Mini-assignment – Kalman filter

1. Title: Design and implement a Kalman filter to solve a target tracking problem.

2. Objective: The goal of this assignment is to implement a Kalman filter to track a target moving in a 2D space. Students will apply the Kalman filter algorithm to perform prediction and updating of the target state based on a dataset and evaluate its performance.

3. Problem Statement: Given a dataset (KF_Measurement.cvs) consisting of 31 measurement points in a 2D space. The 5 columns represent the following fields: time (second), measurement x (m), measurement y (m), ground truth x (m), ground truth y (m). The target is moving in Constant Velocity with speed 12.5m/s, measurement error standard deviation is 10m for both x and y.

4. Your task is to:
    a. Design and implement a Kalman Filter to track the target in 2D space.
    b. Visualize by plotting the target flying profile and the tracking results with proper setting of all the essential parameters.
    c. Evaluate the performance of the Kalman filter

5. Submission Requirements:
    a. Source Code: Submit the complete source code and with the necessary comments.
    b. Report: A brief report (3-4 pages) explaining your approach, challenges faced, results obtained, and any conclusions drawn. Report submits in pdf format. Codes to be placed in the report annex.
    c. Visualization: Include plots of the data points, and any other relevant visualizations.

6. Bonus Challenge:
    a. Experiment with different process noise values and measurement noise values
    b. Apply the Kalman filter to solve another problem.

7. Due Date: week 3, 1st September 2024, 2359hrs. Submission file naming convention: StudentName_number_KF.pdf