

DSO



Milestone 2 Report

EE344: Electronic Design Lab

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1)Circuit Schematic

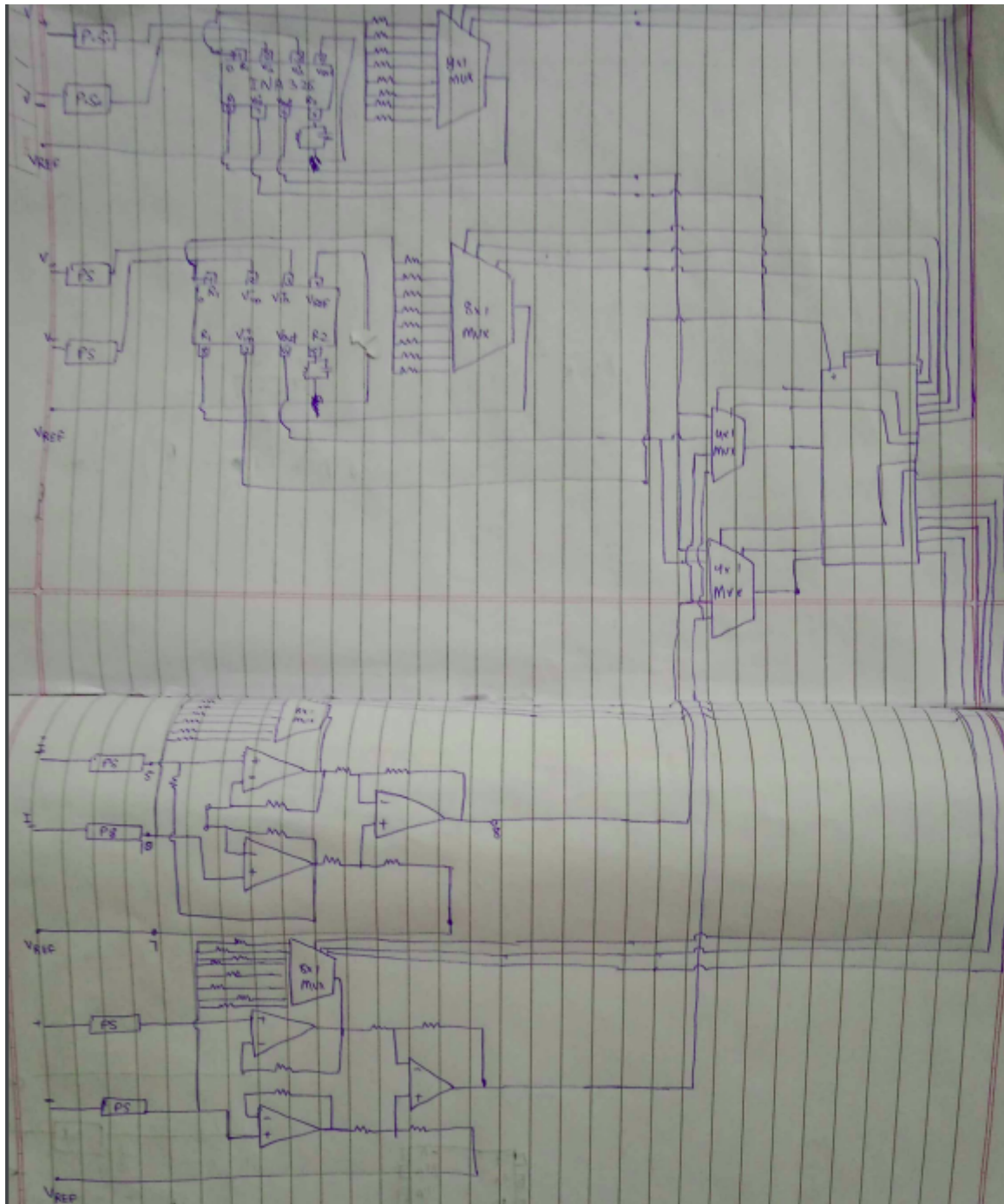


Figure: Hand Drawn Circuit

Protection circuit(PS)

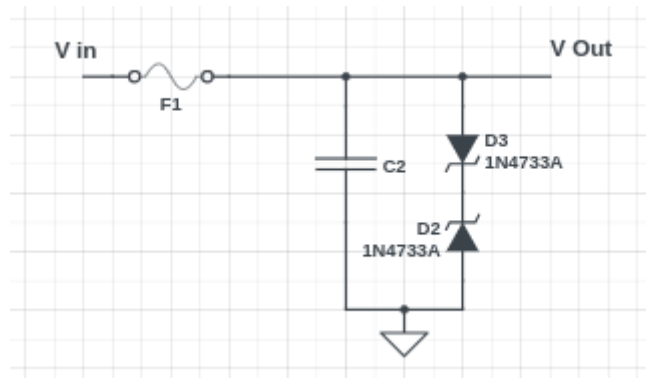


Figure: Protection Circuit

2)Justification for component selection

- 1N4747A: We have chosen a voltage range of 20 Volts for our oscilloscope and it is a commonly used 20V zener diode
- INA101: it is high precision current sense amplifier
- INA326: popularly used instrumentation amplifier, will be used for measuring differential voltage and scaling it
- CD74HC4051M: 8x1 analog MUX used for receiving digital input from the microcontroller and selecting the corresponding resistor for scaling the output
- MC14066BDG: 4x1 analog MUX for selecting the current/voltage mode
- Raspberry pi pico

3)Principle of operation for each subsystem

3.1 Protection Circuitry: Zener diodes with necessary breakdown voltage connected back to back across the input terminals are used for overvoltage protection. Overcurrent protection can be implemented using elements as simple as a Fuse of appropriate rating once the total current required is calculated for the entire circuit.

3.2 Amplifying the differential Voltage: The instrumentation amplifier takes the differential voltage input and A zener diode with necessary breakdown voltage connected back to back across the input terminals can be used for overvoltage protection. Overcurrent protection can be implemented using elements as simple as a Fuse of appropriate rating once the total current required is calculated for the entire circuit and scaled them as per the given commands. its gain is given by $2R2/R1$

3.3 I-to-v conversion: We use INA101 IC for this purpose

3.4 Transmission: We will be going with Bluetooth to transmit data from the microcontroller to laptop

3.5 Software: It will be python based simple GUI to input commands and give the output

4)Risk mitigation

- There can be issues in communication and we will try different methods like bluetooth2.0 and other versions, ESP32 module for Wifi communication
- There can be issues in current amplifications as it is a new application and we can try to use different ICs

5. Bill of materials (BOM)

Updated Bill of material is as follows:

<u>Item</u>	<u>Unit Price</u>
Microcontroller (Raspberry pi pico)	Rs 590
Instrumentation Amplifier (INA 326)	Rs 285
4:1 Analog Multiplexer(MC14066BDG)	Rs 57
8:1 Analog Multiplexer	Rs 300
I- to-V Converter (INA101)	Rs 130
Diode (1N4747A)	Rs 6