**KALMAN FILTER – TRACKING SPACESHIP**

[**Reference**](http://www.bzarg.com/p/how-a-kalman-filter-works-in-pictures/)

* An object has **state** 🡪 **position, velocity** (acceleration is constant 🡪 uniformly accelerated)
* The Kalman filter assumes that both variables (position and velocity, in our case) **are random and Gaussian distributed**. Each variable has mean values , center of the random distribution and variance (uncertainty)
* **Correlated position and velocity** -> likelihood of observing a particular position depends on what velocity you have (Predict new position based on the old one). In this case, we have many information, in fact one measurement tells us something abouts the others. We want to get as mech as possible information from **uncertain measurement**.

This correlation is captured by the **Covariance Matrix** , in which each element is the **degree of correlation** between the *i-th* state variable and the *j-th state* variable.

**Problem**

At time **k,** we need two pieces of information: the best estimate (also called ) and its covariance matrix :