- Sensors-467002

Title: A low-cost underground garage navigation switching algorithm based on Kalman Filtering

I am very glad to review this paper.

Authors discussed the underground garage navigation switching algorithm. A kind of integrated navigation system, which combines the INS, DR, GPS etc, is researched and developed, and EKF algorithm is adopted to provide two freely-switchable navigation modes for vehicles in the ground and underground garages. And some experiments verified the feasibility of the system and correctness of the algorithm.

1) In the matrix of Equation (14), the element of row 1 and column 2 is wrong, must be $\sin(\gamma)*\sin(\theta)$.

2) Please distinguish the specific force from the motion acceleration. The output of accelerometer is specific force, which is equal to the vector difference between the motion acceleration and gravitational acceleration vector. So in the equation (3), "+{0 0 g}"may be "-{0 0 g}", in the equation (3), "-{0 0 g}"may be "+{0 0 g}". Please think carefully .

3) Please explain the meaning (function of observables) of $h(X_k)$, and distinguish altitudes $h(k)$, $h(k+1)$, h , $h(t_k)$ from $h(X_k)$.

4) Roll is denoted by τ (above eq.(14)) and θ, please unify.

5) What is the "direction of X"? In eq.(3) and eq. (5-9), why distinguish x(lowercase) from X(capital), please unify.

6)In page 9, "garage title" → "garage tilt", what are the measurement units about values "8.2", "13.89" and "5.75".

7)In page 10 and 11, "comprehensive" → "comprehensively", "…of the vehicle is" → "…of the vehicle are", "more stable and close" → "more stable and closer", "reduce and controlled" → "reduce and be controlled", "it avods" →"it avoids". Where is Figure 12 and 13? Please recheck.

8)in Abstract , "use efficiency" → "efficient use", "join" → "enter into"?

This manuscript can be accepted with minor revision.