Designing a motion model, an introduction

Sensor fusion & nonlinear filtering

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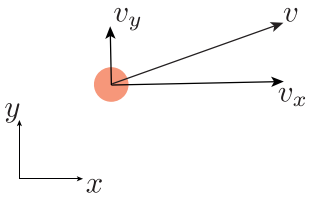

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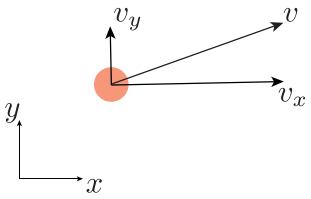
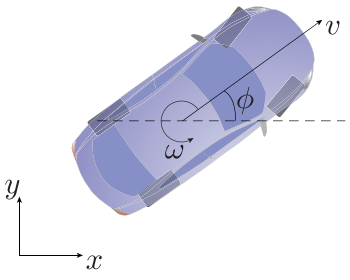


- **Rotational kinematics.**
  Useful when we wish to orient an object in $2D$ or in $3D$. The orientation may also be connected to the translation of the object.



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  - We may have a reasonable description of the noise in the time domain

    $\rightsquigarrow$ how can we describe the noise covariance in the discrete time model?

SELF-ASSESSMENT – ORIENTATION ESTIMATION

Why may it be of interest to include the orientation of, say, a car in a state vector:

- In some cases, we may be interested in estimating the orientation of the object.
- It is not possible to obtain a reasonable estimate of the position of the car (better than 10 meter accuracy) unless we know its orientation.
- Information about the orientation may yield better predictions of the future positions of the car.

SELF-ASSESSMENT – DISCRETIZATION

Why is it often useful to discretize a time continuous model?

- The computers that we use will introduce quantization error when they discretise our signals and it is therefore better that we do this ourselves.
- The discretized version provides a simpler model that we can use for prediction in our filters.
- Normally we obtain measurements at discrete time instants and in most situations it is sufficient to compute the posterior density at these time instants. For these reasons, it is sufficient to find the predicted density at the time when we receive the next measurement.