VP Bericht - Elektronik D

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Abstract—

Contents

I. Introduction

In this experiment, some of the basic concepts of digital circuits are explored. Digital circuits contain logic gate. The gates transform a digital input signal into some digital output signal following a well defined functionality. The input and output signal are either "high/1" or "low/0". This is a main difference compared to the analogous circuits, which have a continous range of input/output signals. In todays world gates play an important role in. Every digital circuit contains a few up to multiple billions of them.

Gates can be categorized by gate-family, that they belong to (e.g. TTL or CMOS) and some other specific properties. Gates perform different operations to "compute" the output signal based on some input signal. Also, gates differ in terms of propagation delay, which is the delay a change in one of the input signals takes to cause a change in the output signal. The propagation delay is very important when designing digital circuits.

In the following, the performend experiments are presented. The experiments describe how to determ the operation performed by a digitial circuit and it's propagation delay, how a pulse generator is build and how to implement a very simple bit shifter logic.

II. Experiment simple logic gate

A. Samples and measurement setup

The circuit was setup as shown in image ¡PLACEHOLDER¿. Based on the different input signals at A and B,

4011			4001		
A	B	C	A	B	C
0	0	1	0	0	1
0	1	1	0	1	0
1	0	1	1	0	0
1	1	0	1	1	0

TABLE I
TRUTH TABLE MEASURING 4011 AND 4001

different values for the output signal C were measured. As for the ICs, a HCF4001BE and HCF4011BE were used.

To measure the propagation delay, input signal A was connect to a alternating current generator. Input signal B was connected to ground. The IC HCF4001BE was used for this measurement. The voltage of the generator was set to 2.9V and the frequency to 1Hz. The input signal A and output signal was visualized using a oscilloscope.

B. Results

For different input signals A and B, the following truth-table was measured as shown in II-B.

Für das *NAND Gatter wurde der Baustein ??? und für den* NOR Gatter wurde der Baustein ??? verwendet. Die

C. Die Messergebnisse

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IV. Die Messergebnisse