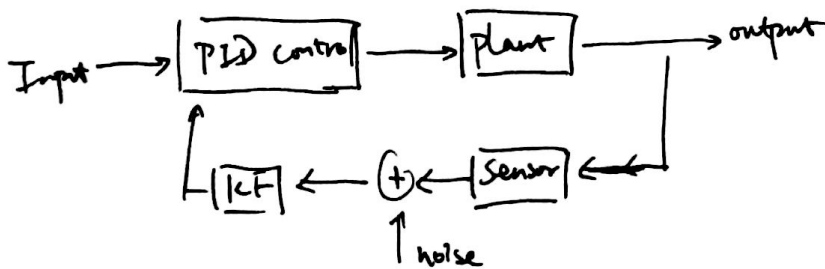
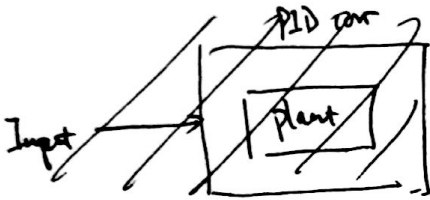


## Kalman Filter in Control Applications

KF filters sensor signals/observations by estimating underlying state and ~~also~~ combining that with incoming measurement to derive most likely estimate.

In control, e.g. a PID controller aims to minimize the difference between an input/set-point and the output. The "output" is sensed via an observer or sensor. The PID controller is good at this ~~and~~ under external disturbances, but becomes ineffective under a lot of sensor noise. Therefore, a KF can be used to filter the noisy sensor readings, complementing the controller.



Kalman filter:

- Derived from:
- 1) Keeping mean estimate = mean true state
  - 2) Minimize error variance.

Extra constraints:  $\Rightarrow$  Measurement and Process noise are Gaussian with ~~not~~ mean=0, and no correlation.