ELECTENG209
Team 02:
Project Component Values

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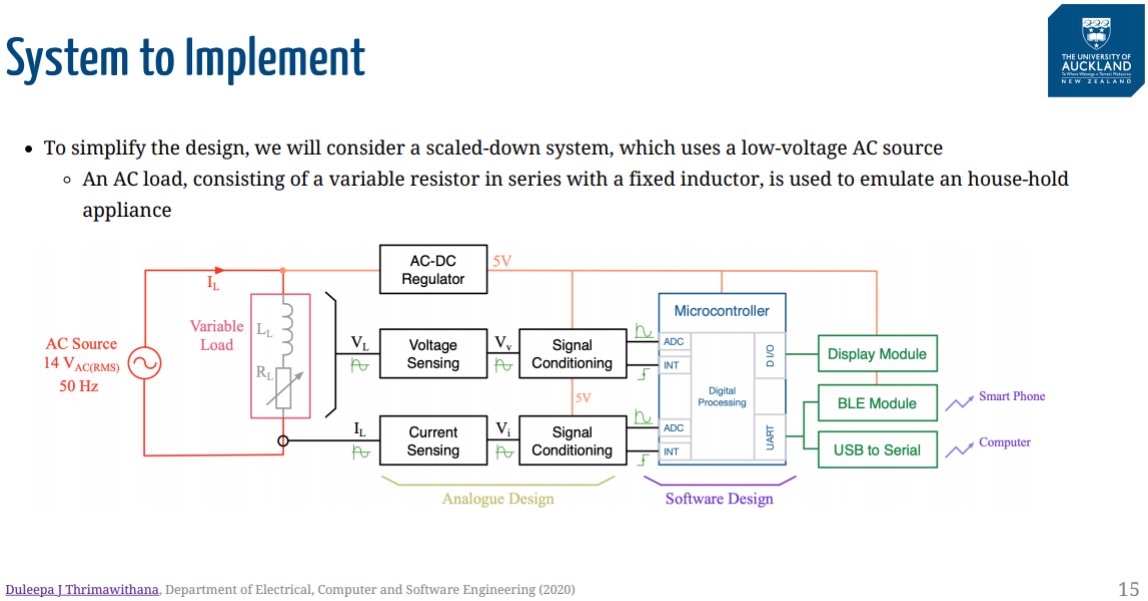
1 Introduction

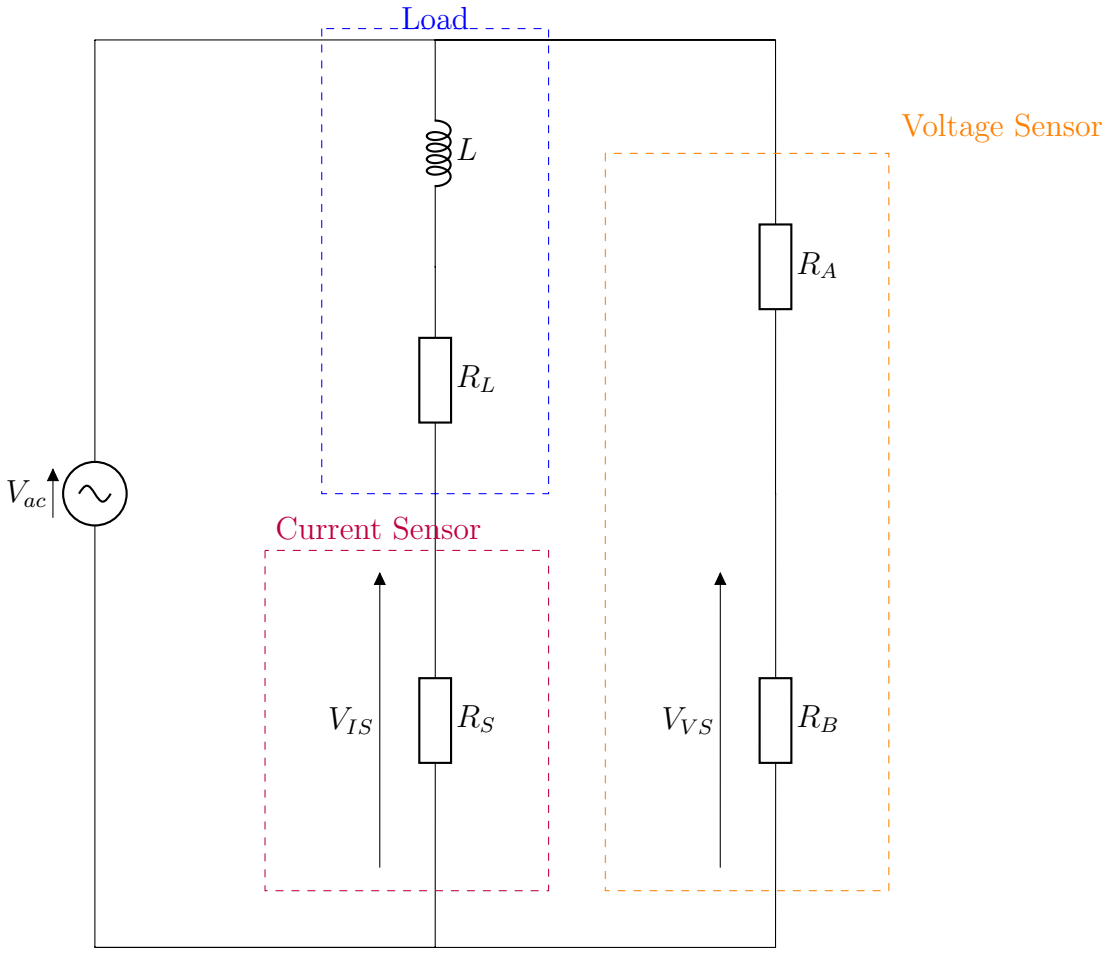
This document details the circuits and component values we will use to build our project. The structure and order of the component values and circuits described follow the order of the Labs.

The basic structure of components is as follows:



All (fixed) component values are based on the The E-12 Series

2 Voltage & Current Sensors



R_S is the Shunt Resistor that we use to measure the current drawn through the load.

V_{IS} is the voltage dropped across the shunt resistor (R_S). This drop in voltage is proportional to the current through the shunt resistor (and therefore proportional to the current through the load).

The nominated value of R_S is $R_S = 0.56\ \Omega$.

R_A and R_B are the two Voltage Dividers that make up the voltage sensor. The Voltage sensors output is taken to be the voltage across R_B (V_{VS}).

The nominated values for R_A and R_B are: $R_A = 82\ \text{k}\Omega$ and $R_B = 3.8\ \text{k}\Omega$.

The following is a table of values to use for testing the limits of the sensors:

Source V_{AC}	$V_{AC(RMS)}$	R_L
7.5 VA	12.6 V	16.65 Ω
7.5 VA	15.4 V	29.00 Ω
2.5 VA	15.4 V	92.82 Ω

3 Measurement Conditioning

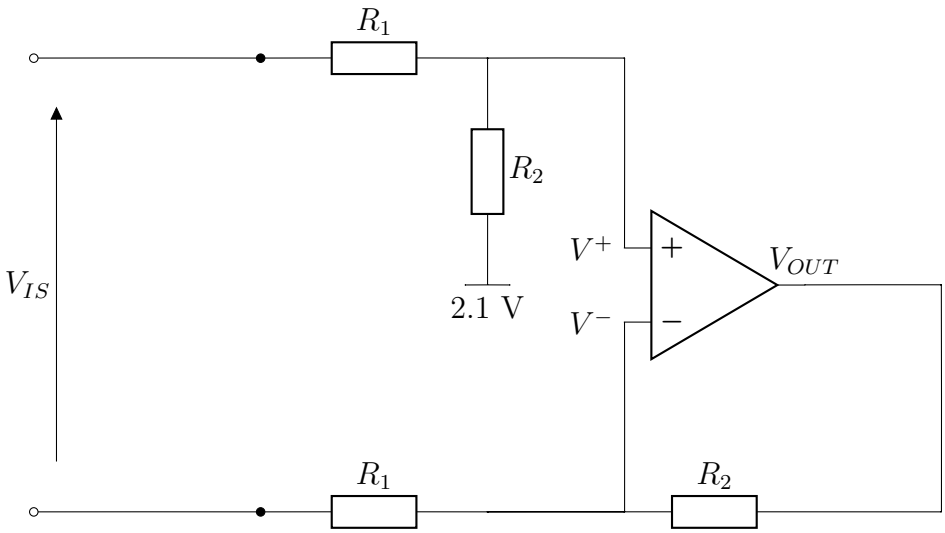


Figure 1: Current Signal Conditioning Circuit

The the four resistors of value R_1 and R_2 control the gain and offset applied by the Operational Amplifier to the input signal V_{IS}.

The value of R_1 and R_2 is: $R1 = 39$ kΩ and $R_2 = 82$ kΩ.

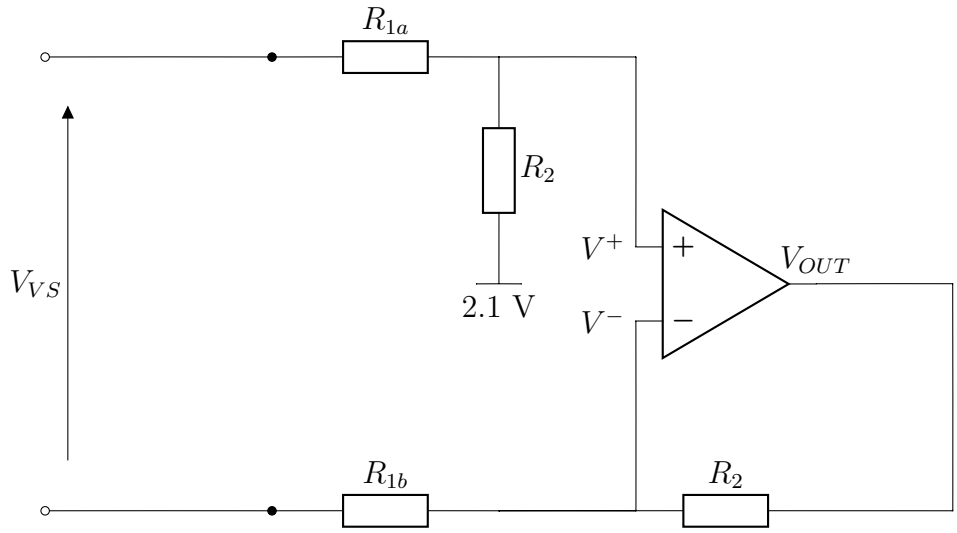
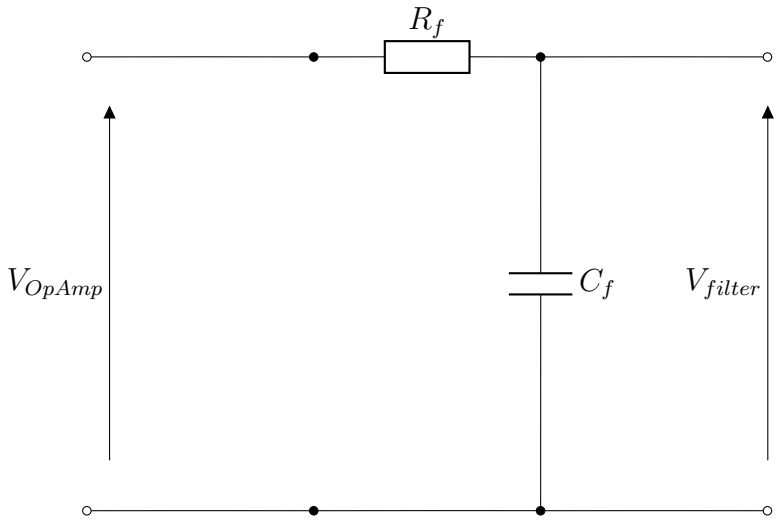


Figure 2: Voltage Signal Conditioning Circuit

The four resistors of value R_{1a}, R_{1b} and R_2 control the gain and offset applied by the Operational Amplifier to the input signal V_{VS}.

The value of R_{1a}, R_{1b} and R_2 is: $R_{1a} = 10$ k$\Omega, R_{1b} = 47$ kΩ **and** $R_2 = 47$ kΩ.

4 Filters



The Resistor and Capacitor create a filter that has a breakpoint frequency of 100 kHz.

The value of R_f and C_f is: $R_f = 33$ kΩ **and** $C_f = 4.8$ nF.

5 The E-12 Series:

1.0 Ω 1.2 Ω 1.5 Ω 1.8 Ω 2.2 Ω 2.7 Ω
3.3 Ω 3.9 Ω 4.7 Ω 5.6 Ω 6.8 Ω 8.2 Ω 10.0 Ω

(Multiplied by any power of ten).