OpAmp Device As a Buffering Stage
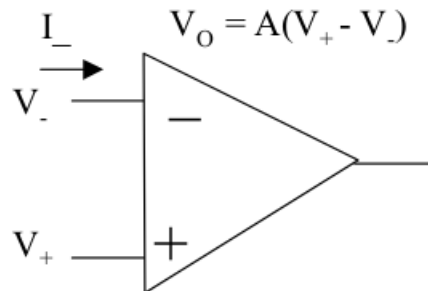
Both Analog and Digital Circuit
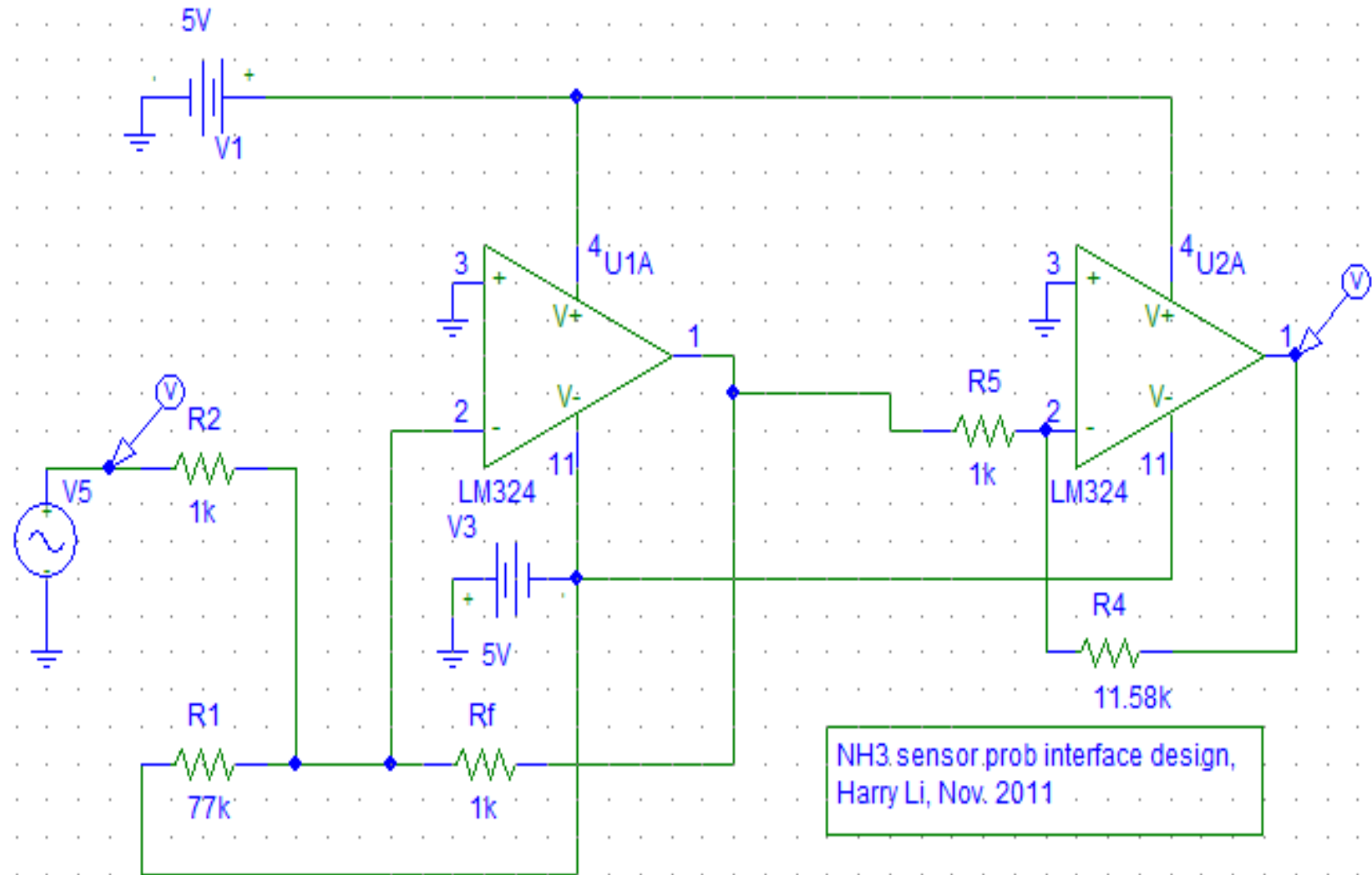
I_- $V_O = A(V_+ - V_-)$

V_-

V_+

(1) To protect the previous stage's output signal, which is the input to the next stage, while sampling/connecting the signal to its next stage logic circuit. (2) Unit gain non-inverting OpAmp configuration is an excellent choice.

Ideal OpAmp Properties: (1) very large gain, A>>M; (2) draws very little current, $I_- \sim 0$, e.g., very high impedance; (3) $V_O = A(V_+ - V_-)$ is finite range, which leads to $V_+ = V_-$.

$$\frac{V_O}{V_{IN}} = 1 + \frac{R_2}{R_1}$$

R_1 R_2

V_-

V_+

V_o

V_{IN}

NON-INVERTING

$$\frac{V_O}{V_{IN}} = -\frac{R_2}{R_1}$$

R_1 R_2

V_{IN}

V_-

V_+

V_o

INVERTING

Harry Li, PH.D. SJSU
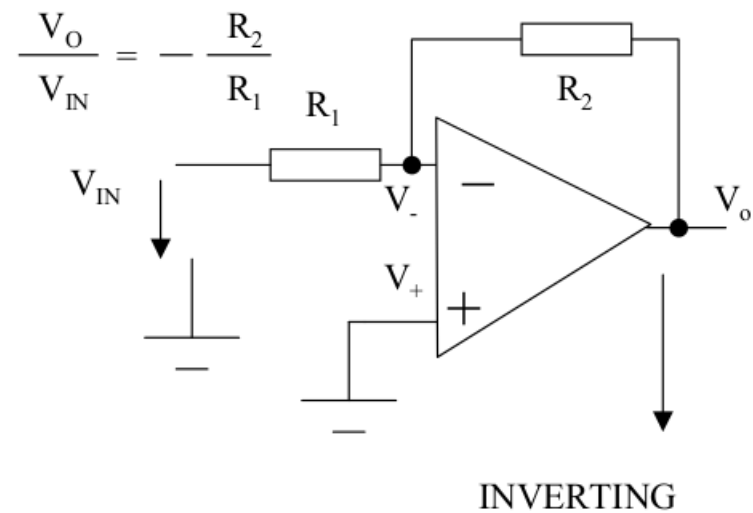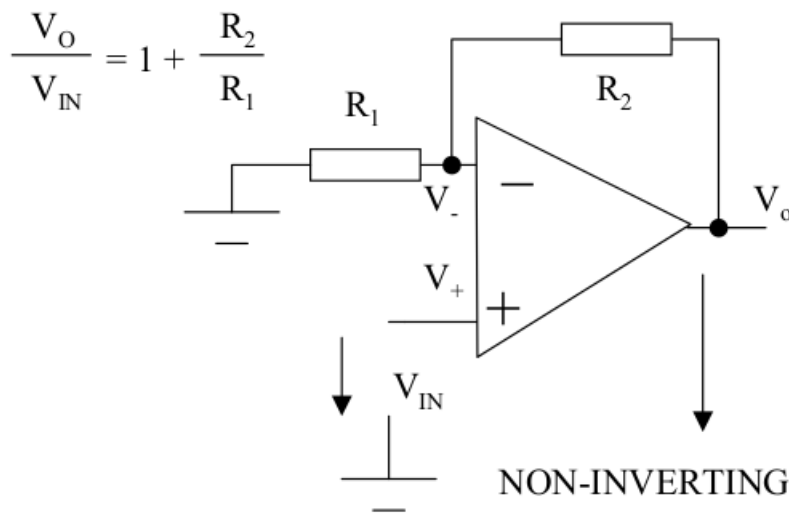
Circuit Design for NH3 Sensor

Harry Li, Ph.D.

Simulation Result

The output: 3.3V

The input offset 65mV

V(U2A:OUT)   V(R6:1)

Time

Harry Li, Ph.D.

Arithmetic With OpAmps

Output is almost like idealized voltage source, Rs << epsilon

Harry Li, Ph.D.
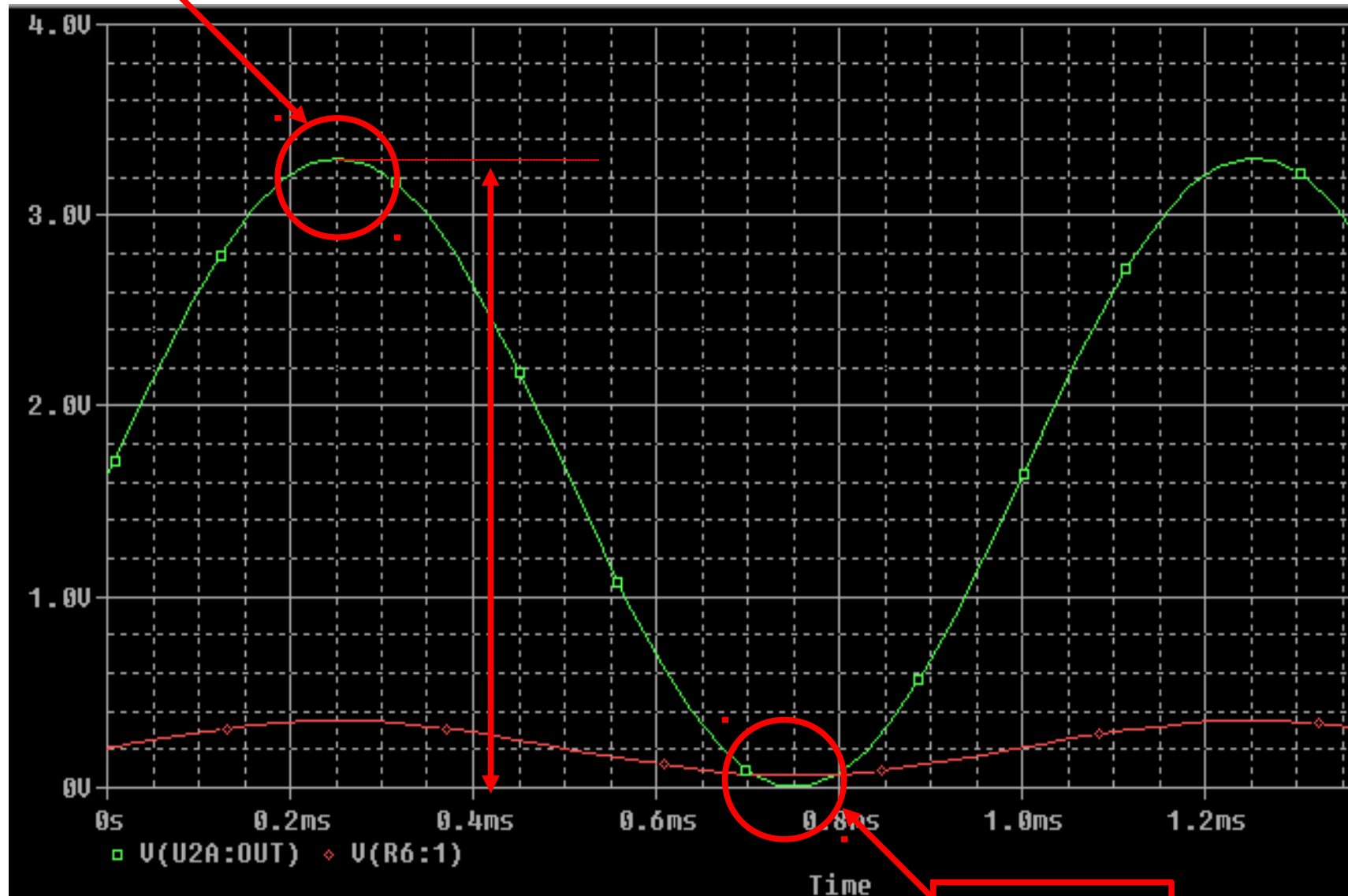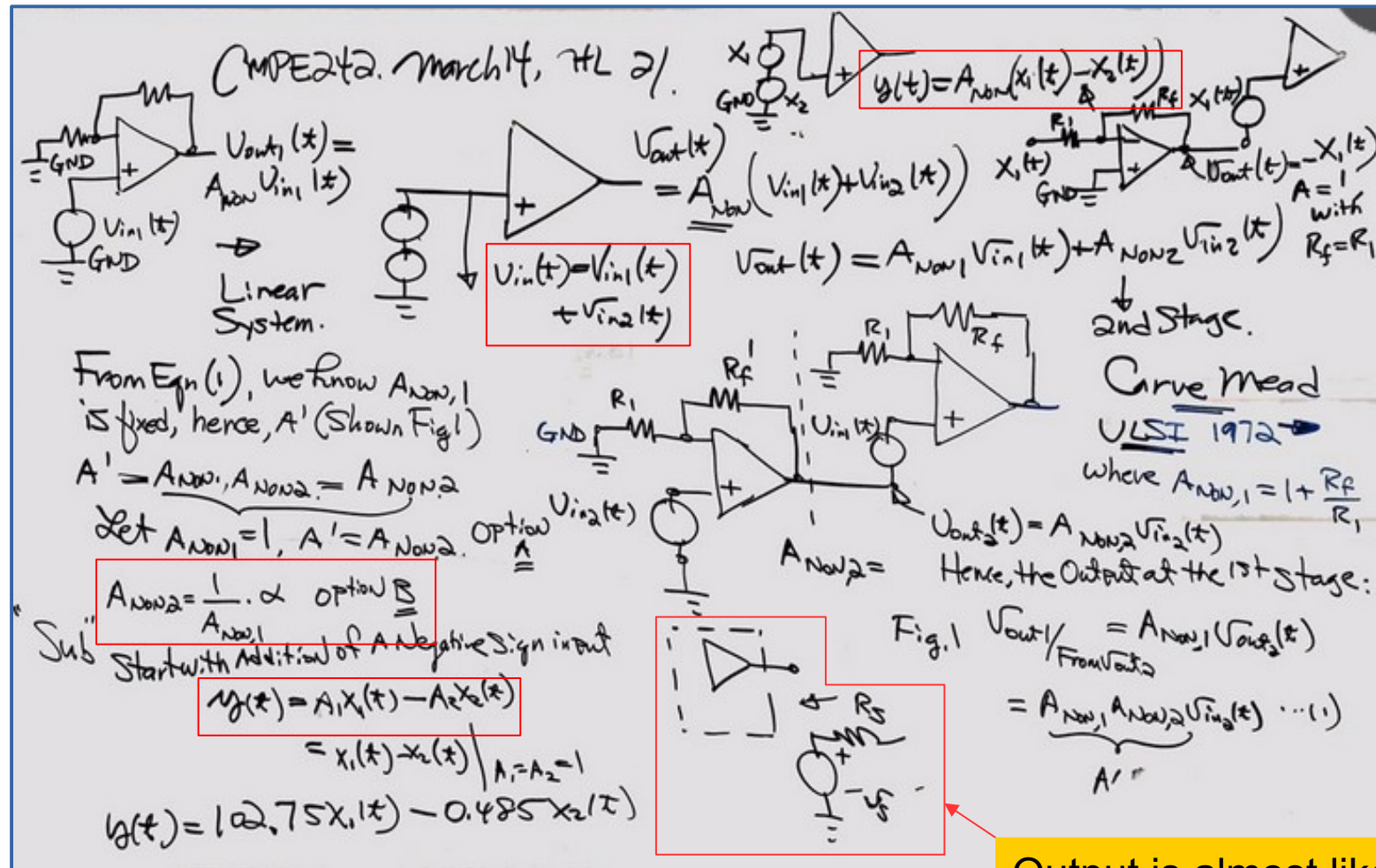
Reference: Some Of My Work

VISION CHIPS
Implementing Vision Algorithms
with Analog VLSI Circuits

Christof Koch and Hua Li

IEEE Computer Society Press   The Institute of Electrical and Electronics Engineers, Inc.
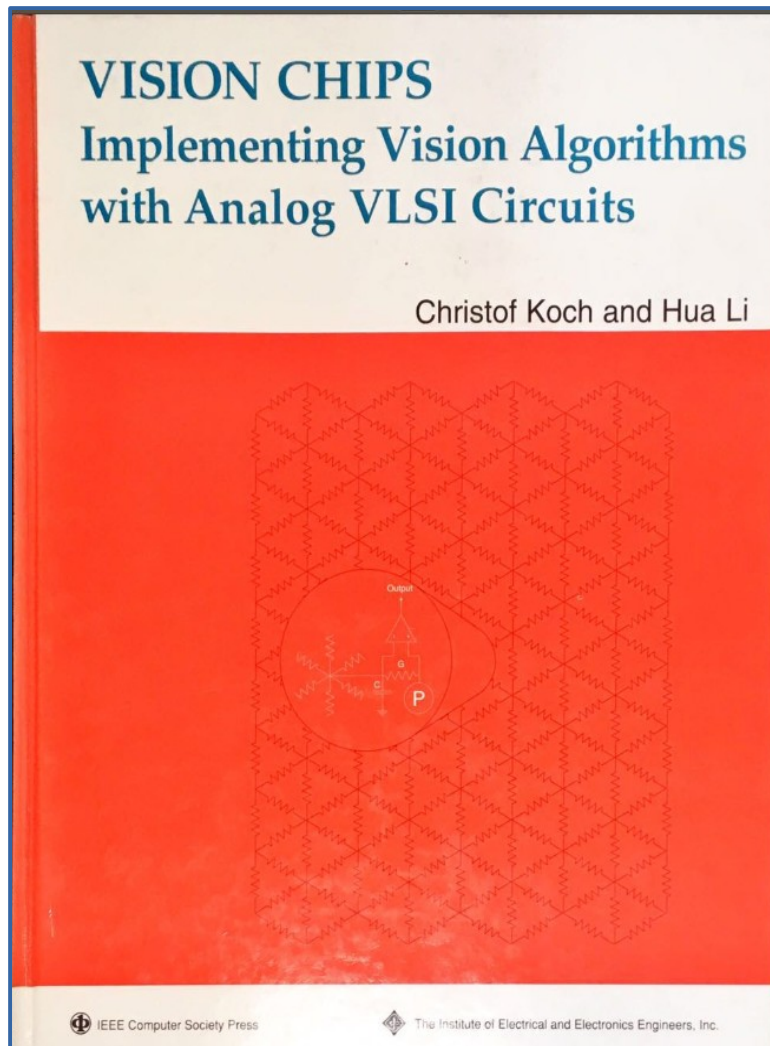
Silicon Neuron idea pioneered by Carver Mead, who is credited as the inventor of standardized VLSI (Very Large Scale Integrated Electronic Circuits) design, has proposed building a silicon neuron machine, e.g., silicon brain. Inspired by his work, I have ventured in the Analog VLSI technique to build Vision Chips, and did edited book with Christoff Koch. Carver Mead and our book was primary reference for the IEEE Spectrum cover story, Artificial Eye.

MAY 1996
THE INSTITUTE
OF ELECTRICAL
AND ELECTRONICS
ENGINEERS, INC.

SPECTRUM

Toward an Artificial Eye
- The eye as computer
- Neuromorphic vision chips
- Electronic bio-implants
- Learning to see