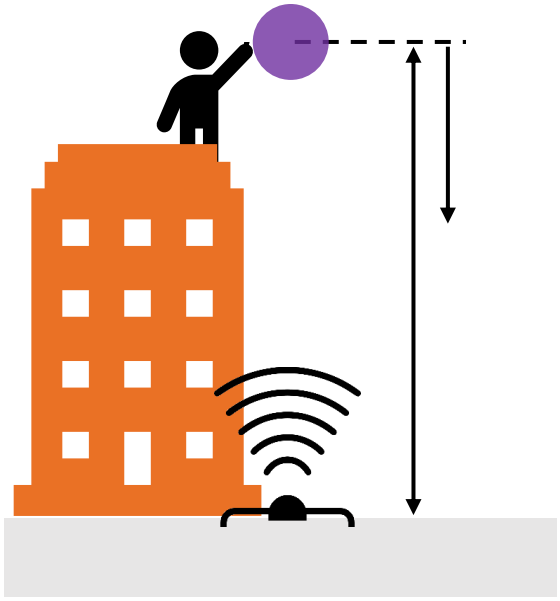
Optimal State Estimation

Practice 2. Least Square Estimation



A discrete model of the free-falling object can be represented as follow:

$$r_{sensor}(t) = r_0 + v_0 t + a_0 t^2/2 + noise_t$$

, where r_{laser} is an altitude (range between object and ground) measured from sensor, r_0 is an altitude at time 0, v_0 is the velocity of object at time 0, a_0 is the acceleration of the object at time 0, and $noise_t$ is a noise of sensor which follows $noise_t \sim N(0, 0.01)$ characteristics.

[Practice 1]

Please find the r_0, v_0 and a_0 using given data through least square estimation. Submit the estimation error.

[Practice 2]

Please find the r_0, v_0 and a_0 using given data through recursive least square estimation. Plot the estimation results for the time.