EE5111/5060 Selected Topics in Industrial Control & Instrumentation

CA3a Assignment for Force Sensing

(Academic Year 2021/22, Semester I)

This assignment will contribute 5% to the total marks for the module EE5111 and 10% for EE5060.

Please make sure your CA3a report is clear and readable.

Please submit your CA3a report (soft copy: Word or .pdf) into the "CA3a - Submission" folder in LumiNUS.

Submission deadline: **Oct. 8, 2021**

Important: Each submitted CA3a report must be an individual report.

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1. A force sensor is used to measure a contact force which range is from 0 to 2 N. The specifications of the force sensor are shown as follows. An instrumentation amplifier is used to amplify the force sensor output signal to an analog-to-digital converter (ADC). The of the ADC is from -10 to 10 V.

Table I Force sensor specifications

Characteristic	Unit	
Excitation	V	10
Force sensing range	N	0 to 5
Sensitivity	mV/N	60
Safe overload	N	10

Please analysis this force sensing application and design the amplifier gain and the gain resistor (R_G) of the instrumentation amplifier as shown in Fig. 1 (where $R_1 = R_2 = 25$ kΩ).

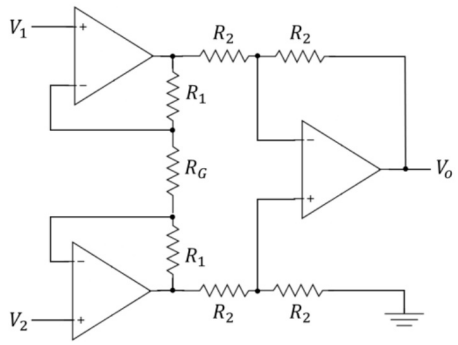

Figure 1 Block diagram of an instrumentation amplifier