Outpatient Tracking to Reduce Cross Infection

Progress Report

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Outline

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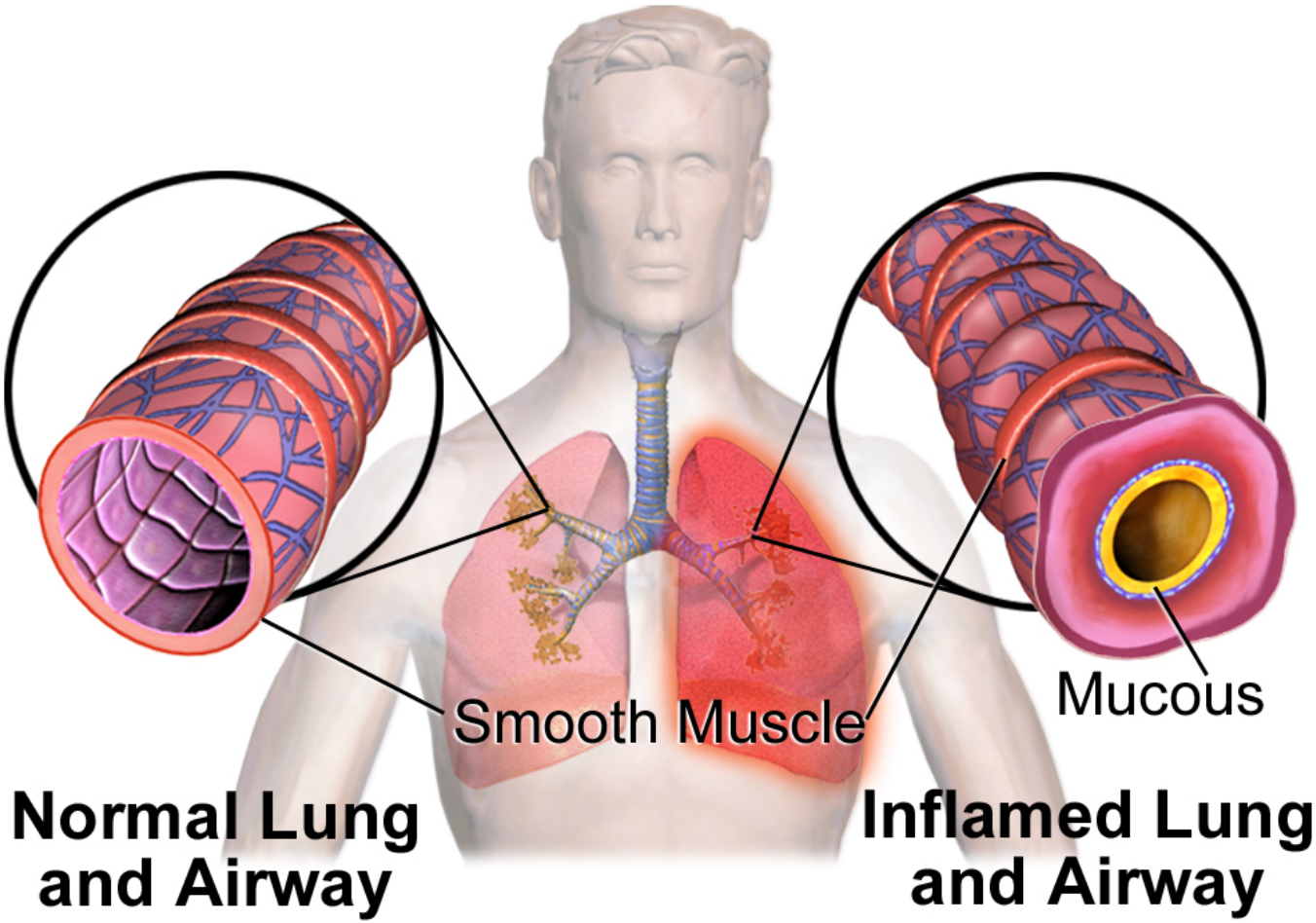
Smooth Muscle
Mucous
Normal Lung and Airway
Inflamed Lung and Airway

Background

- 200,000 hospital acquired infections (HAIs) occur annually in Australia.
- In-patient care vs out-patient care
- Cystic Fibrosis (CF) is a genetic condition that primarily affects the lungs.
- CF health care delivery has moved to out-patient environments.

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Our hypothesis is that patient encounters can be tracked using lightweight indoor localisation technologies allowing for interventions to improve patient flow, reduce patient contact, and reduce HAIs.

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Aim

Identify areas of potential cross infection in the hospital out-patient environment.

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  - presence of low cost embedded sensors in smart-phones

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- Air-borne infection transmission among CF patients
- SNA focused on disease transmission and control

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- Development of a smart-phone application to accurately track the position of the CF patient indoors.
- Development of algorithms to identify high risk areas for CF patients in the hospital out-patient environment.
- Implementation and testing of the software system to identify areas of improvement and practicality of system.

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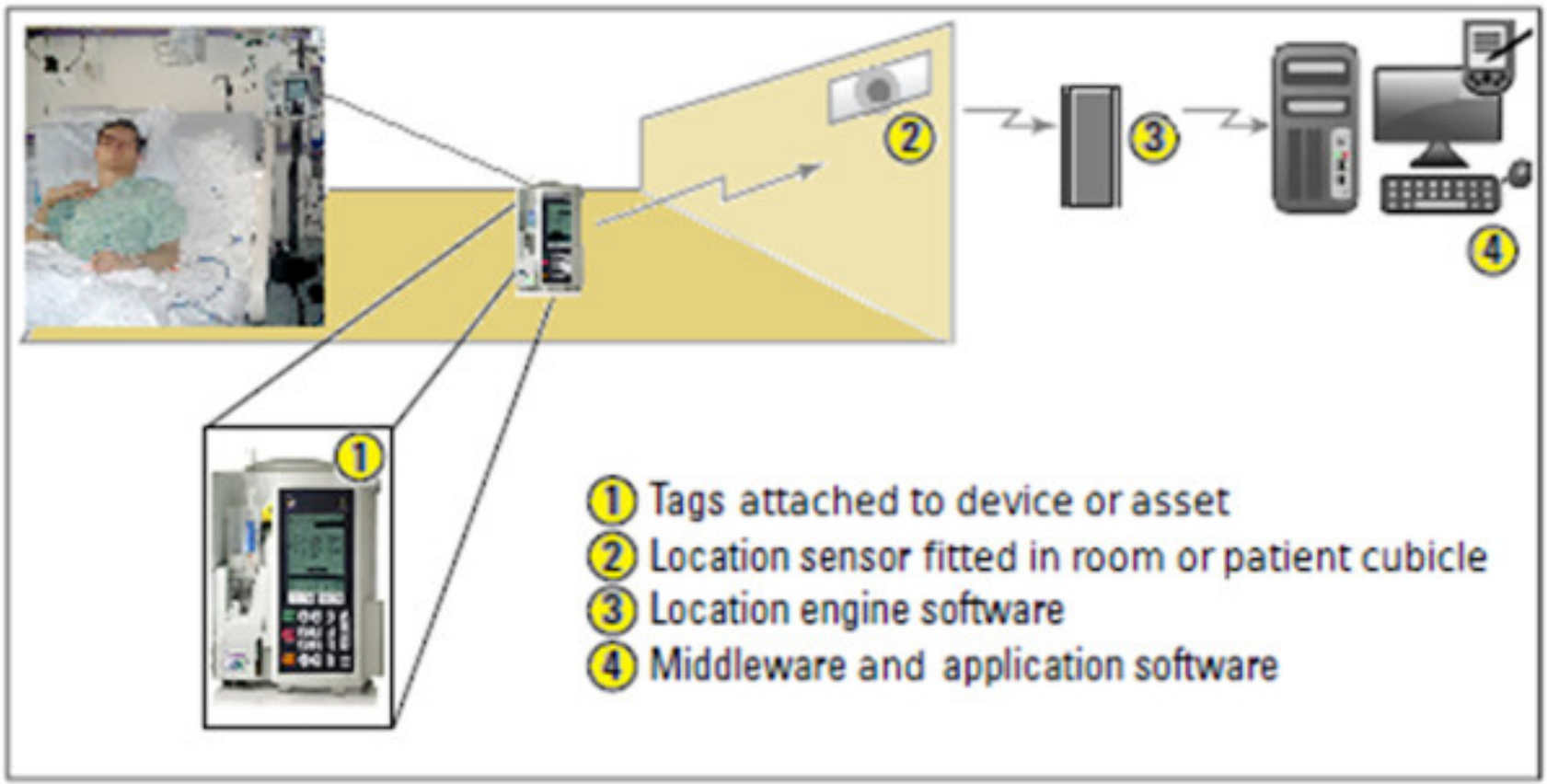

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- RTLS is an integral part of the health care industry
- RTLS components
- Used in monitoring and workflow improvements
- No consistent RTLS system

Indoor Localisation

- Pedestrian Dead Reckoning (PDR)

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- Direct Sensing

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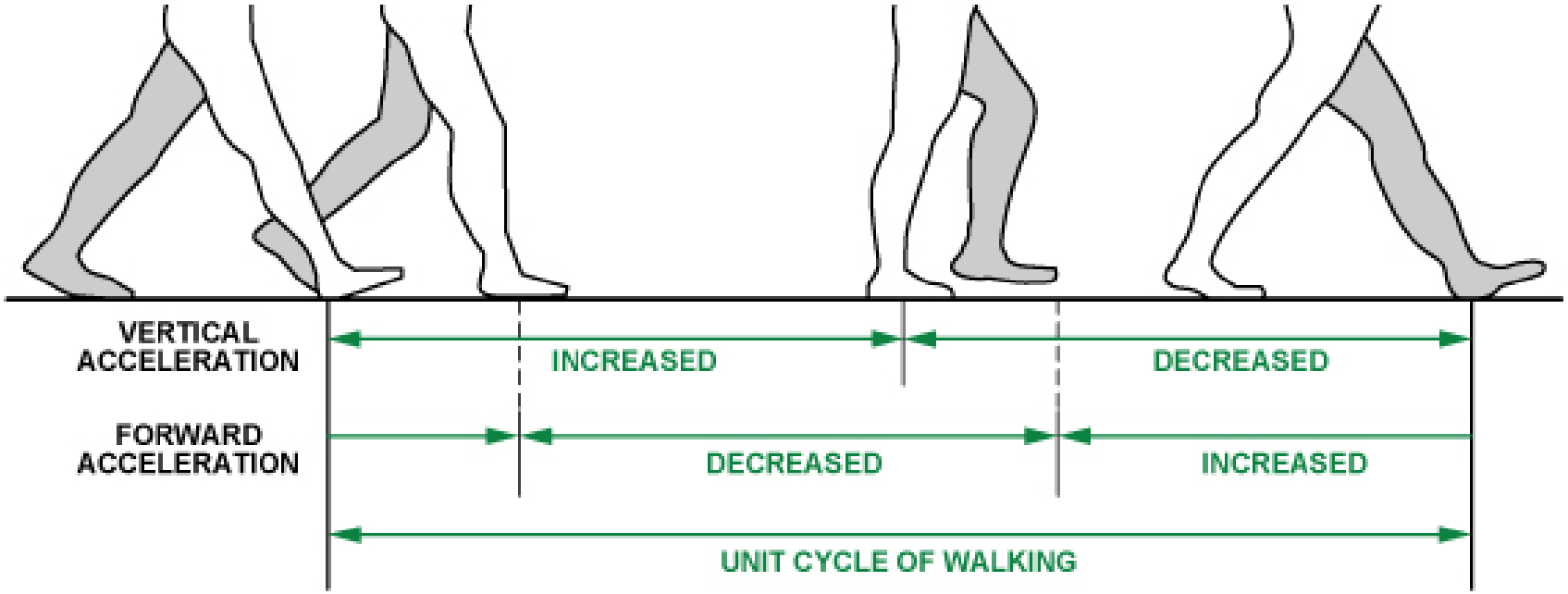

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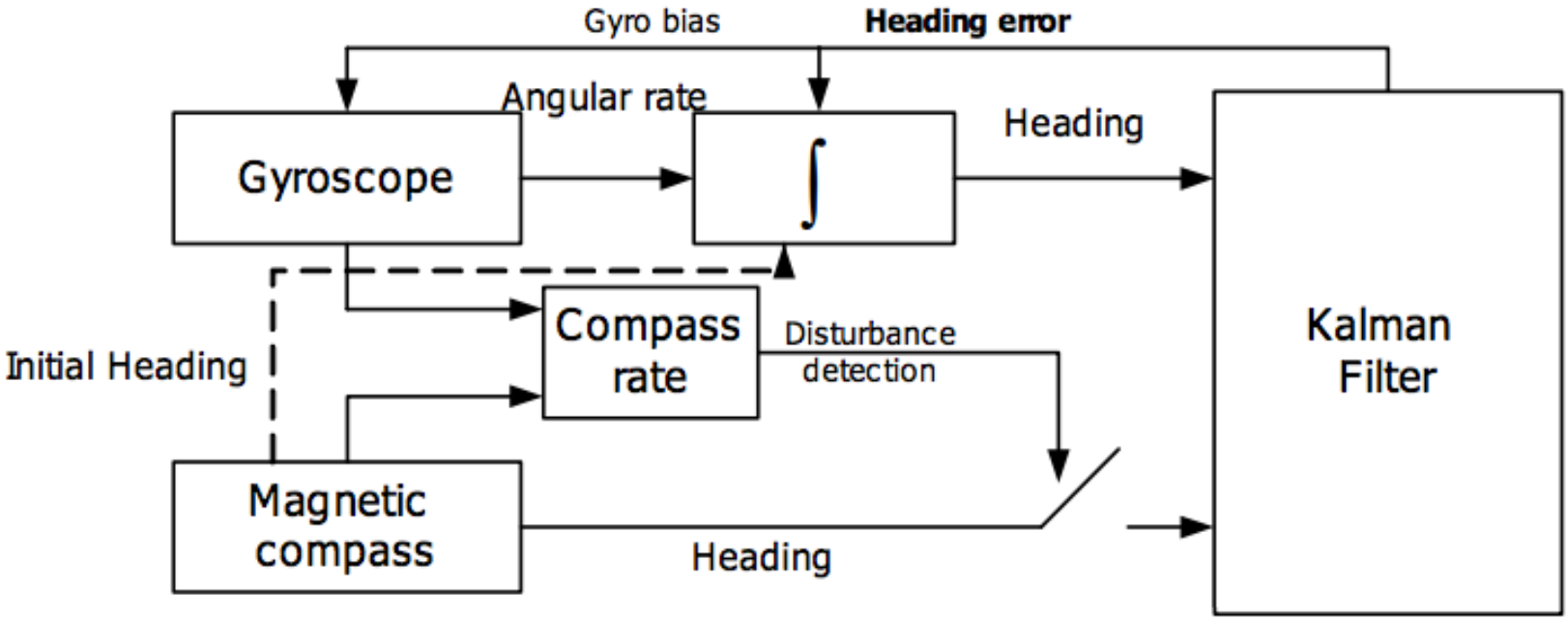

$$\omega_{compass} = \frac{\psi_{compass}(t_k+\Delta t)-\psi_{compass}(t_k)}{\Delta t}$$

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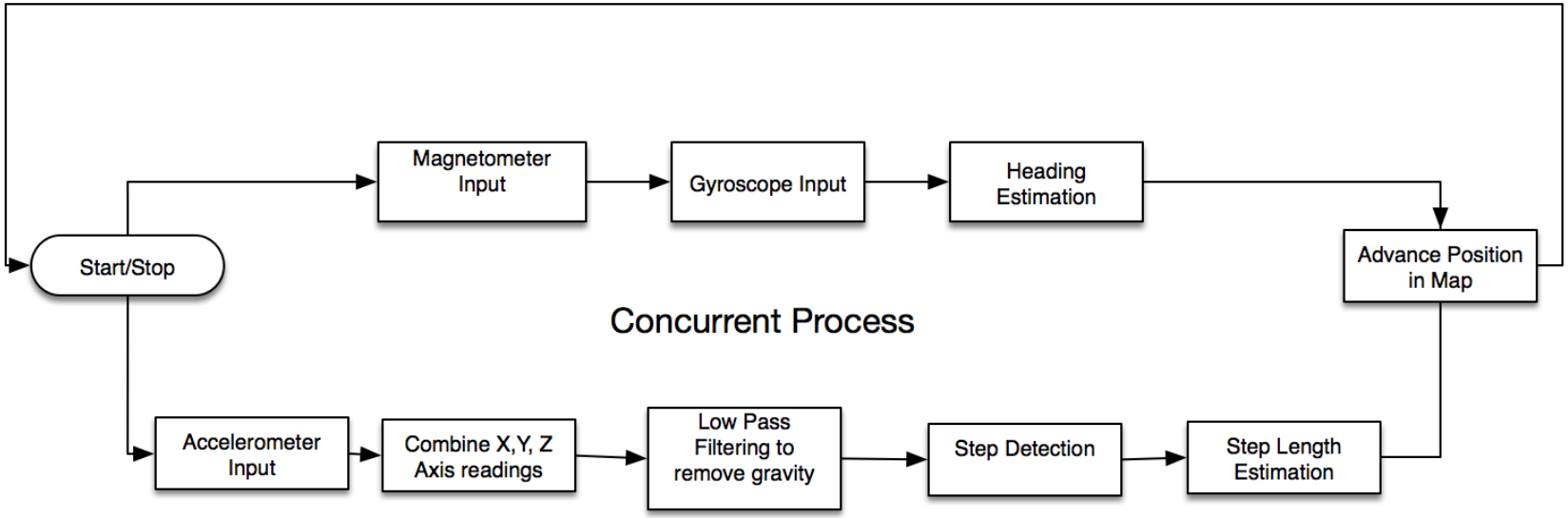

$$\boldsymbol{x} = \begin{bmatrix} x \\ y \end{bmatrix} = \begin{bmatrix} x + s\sin(\theta) \\ y + s\cos(\theta) \end{bmatrix}$$

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- Error Correction with Direct Sensing Technology
  - Bluetooth Beacons with known positions scattered through the map

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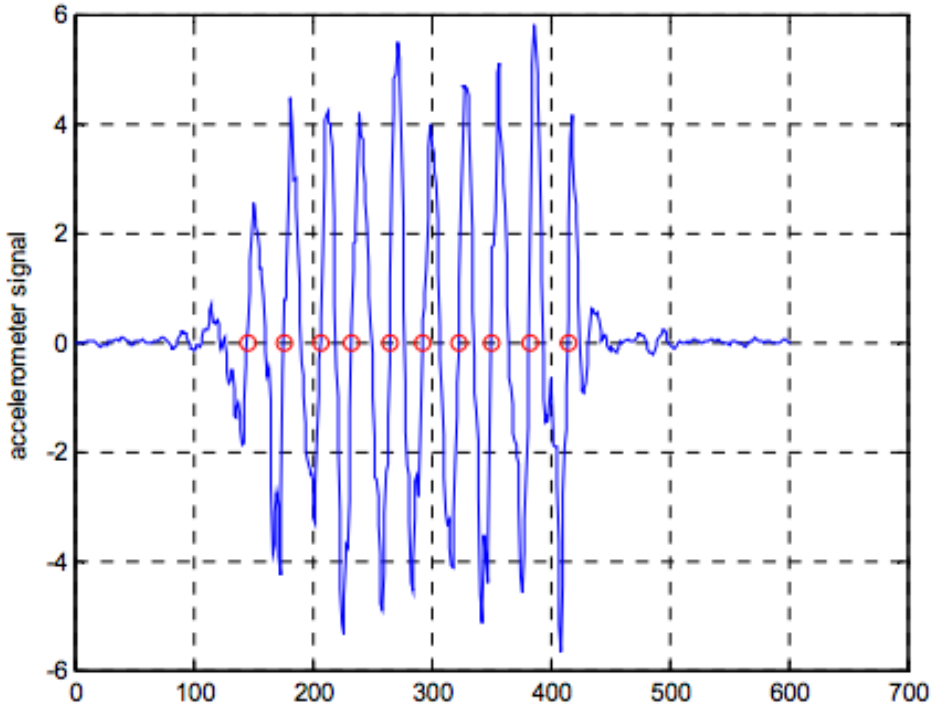
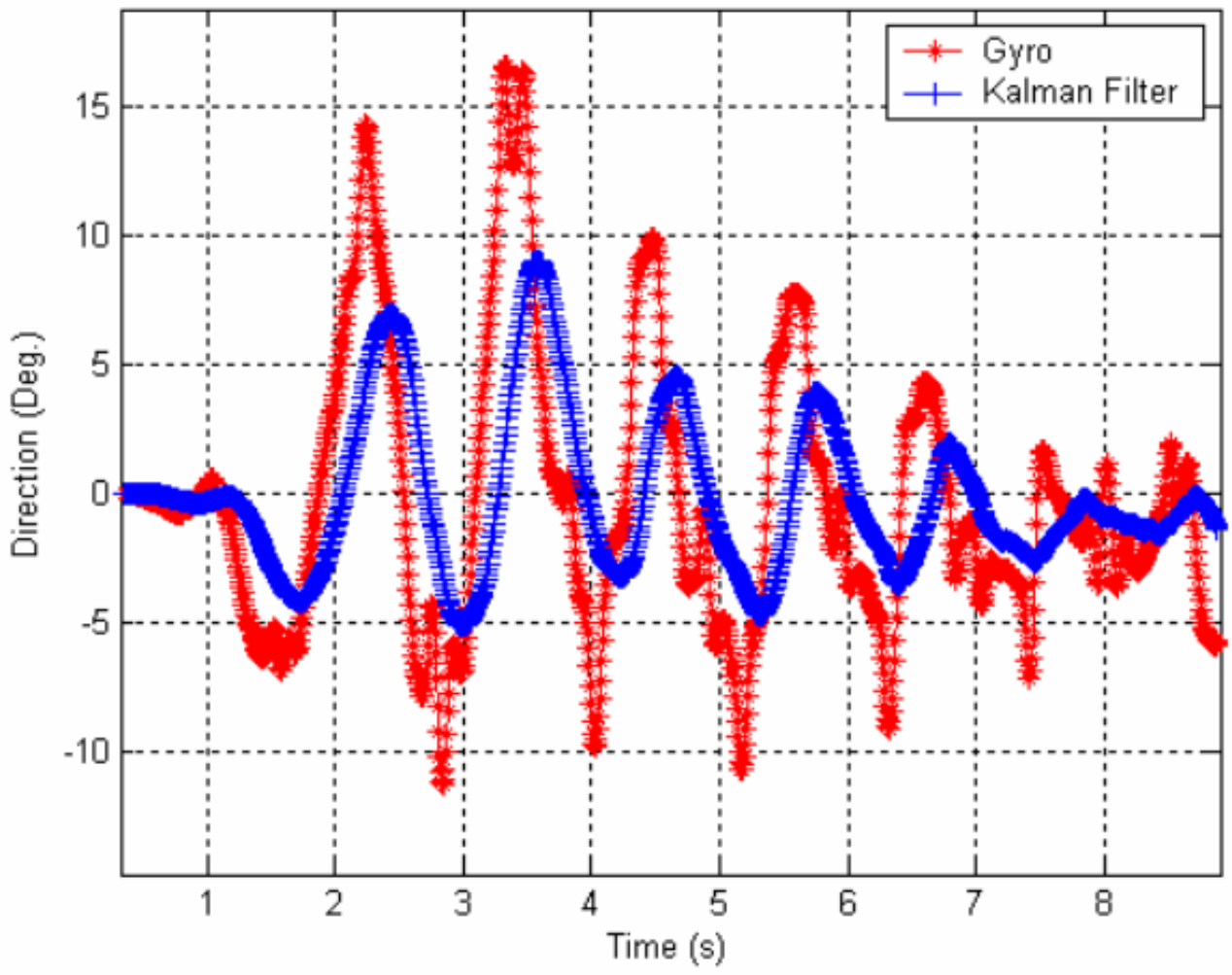
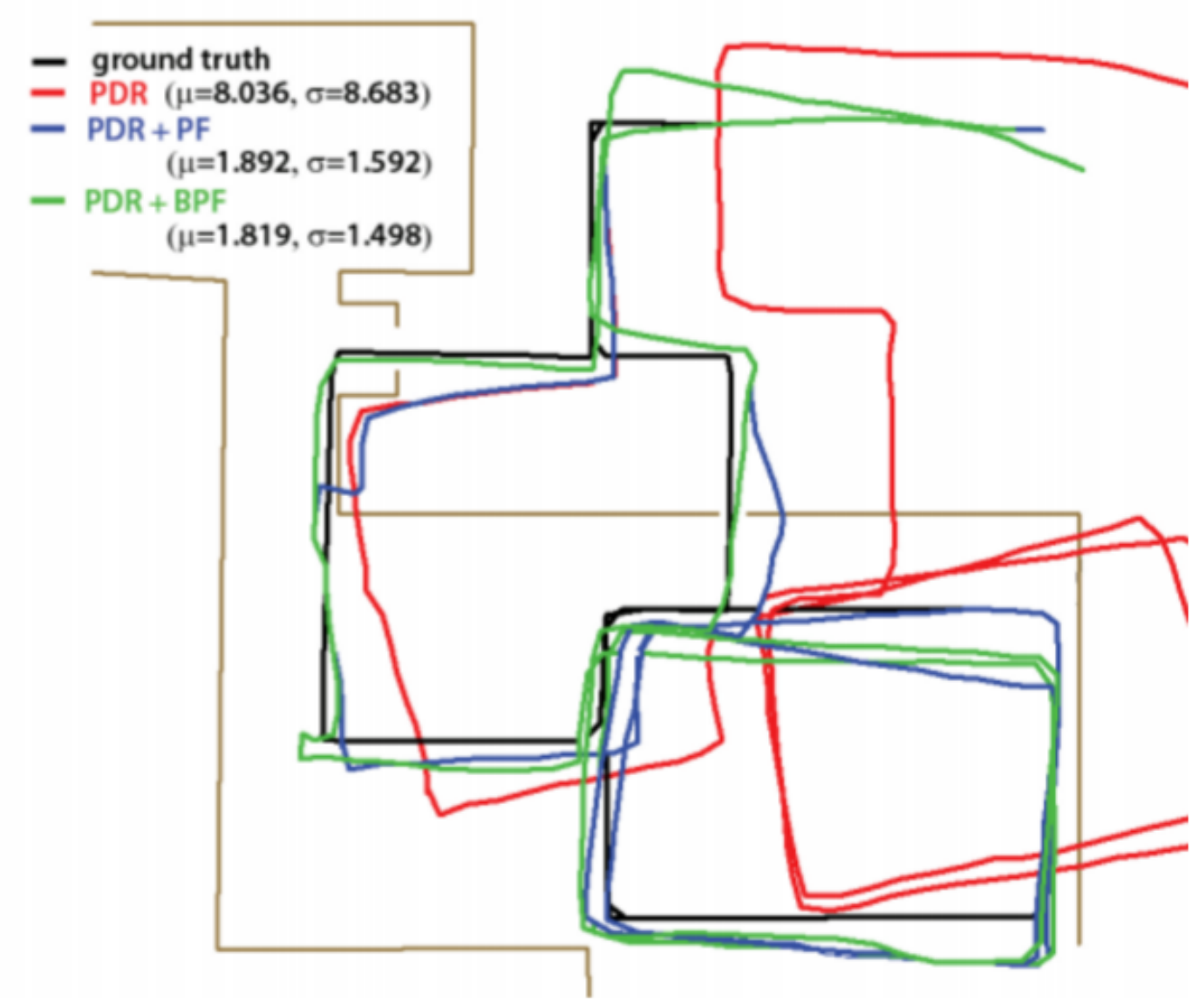


Heading Estimation



Map Matching



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