arm of the servo, and the rotation of the arm drives the tension of the line, to achieve the purpose of the spring contraction. Today's final drawing has been drawn and is waiting for printing tomorrow.

Daya4:
Today I studied the problem of springs. First, the spring is fixed by the screw which is easy to get stuck, so I decided to change the sleeve fixed. It was not strong to stick the bushing to the partition with hot melt glue, so I decided to use interference fit to make the bushing get stuck in the holes in the partition. At the same time, I removed the hole reserved for the cable and made a hole in the shaft sleeve so that the cable could pass through and be fixed on the other side of the partition. Through the mathematical formula calculation, when the position of the spring is opposite the steering gear arm, it can

achieve the maximum tension. Now, what I have to think about is the original length of the spring. I decided to use half the original length of the spring so that there is enough room to compress and restore the spring. At the same time, I unified the positions of the three servos to move half the length of it in one direction, so that the distance betlen the center of the servo arm and the spring is maximum. The problem encountered is that the deformation of the spring after pulling the steering gear arm is not obvious when the wire is tied and the experiment is done. This is a problem to be solved tomorrow.

Day5:

Through theoretical calculations this morning, the coefficient of the spring and the maximum force of the steering gear needed to lift the mechanical snake was determined. The final selected spring is 0.5*8*50, compared with the reference of 0.6*8*50, 0.6*9*50, and 0.5*9*50. 0.5 represents the line diameter and 8 represents the inside diameter. After the experiment, this spring is the best to compress of the four kinds of spring, so I choose it. After drawing the schematic diagram of the force, the analysis of the force needed to lift the mechanical head of the steering gear is completed. Through the force decomposition and formula calculation, the relationship betlen the lifting force and gravity of the robot is summarized. In the afternoon, two parts of the mechanical snake body lre assembled. The problems lre that the interference holes lre too large, and the servo arm was attached to the servo when the wires lre glued together, and they interfered with each other. The solution to the first problem is to replace a longer shaft sleeve, the solution to the second problem is to stick the wire more carefully, and the solution to the third problem has not been figured out yet. Then I thought of two ways to improve the robot. The first was to flatten the mechanical robot to make it look more like a real snake. The second is to add the function of grasping and exploration to the function of movement.

Today I studied the grasping system of the mechanical snakehead. The drawing is drawn from existing drawing strokes. The problem with the first print is that the clip is not wide enough. The width of the shelf was so narrow that it broke when it was printed and removed from the board. Another problem is that the boards holding the servo and clips are too long. So based on the original, the width of the clip was widened, the board was shortened. In the afternoon, the head was finished. Then, the problem with the mechanical snake's body is that when it rears its head, it leans sideways due to a lack of support for the Right of the head. Therefore, a universal joint can be used to make the snakehead upright. The universal joint is fixed in the middle of the clapboard using interference and is firmly glued on the clapboard with hot melt adhesive.

Day8:

Today is an improvement on yesterday's mechanical snakehead fixation method. Based on universal joint, the spring is added. The study found that springs with a wire diameter of 0.6 worked better than those with a wire diameter of 0.5 because springs with a wire diameter of 0.7 compressed easily and did not cause excessive deformation. In addition, I also looked at the possibility of skin. The balloon wraps a shell around the skeleton, using a plastic sheet as scales. This is unlikely because of the difficulty of attaching the plastic sheet to the balloon, and for a variety of reasons. Adding wheels is a good idea. Next, the four basic bones plus the head are assembled. The basic mechanical snake is

partially completed

Day9:

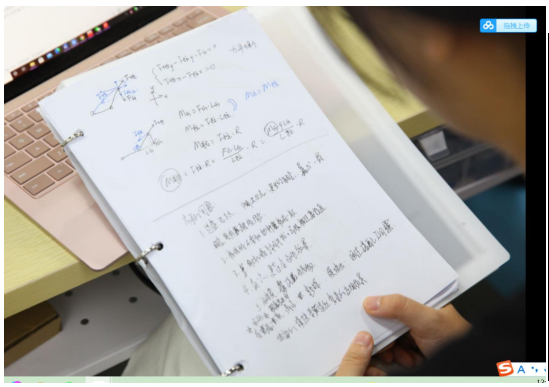
A partial joint error in the entire mechanical snake that was previously assembled was discovered today. The installation of servo and baffles is required to be positive and negative. If they are wrong, the underside of the stationary mechanical snake will not be able to touch the ground. So the pros and cons Ire resolved in the morning. In addition to this, the servo pulls interfere with each other because they are on the same level, so the solution is to keep the top one in the highest position so that it is not on the same level as the other two. So the problem of the steering-gear cable was solved. In addition, today I also installed the software to control the servo and learned the operation method of the main control panel.

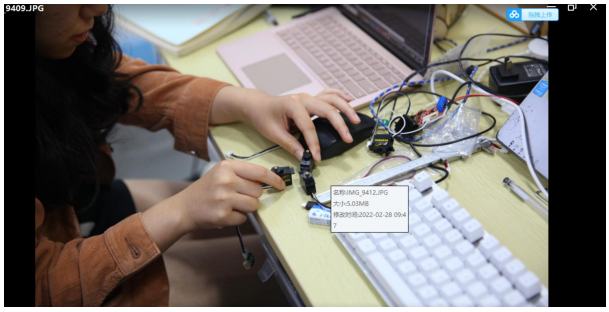
Day10:

Find and fix problems in yesterday's program today. In yesterday's procedure, some of the strings Are not in place. In the case of given the same Angle, some servo pulls in place, some pull amplitude is not large enough, resulting in the spring elastic deformation is not enough. After increasing the pull Angle of the servo not enough, some improvement was made, but the pull line was still not perfect. Afternoon mechanical snake added two modules, including the initial position of the commissioning servo and the servo number. Finally, I sorted out the ideas of the paper and started to write the paper. I wrote two modules, including project background and research status

Day11:

Today I will continue to finish the paper I did not finish yesterday. To improve the shortcomings of the first two modules written yesterday, continue to write the third module of theory application. First of all, draw a schematic diagram of the force in AutoCAD, and then draw the decomposed force. And then, finally, the meaning of each of the forces. Finally, the problem with yesterday's wiggling joint was discovered. Since there are two bushings inside the joint, the rope cannot rotate as expected due to the resistance of the bushings after pulling the rope tight, resulting in insufficient elastic deformation of the spring. Thus, the mechanical snake was disassembled and the bushings Ire removed from each joint.

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