

Fourth Year Mechatronics Department

CSE-473: Digital Control

Sheet #01: Introduction to Digital Control Systems

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- 1- A fluid level control system includes a tank, a level sensor, a fluid source, and an actuator to control fluid inflow. Consult any classical control text to obtain a block diagram of an analog fluid control system. Modify the block diagram to show how the fluid level could be digitally controlled.
 - 2- If the temperature of the fluid in Problem 1 is to be regulated together with its level, modify the analog control system to achieve the additional control. (*Hint: An additional actuator and sensor are needed.*) Obtain a block diagram for the two-input-two-output control system with digital control.
 - 3- Position control servos are discussed extensively in classical control texts. Draw a block diagram for a direct current motor position control system after consulting your classical control text. Modify the block diagram to obtain a digital position control servo.
 - 4- Repeat Problem 3 for a velocity control servo.
 - 5- A sinusoid with a frequency of 2Hz is applied to a sampler/zero-order hold combination. Draw the output signal if the sampling rate is (i) 1Hz, (ii) 4Hz, and (iii) 8Hz. Comment on the results.
 - 6- Repeat Problem 5 but using a first-order hold.
 - 7- Write a MATLAB program to plot the resulting signals of Problems 5 and 6.
 - 8- Make a comparison between different types of ADCs according to conversion rate and cost/complexity. Sketch the block diagram and explain briefly the function of each type.
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