

# CENG4480

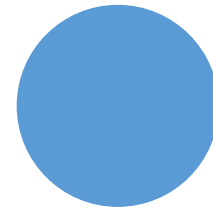
## Lab1 : Op Amp(1)

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- Introduction and Objectives
- 4 experiments
- How to use a breadboard
- Suggestions

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# Outline



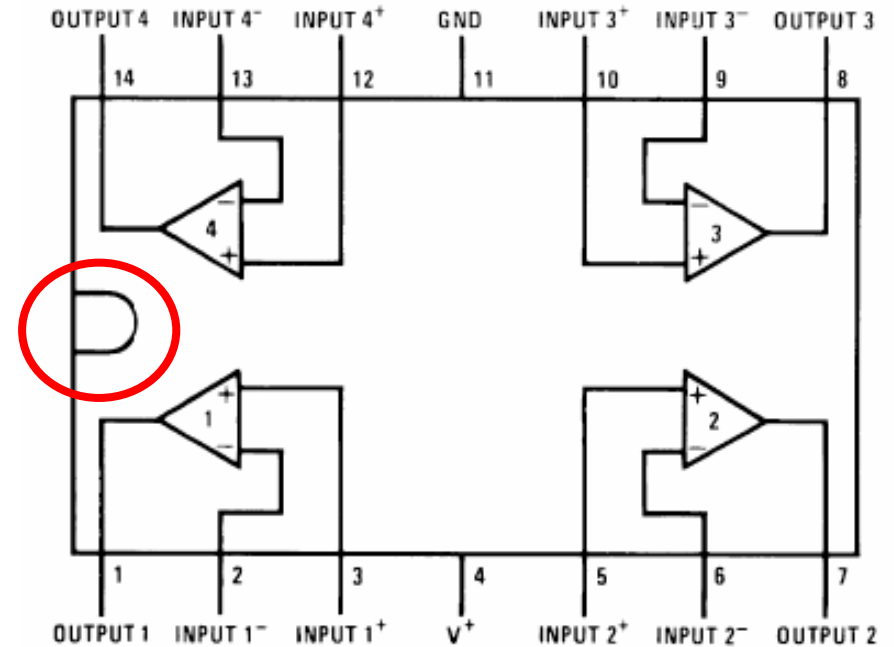
# Objectives

- How to use op amp circuits to interface between sensors and MCU
- How to design amplifier circuit using amp and
- How to design integrator and differentiator circuit using an op amp

Remember to record the input and output waveforms and write the answers to the questions of each experiment on your lab report

# Introduction

- The core component: LM324
  - 14 pinouts, 4 amp.
  - Only use one of them. E.g. amp1, including pin 1, 2, 3 plus pin 4, 11(V+ and GND)
- The sign



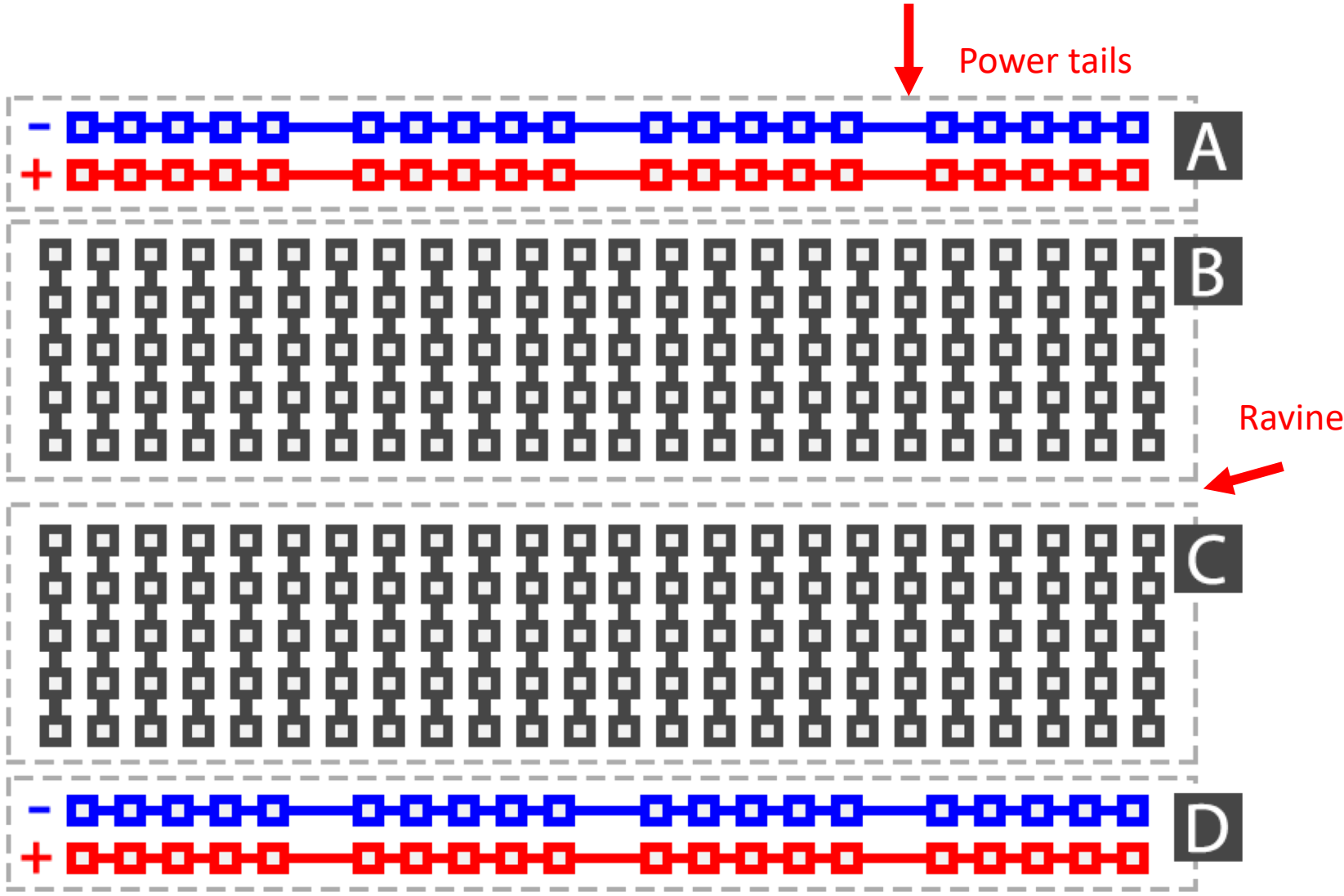
# 4 experiments

- Inverting amplifier
- Non-inverting amplifier
- Differential amplifier
- Voltage follower

Follow the procedures listed on the lab report

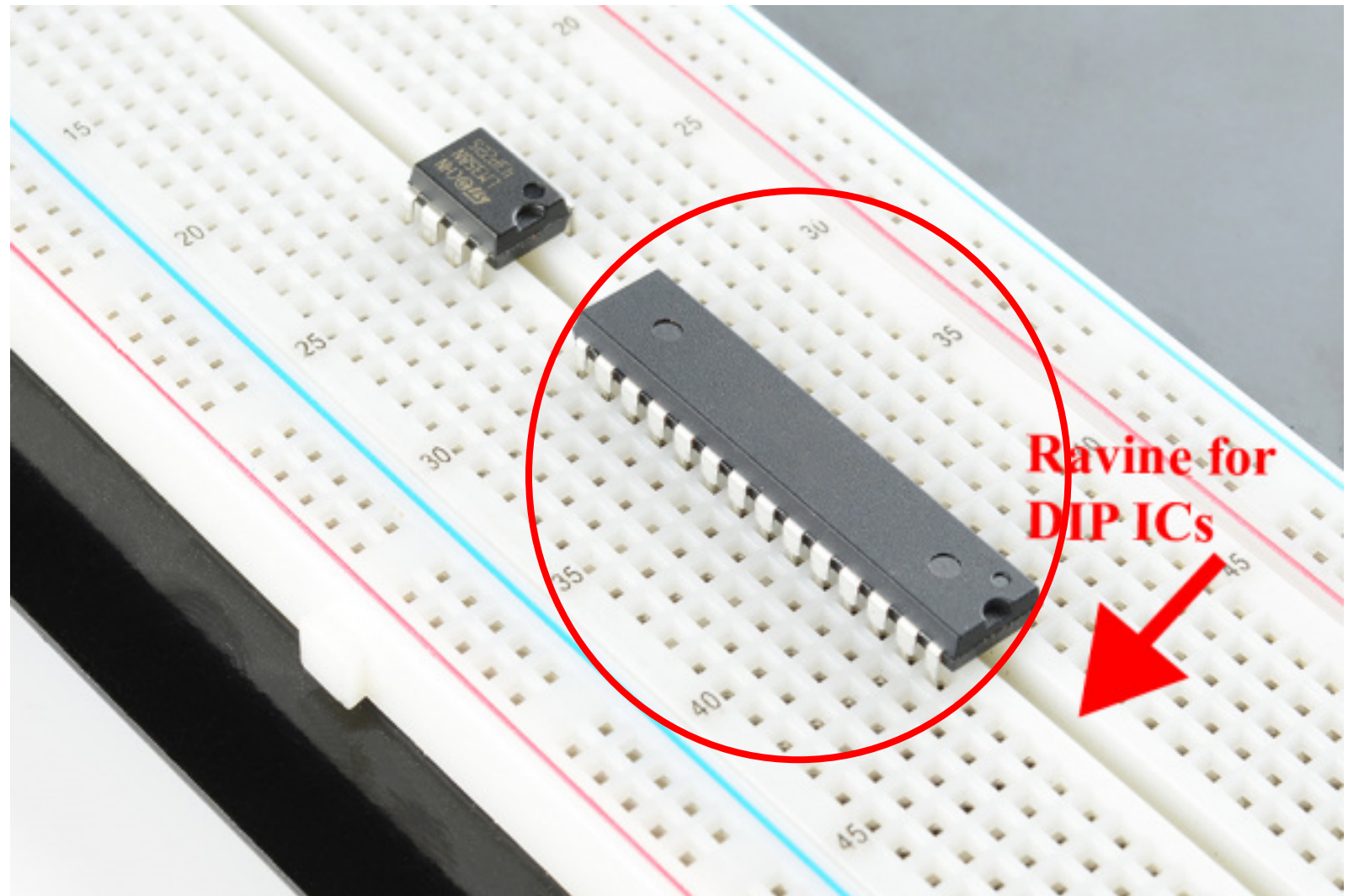


How to use a breadboard



Breadboard layout

How to use a breadboard



# Suggestion

- Start from V+ and GND, connect them to the power supply through power trails
- 3 pins of an Amp
- Resistors and Dupont wires
- Input and output to oscilloscope
- Check the circuit and connectivity
- Supply the power
- Record the waveforms