Southern Illinois University Edwardsiville

MRE 320 Sensors and Actuators Group Project

JetBot Track Racing

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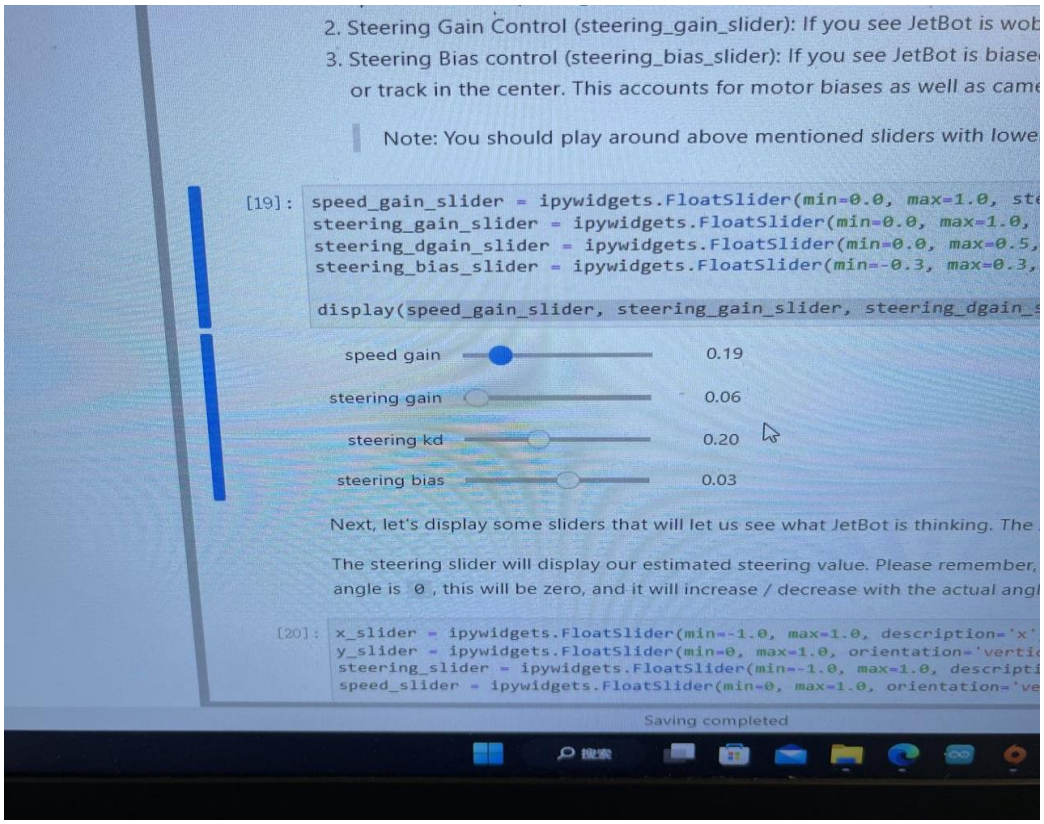
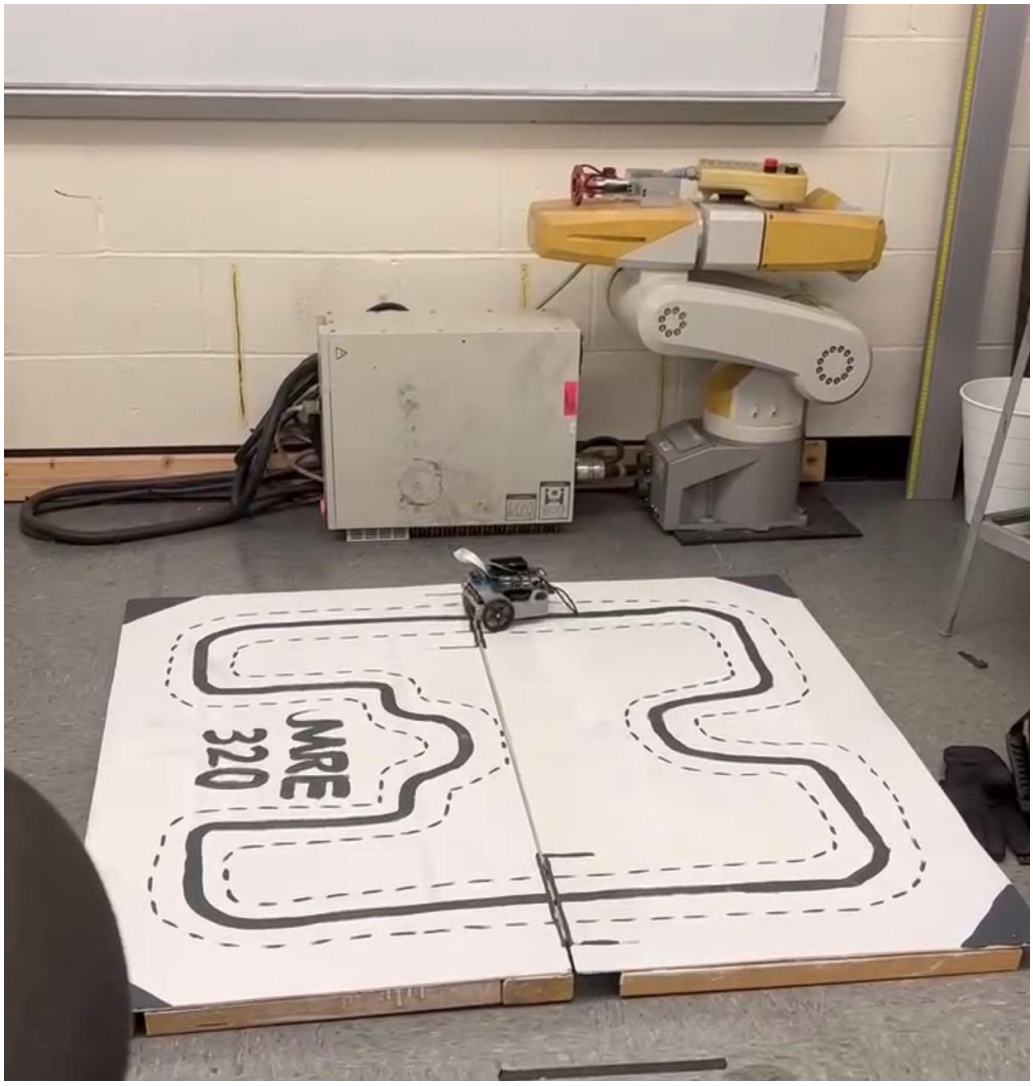
Automatic mode

Explain your strategy to win each race

For the automatic part, we think two aspects are very important. One is to take more photos of the track. We think that the more photos we can take, the more accurate they will be. It can make the car not skew out of the track, but also turn more smoothly. For every place, we think we can take 3-5 photos, one right, one right, and one right. This is necessary, More photos may be needed. Another aspect is to control the speed. The car cannot be driven too slowly to affect the performance, nor can it be driven too fast to cause the car to open the track. There are four data to control the overall trolley, namely, speed gain, steering gain, steering kd and steering bias. Better data need to be obtained through multiple debugging.



From the test, we get the best data of speed gain, steering gain, steering kd, steering bias is as follows:
speed gain: 0.19
steering gain: 0.06
steering kd: 0.20
steering bias: 0.03



We took about 300 photos and got the following training data:

0.547126, 0.191174
0.086377, 0.064022
0.070441, 0.057012
0.050009, 0.045608
0.045524, 0.033490
0.046325, 0.028679
0.047752, 0.041592
0.039050, 0.022120
0.029536, 0.039163
0.024224, 0.017705
0.025726, 0.016970
0.023288, 0.018948
0.023649, 0.022320
0.017588, 0.018972
0.023266, 0.022991
0.021394, 0.014039
0.020309, 0.023080

0.021548, 0.023139
0.015581, 0.015823
0.022291, 0.024696
0.019303, 0.032814
0.015769, 0.015123
0.015668, 0.010039
0.016401, 0.018510
0.018933, 0.030593
0.011705, 0.010128
0.011545, 0.013328
0.016121, 0.017479
0.012694, 0.012248
0.015628, 0.015549
0.008091, 0.012375
0.012536, 0.015224
0.010909, 0.019982
0.010152, 0.010596
0.013252, 0.012980
0.007984, 0.011357
0.009930, 0.013583
0.008126, 0.013343
0.007737, 0.011337
0.010859, 0.007468
0.007768, 0.010724
0.006063, 0.009388
0.005933, 0.009126
0.005959, 0.007961
0.004507, 0.010183
0.005139, 0.007749
0.005225, 0.009138
0.005006, 0.010331
0.005664, 0.015544
0.009629, 0.008707
0.008380, 0.009629
0.005653, 0.011425
0.006229, 0.008943
0.006680, 0.014461
0.007358, 0.009883
0.007133, 0.009680
0.008810, 0.017755
0.007740, 0.013294
0.008079, 0.014346
0.006845, 0.016911
0.006604, 0.010309

0.004034, 0.008544
0.005557, 0.009444
0.008185, 0.015593
0.006596, 0.010763
0.004995, 0.011020
0.006567, 0.011056
0.005286, 0.009052
0.004997, 0.009877
0.003565, 0.010116

What went well, and what did not?

Our automatic part will be attracted by these black lines at the beginning when MRE320 is big, which is also a difficult point for the automatic part. So we modified the steering to let the car drive from the other direction, but it was successfully completed. We think the speed control is good, and the data obtained after several debugging is good. Of course, it is not ruled out that we have not found any better.

If you have a chance of do-over, what would you have done differently?

We can take more photos to get more accurate training, and it is also very important to debug the four groups of data. The range of turning, whether the turning is smooth, and whether the speed is fast are all important, so we can test more data to get better speed.