Lab 2 Extra
IN3170 - Microelectronics

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Contents

1 Task 1

1.1 Objective

The objective of this task is to build two CMOS inverter chains of different length and probing before the first and after the last inverter. The purpose of this is to measure and calculate the propagation delay a single inverter without knowing the added capacitance of the scope probe or directly measuring the input capacitance of just one inverter.

1.2 Equipment

Component	Model	Quantity
Hex Scmitt-Trigger Inverters	SN74HC1	1
Oscilloscope	HP54622	1
Waveform generator	HP33120	1
Voltage source	HPE3631	1
Breadboard		1

Table 1: List of components used in task 1.
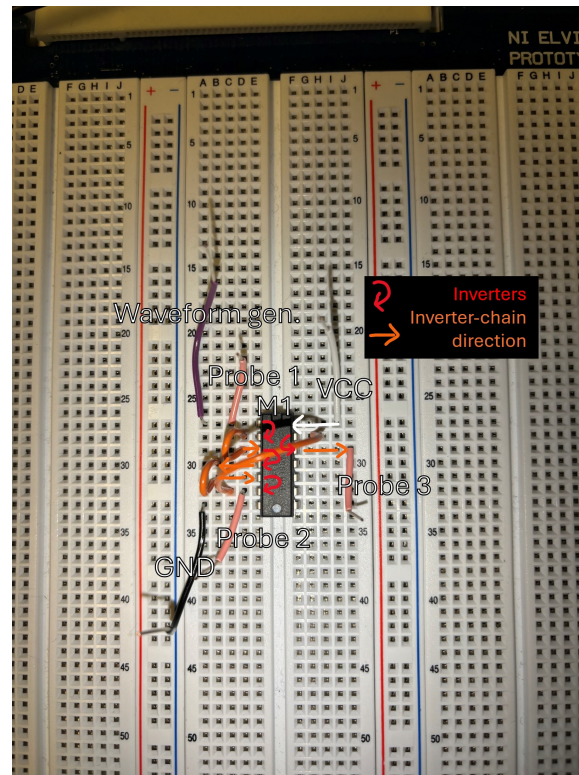
1.3 Method

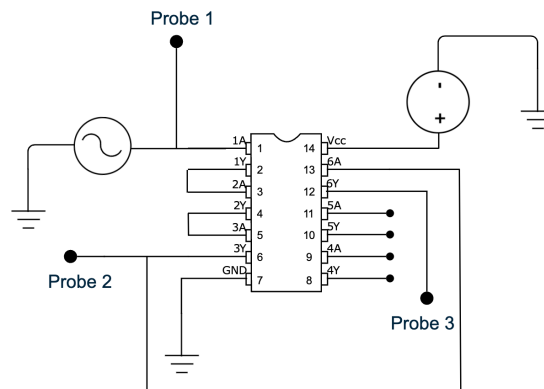Figure 1: Picture of the setup for task 1.

Figure 2: Schematic of the setup for task 1.

In this task we made two inverter chains, one with 3 inverters and one with 4 inverters. By using the IC SN74HC1 we only made 1 chain with 4 inverters, and then used the first 3 inverters to make the chain with 3 inverters. We probed the output of the third inverter with a oscilioscope to measure the propagation delay of the inverter chain with 3 inverters. We then probed the output of the fourth inverter to measure the propagation delay of the inverter chain with 4 inverters. The input was proved with channel 1 on the oscilioscope and both of the output was probed using channel 2 on the oscilioscope.

The input signal was a square wave with a frequency of 400Hz that was connected to pin 1, the input of first inverter in the chain. On pin 14, we connected a 5V power supply.