Your topic is approved. Your project idea on exploring the application of linear regression within the Kalman filter is an excellent and ambitious choice. The focus on how linear regression is used in the prediction step of the Kalman filter, especially for modeling the relationship between observed measurements and system state variables, is well-articulated and demonstrates a solid understanding of both regression analysis and filtering techniques. The decision to use a simulated dataset with noise is smart, as it allows for controlled experimentation while staying true to the Kalman filter’s assumptions.

To improve, I would suggest a more detailed explanation of how the interaction terms in your regression model will be specifically applied to the Kalman filter context. It would also be helpful to clarify how you plan to evaluate the model’s performance beyond the regression diagnostics and F-test. For instance, will you use any specific error metrics (e.g., mean squared error or mean absolute error) to assess the accuracy of your position estimates? Additionally, you may want to consider explaining the role of the categorical variable (sensor type) in more detail—how you expect it to influence the model and its predictions. This will further demonstrate the depth of your approach. Overall, your topic is promising and well-thought-out; refining these details will make it even stronger.

Looking forward to seeing your work develop!