CCD tracking-Mini chassis

1.Experimental Purpose

Through the previous experiments, we have gained an understanding of how the CCD module works. This experiment uses a linear CCD module for tracking purposes

2.Experimental preparation

This experiment requires an ROS expansion board, a Chinese racing chassis car, a 310 motor, a 7.4V battery, a linear CCD module, and an OLED screen (not required)

These hardware can be purchased at the Yabo Smart Store

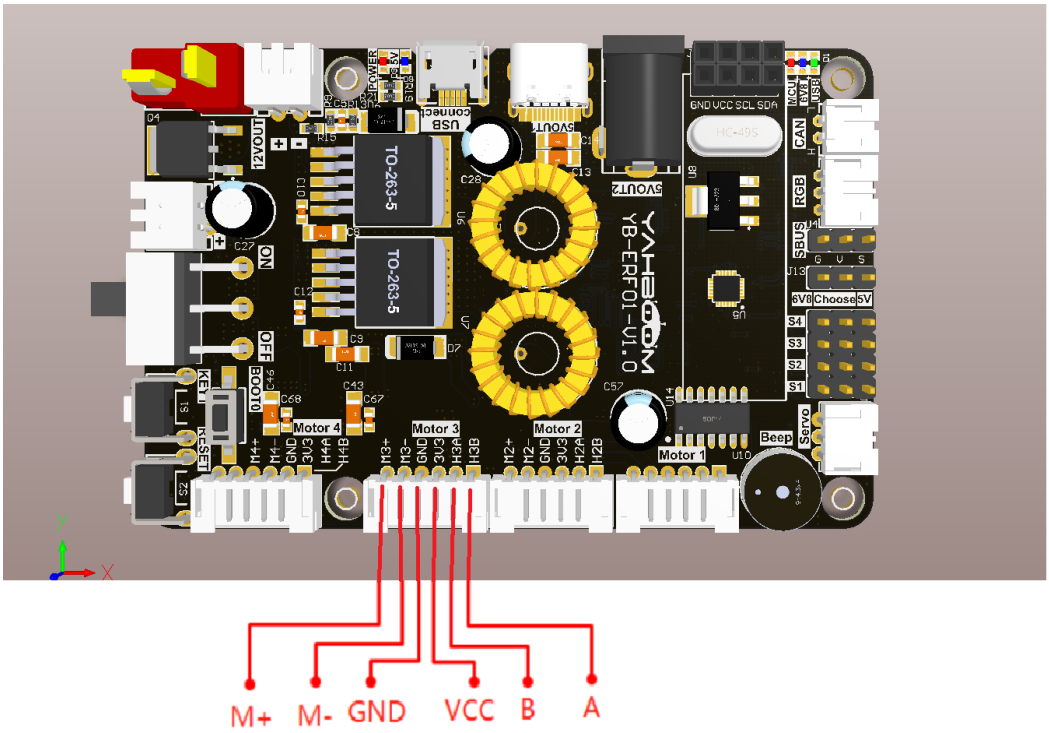
3.Experimental wiring

3.1 Jumpers are required for the wiring of the ROS expansion board and the 310 motor

The line sequence of the two is shown in the following figure:

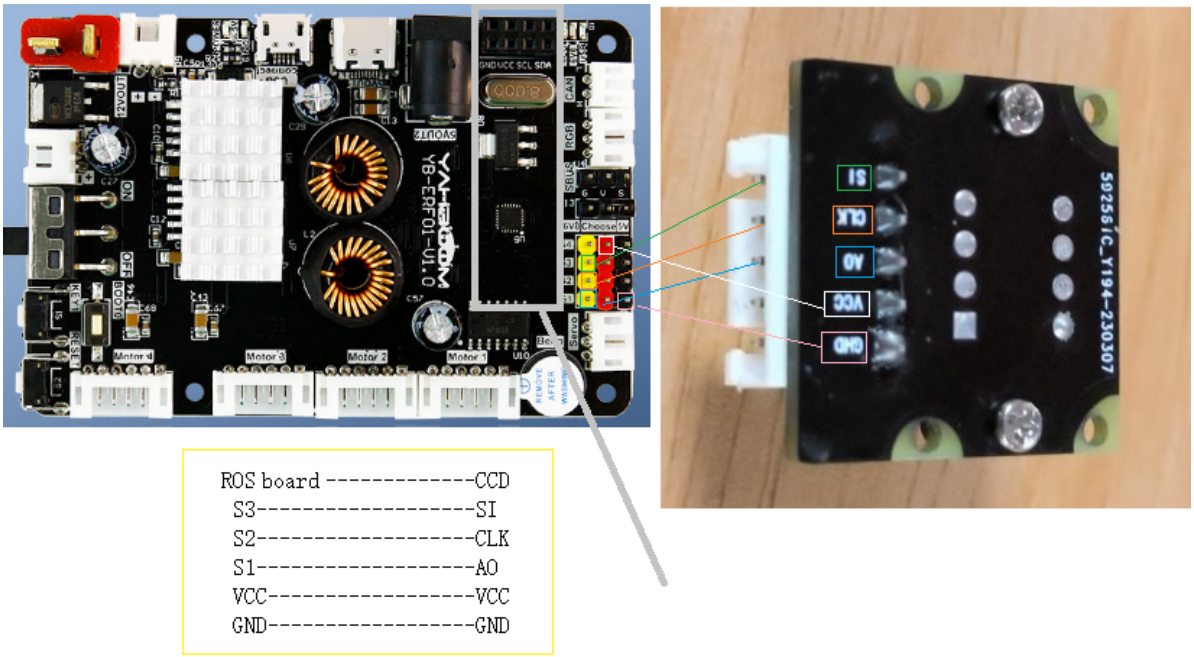
Wiring instructions

1: 【M2】
2: 【V】
3: 【A】
4: 【B】
5: 【G】
6: 【M1】



M1--->M+
M2--->M-

3.2 Wiring of ROS expansion board, linear CCD module, and OLED screen



4.Program source code analysis

This project introduces a real-time operating system for Freeros, and we will look at vTask ourselves_ The CCD thread function is sufficient, and other thread functions are not closely related to this experiment. Interested parties can analyze it on their own.
vTask_CCD：This task is to first determine whether the freeros system is normal, and if it is normal, enter the APP_ CCD_ The following will focus on analyzing the processing function for the tracking task of Handle

```
void APP_CCD_Handle(void)
{
    CCD_Read_TSL();
    g_ccd_median = CCD_Find_Median()-64;
    OLED_Show_CCD_Image(CCD_Get_ADC_128X32());
    pid_output = (int)(APP_CCD_PID_Calc(g_ccd_median));
    Motion_Ctrl(CCD_SPEED, 0, pid_output, 0);
}
```

- CCD_Read_TSL:This function is used to drive a linear CCD camera for data collection.
- CCD_Find_Median：The dynamic threshold algorithm used inside extracts the position of the current camera on the black and white lines.
- OLED_Show_CCD_Image：The purpose of this function is to display the waveform data collected by CCD.
- APP_CCD_PID_Calc：The PID algorithm is used inside, and the processed data is controlled for the speed of four motors based on the dynamic threshold algorithm.
- Motion_Ctrl：According to the PWM output of the PID algorithm, a motor is driven to perform a tracking of the car.

5.experimental result

You can see that the car is tracking normally on the black and white line. For a detailed tracking video, please refer to the introduction video of the CCD module on the Yabo Intelligent Flag Store.
Other reference tutorials:
https://blog.csdn.net/Gxust_Veneno/article/details/119797411