OrbitAI Transformer Debugging:

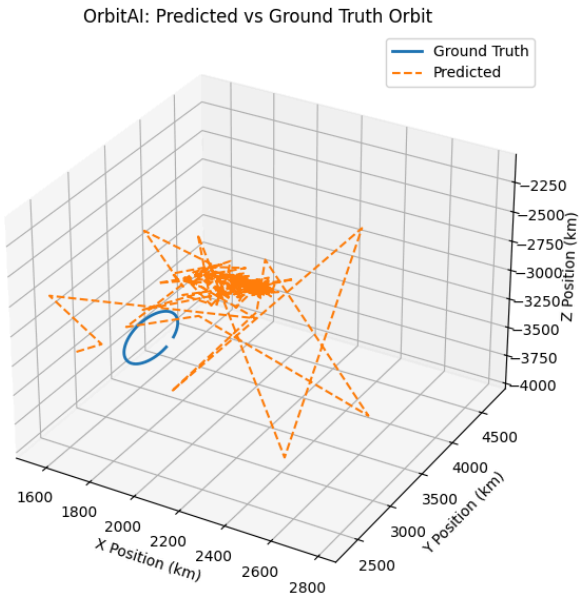
4/10/2025

Predicted (first 3 rows):

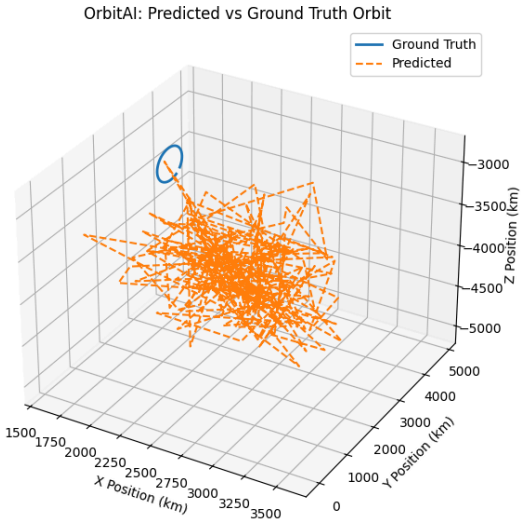
1.6579845e+03	2.4622756e+03	-3.1623108e+03	-1.3015160e-01	-3.3658743e-01	1.3796708e-02
1.7526527e+03	2.5250862e+03	-3.0750806e+03	-1.3985862e-01	-3.3981130e-01	1.6303470e-02
1.5523536e+03	2.4397693e+03	-2.7359963e+03	-1.3901298e-01	-4.1022074e-01	-3.5138562e-02

Ground Truth (first 3 rows):

1.9225734e+03	2.9976367e+03	-3.1568306e+03	-6.0382966e-02	-1.8176106e-01	3.5284859e-01
1.9239760e+03	2.9999663e+03	-3.1498799e+03	-6.1611120e-02	-1.8933018e-01	3.5560596e-01
1.9253411e+03	3.0020676e+03	-3.1428501e+03	-6.2887870e-02	-1.9697529e-01	3.5811433e-01

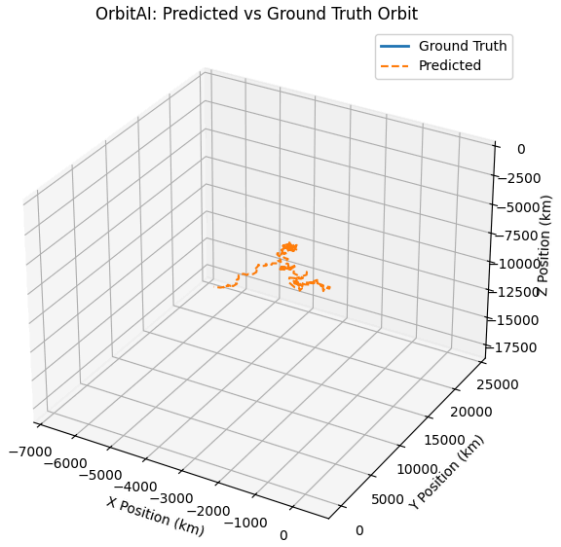


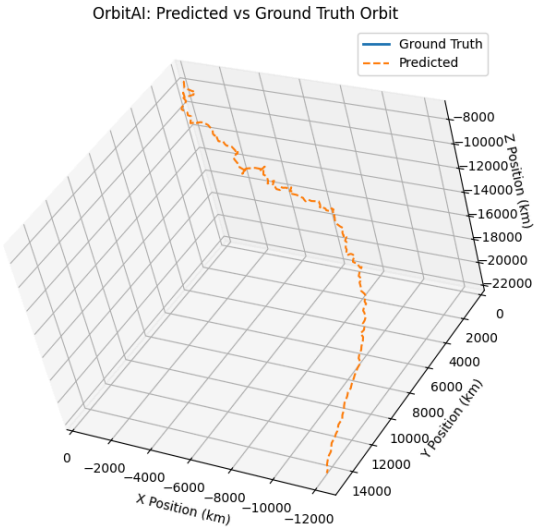
Position X RMSE: 297.2625 km
Position Y RMSE: 548.5104 km
Position Z RMSE: 385.7694 km
Velocity Vx RMSE: 0.0448 km/s
Velocity Vy RMSE: 0.1807 km/s
Velocity Vz RMSE: 0.3150 km/s



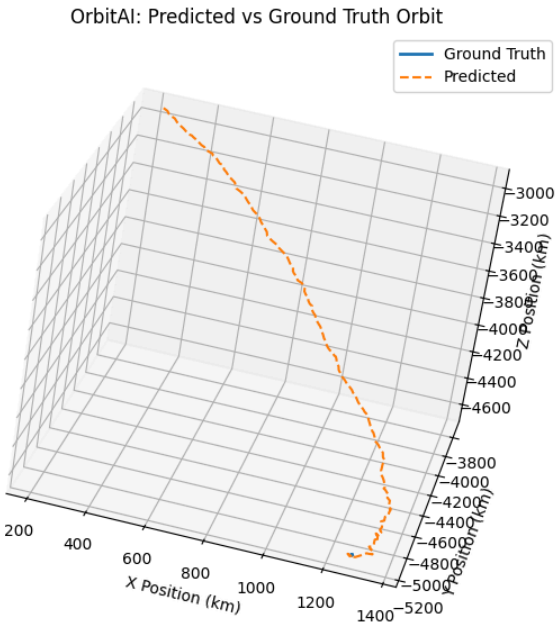
After Change #001
Position X RMSE: 827.9402 km
Position Y RMSE: 1029.1226 km
Position Z RMSE: 943.1311 km
Velocity Vx RMSE: 0.0604 km/s
Velocity Vy RMSE: 0.2018 km/s
Velocity Vz RMSE: 0.1900 km/s

After Change #002: Learning has gotten worse, predictions are further from ground truth but they are at least sequential.





After Change #003: Significantly improved learning. Position is at least sequential but also in a curve, potentially trending towards an orbit.



After Change #007: Model Architecture swap. GRU was incredibly accurate, less than 2% inaccuracy and capable of predicting 180 future sequences given only 20 previous sequences of positions & velocities.