

EE683 Assignment 3

- ✓ **Due date:** Nov/10 (Tues) 23:59 (late policy: -10%point per day)
- ✓ **Submit to:** mjkim.lecture (at) gmail.com
- ✓ **File name:** HW3_[Student ID]_[Full name]_1.pdf (ex. HW3_20201234_홍길동.pdf)
- ✓ **Style:** use IEEE LaTeX style (conference, double column)
- ✓ **Page length:** at least 2 pages. Less than 2 pages will be regarded as "not submitted". There is no upper limit, but please try not to exceed 6 pages.
- ✓ **Language:** English
- ✓ **Format:** there is no fixed format as far as you include (i) summary of the lecture, and (ii) example
- ✓ **Summary of the lecture (50% of grading):**
 - Your own summary for the lecture 12,13
 - The purpose is to prove that you studied and understood.
 - You have to explain things in your own language. Don't just copy and paste equations from the lecture slides, and argue that you understood. This is not accepted.
 - Instead, try to use plain English with figures. Key equations should be there of course, but please don't fill out space with a number of equations for no reason.
- ✓ **Example (50% of grading):**
 - Make your own example. Implement, simulate and discuss about the result.
 - You may solve a basic question (provided below), but you can get only 30% of grading. However, in case discussion is "exceptionally" good, you may get maximum 40% even with the basic question. But, the standard for "exceptional" will be high.
 - Basic question: Extend your 2-DOF robotic systems (that you already used for assignment #2) to flexible joint system with gear friction. Apply disturbance observer on the motor-side dynamics, to compensate for the friction. When implementing the friction, use LuGre model (reference: Revisiting the LuGre friction model, IEEE Control Systems Magazine, 2008).
 - To get full 50%, make your own example which should be more advanced than

the basic one. For instance, apply link-side residual-based observer to estimate interaction force (or torque), and discuss using the following paper: Robot collisions: A survey on detection, isolation, and identification, T-RO 2017.