Special Topics on Intelligent Control: Program Report II
Deadline: June 6, 2022

Consider a feedback control system shown in Figure 1. Please design **A controller** such that output of the closed-loop discrete system is able to track a rectangular command signal, r(k), with ***magnitude = 1*** and ***period = 60*** iterations for **4** periods. The plants are

$$y(k+1) = 2.6\,y(k) - 1.2\,y(k-1) + u(k) + 1.2\,u(k-1) + \eta\,y(k)\sin(u(k) + u(k-1) + y(k) + y(k-1))$$

where $y(0) = -2, 0, or +2$, $y(-1) = 0$, $0.3 < \eta < 0.8$, and $|u(k)| \le 20$ (or 50).

This report should include "programs" and "discussions". For discussion part, the following questions should be answered at least.

(i) Which kind of meta-heuristic optimization algorithm or AI method is adopted? Why?

(ii) Which kind of controller (PID, SMC, FLC, or …) does your program utilize? Why?

(iii) Please explain why the fitness function, all the parameters and settings that are chosen or involved in the design of such controller.

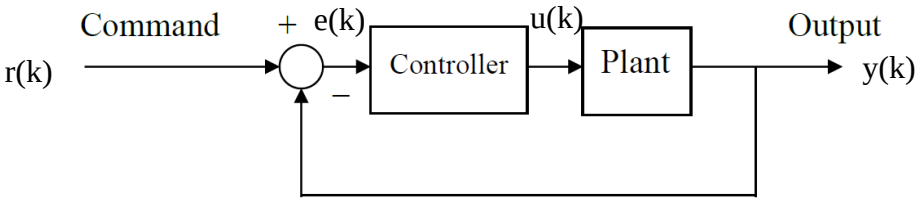

Figure 1. A Standard Feedback Control System