**California State University, Northridge**

**College of Engineering & Computer Science**

**Electrical and Computer Engineering Department**

**ECE 443L Digital Electronics Laboratory Report 9**

**CMOS based ADC Circuit Design, Simulation and Experimental Test as well as Analysis**

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**Abstract:**

Diagram, schematic

Description automatically generatedAn analog signal can be represented with digital values at some time interval. There are four binary positions that give us a 4-bit resolution that has 16 representations. An 8 bit resolution would give us 256 different combinations. Parallel encoding also called simultaneous, multiple comparator, or flash converting is used to convert from analog to digital. Several comparators with different reference voltages make up a priority encoder.

In this picture we can see that the analog range is from 0 to 7 volts and has a 3 bit or 8 level resolution. Using this configuration, we can get the analog signal converted into a digital output that can open up many possibilities for practical application.

**Author 1 Case 1 and 3:**

Assignment for Lab # 9 – Pspice & Experimental Individual Work - CMOS based ADC Circuit Design, Simulation and Experimental Test as well as Analysis

Graphical user interface

Description automatically generated with low confidence

Case 1 @ 1kHz Analog to Digital Circuit

Chart, line chart

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Case 1 waveform of ADC Circuit

Diagram

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Case 1 Experimental Result @1kHz

A picture containing graphical user interface

Description automatically generated

Case 3 @ 10kHz ADC Circuit

Graphical user interface, chart, application, line chart

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Case 3 ADC Waveform

Timeline

Description automatically generated with medium confidence

Case 3 experimental result @ 10kHz

**Author 2 case 2 and 4:**

Diagram, schematic

Description automatically generated

Figure 9.1 Case 2 7V Ramp Schematic with a freq @ 5kHz ADC Circuit

Chart

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Figure 9.2 Case 2 Waveform 7V Ramp with a freq @ 5kHz ADC Circuit

Timeline

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Case 2 Experimental

Diagram, schematic

Description automatically generated

Figure 9.3 Case 4 7V Ramp Schematic with a freq @ 15kHz ADC Circuit

Chart, line chart

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Figure 9.4 Case 4 Waveform 7V Ramp with a freq @ 5kHz ADC Circuit

Timeline

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Case 4 Experimental

**Alternate Author 1 Case 1 and 3 Results:**

Diagram, schematic

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Fig. 9.1 Analog to Digital Converter Schematic, Vin = 1kHz, Vref = 7V

Chart, line chart

Description automatically generated

Fig. 9.1 Analog to Digital Converter Simulation Results, Vin = 1kHz, Vref = 7V

Diagram

Description automatically generated with medium confidence

Fig. 9.3 Analog to Digital Converter Experimental Results, Vin = 1kHz, Vref = 7V

Diagram, schematic

Description automatically generated

Fig. 9.4 Analog to Digital Converter Schematic, Vin = 8kHz, Vref = 7V

Chart, line chart

Description automatically generated

Fig. 9.5 Analog to Digital Converter Simulation Results, Vin = 8kHz, Vref = 7V

Timeline

Description automatically generated with medium confidence

Fig. 9.6 Analog to Digital Converter Experimental Results, Vin = 8kHz, Vref = 7V

**Conclusion:**

In this experiment students were exposed to the set up and application of Analog to digital converter circuits. This is used in everyday life ranging from music to smart phones to satellites up in space.