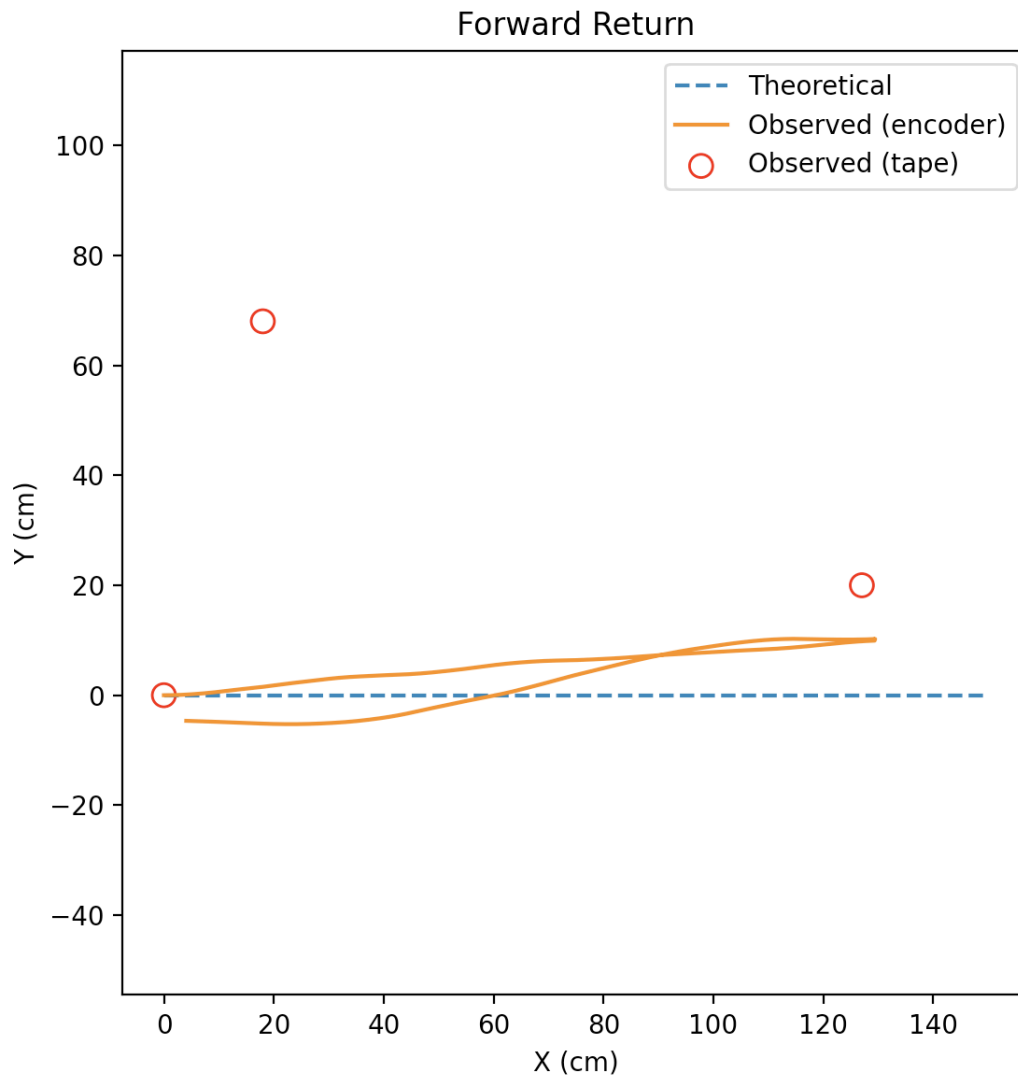


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Spring, 2025  
ME134 - Prof. Nemitz  
Lab 3 Writeup

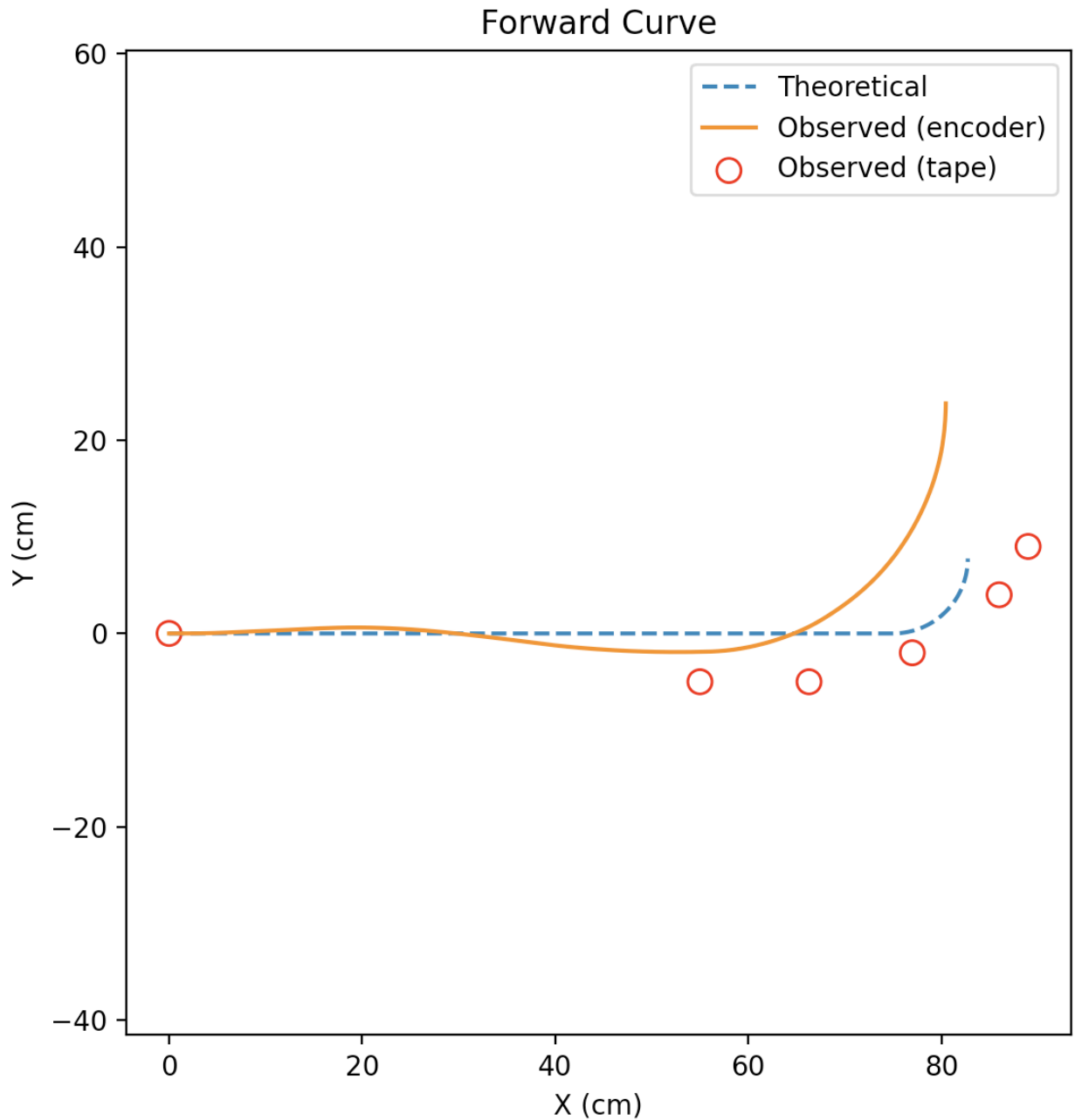
1. Experiment 1:

In this experiment, the XRP was instructed to move out forward for 10 seconds at 15 cm per second. Then, it should do a full 180° turn, and return back for 10 seconds at the same 15 cm per second.



2. Experiment 2:

In this experiment, the XRP was instructed to move out forward for 5 seconds at 15 cm per second, then continue on a curved trajectory where the right wheel is moving twice as fast as the left wheel, at 15 cm per second and 7.5 cm per second, respectively, for 5 more seconds.

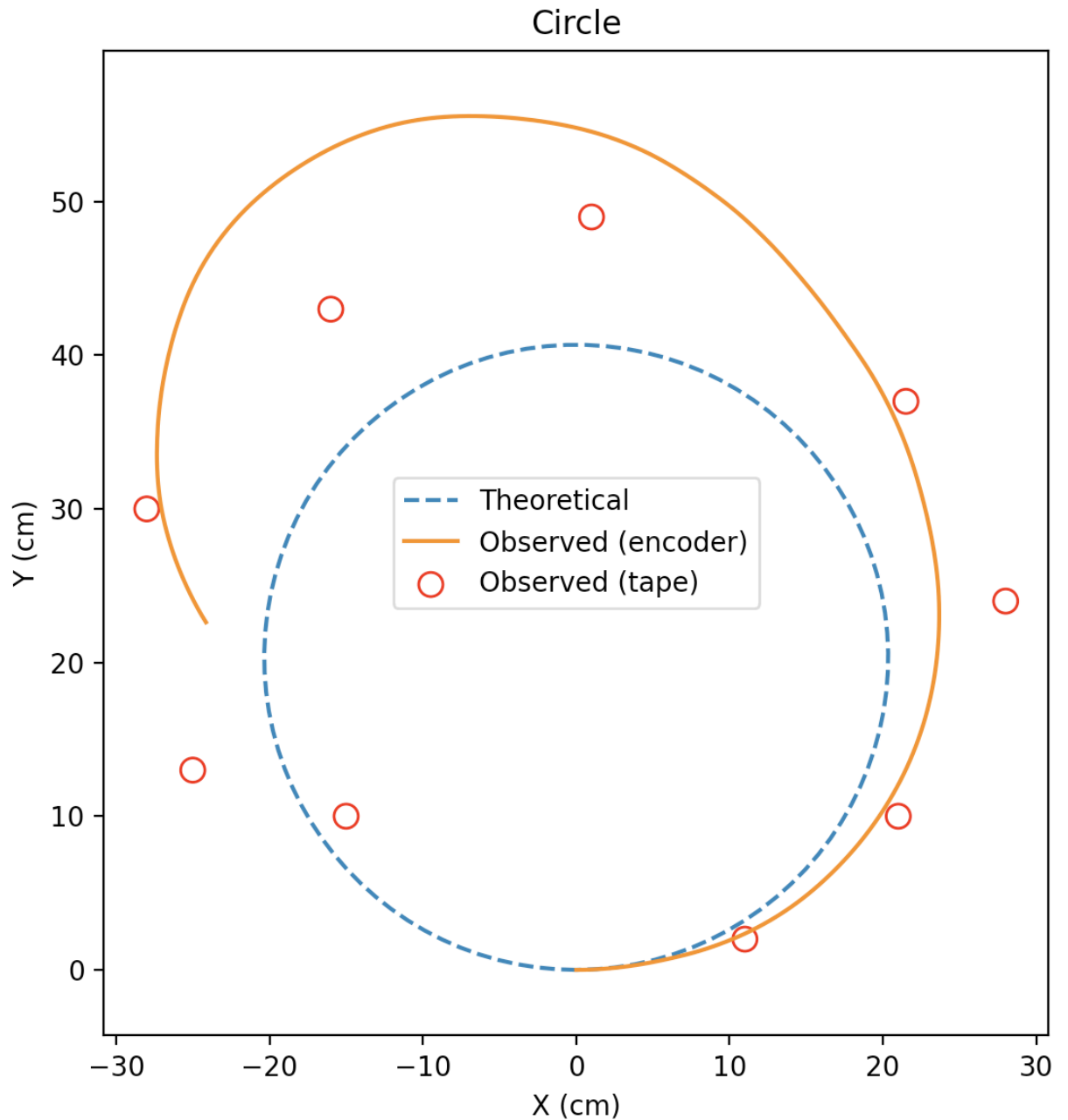


3. Experiment 3:

In this experiment, the XRP was instructed to move in a circle, trying to time for a 30 second lap. The radius of the ICC can be determined by this formula:

$$(\text{TRACK\_WIDTH}/2) * (1 + \text{LR\_RATIO}) / (1 - \text{LR\_RATIO})$$

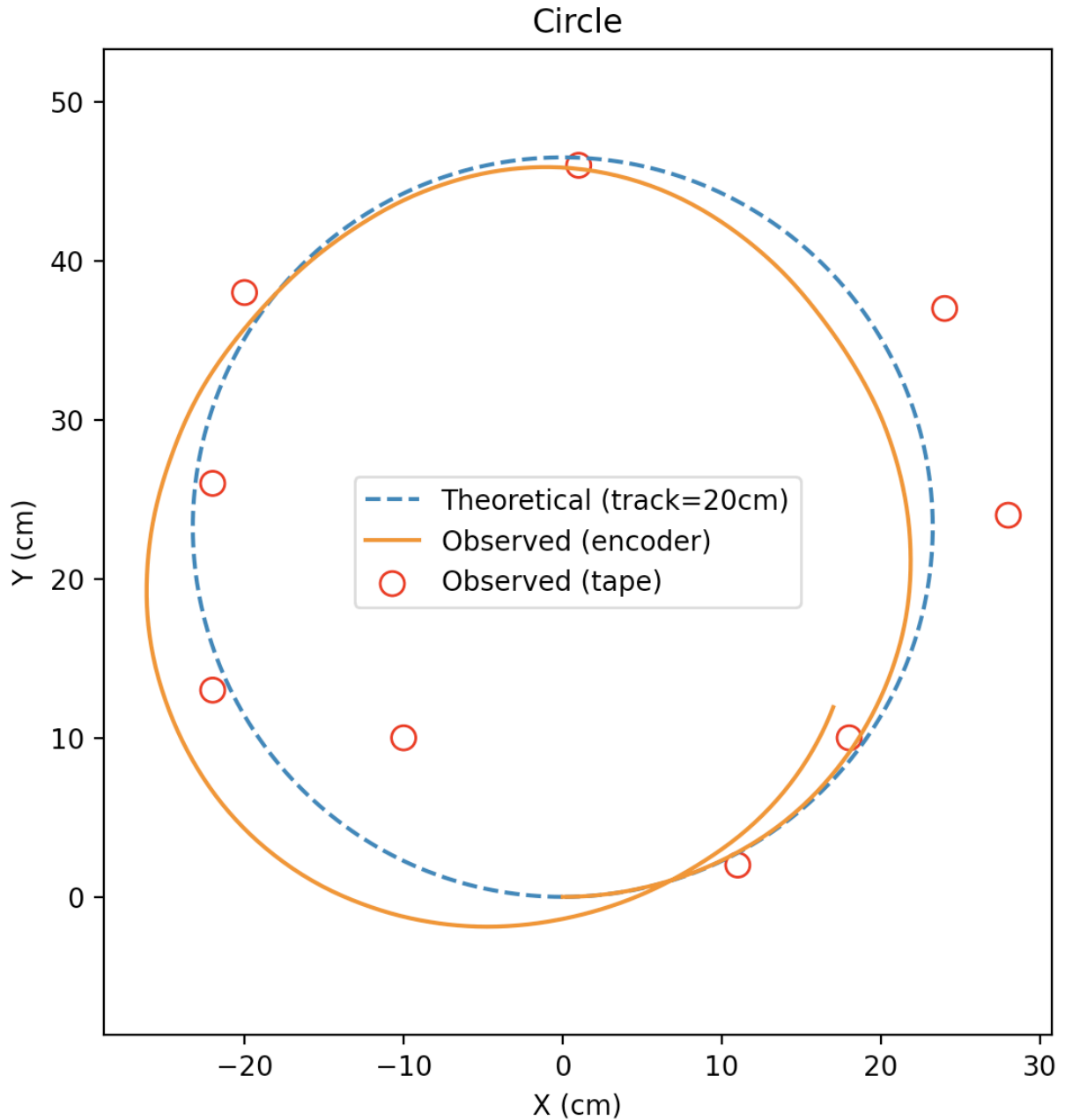
Given a track length of 15.5cm, and the ratio between the left and right wheels being  $\frac{1}{2}$ , the radius of the ICC is 23.25cm.



4. Experiment 4:

In this experiment, the track length of the robot was falsely increased to 20cm as opposed to the true 15.5cm. This should have caused a bigger track radius, because the two are proportional, as track length increases  $R_{ICC}$  also increases. In this experiment however, the XRP ended up doing more of an oval shape, and would overshoot where the original start point was, so you can see the extended radius in some areas.

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5. A couple methods could include using a ground truth position and occasionally re-zero the robot's position using this definite datapoint. Another way could be fusing data from another sensor like an IMU and filtering with a kalman filter to trust or weigh the encoder data less.