Digital System Design Lab

Lab 1

Breadboard Techniques and Logic Function Demonstration

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1. **Objectives**

* To become familiar with the Digital Tool Kit
* To learn how to build and test digital circuits using the Breadboard
* To learn about basic logic functions such as AND, NAND, XOR, and NOR

1. **Theorem**
   1. **Circuits**
      1. *Beadboard*

Breadboard is a bread-like circuit, and it can help us test and make temporary circuits and prototyping without soldering.

* + 1. *Network Resistor*

A circuit contains a row of resistor.

* + 1. *DIP Switch*

A circuit can be installed on breadboard and can be customized to perform certain electrical behaviors by users.

* + 1. *NOT GATE*

A circuit contains 6 NOT gates, and each of them can turn 0 into 1 and 1 into 0.

* + 1. *AND GATE*

A circuit contains 4 AND gates, and each of them can output 1 when both signals are 1 and output 0 when either or both signals are 0.

* + 1. *NAND GATE*

A circuit contains 4 NAND gates, and each of them can output 1 when either or both signals are 0 and output 0 when both signals are 1.

* + 1. *NOR GATE*

A circuit contains 4 NOR gates, and each of them can output 1 when both signals are 0 and output 0 when either or both signals are 1.

* + 1. *XOR GATE*

A circuit contains 4 XOR gates, and each of them can output 1 when both signals are the same and output 0 when both signals are different from each other.

* 1. **Logic Gate**
     1. *NOT GATE*

一張含有 文字, 行, 字型, 數字 的圖片

自動產生的描述

X

A

NOT

A

X

* + 1. *AND GATE*

一張含有 數字, 字型, 文字, 圖表 的圖片

自動產生的描述

X

X

B

A

* + 1. *NAND GATE*

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自動產生的描述

X

X

A

B

* + 1. *NOR GATE*

**一張含有 字型, 數字, 圖表, 文字 的圖片

自動產生的描述**

B

X

A

X

* + 1. *XOR GATE*

一張含有 字型, 數字, 圖表, 行 的圖片

自動產生的描述

X

A

B

X

1. **Experimental Results**

一張含有 電子產品, 電子工程, 電氣線路, 電路 的圖片

自動產生的描述

一張含有 圖表, 文字, 行, 字型 的圖片

自動產生的描述

一張含有 文字, 字型, 數字, 螢幕擷取畫面 的圖片

自動產生的描述

0

1

1

0

0

0

0

1

1

0

0

0

1

1

1

0

1. **Comments**
2. **Problems & Solutions**
   1. Sometimes, I confused the direction of the circuits, and it makes the circuit broken or the whole model cannot work. Therefore, I determine to let all the U-sign on the circuits upwards and will watch carefully afterwards.
3. **Feedback**

There is high chance to get broken circuits, maybe consider changing or test all of them is great to use or not.