بسم الله الرحمن الرحيم

شبكة المعلومات الجامعية

التوثيق الالكتروني والميكروفيلم

شبكة المعلومات الجامعية

جامعة عين شمس

التوثيق الالكتروني والميكروفيلم

قسم

نقسم بالله العظيم أن المادة التي تم توثيقها وتسجيلها

علي هذه الأفلام قد أعدت دون أية تغيرات

يجب أن

تحفظ هذه الأفلام بعيدا عن الغبار

في درجة حرارة من ١٥-٢٥ مئوية ورطوبة نسبية من ٢٠-٤٠%

To be Kept away from Dust in Dry Cool place of 15-25- c and relative humidity 20-40%

بعض الوثائـــــق الاصليـــة تالفـــة

بالرسالة صفحات لم ترد بالاصل

Cairo University
Faculty of Computers & Information
Information Technology Department

A Proposed Design for Optical Digital Circuit

By
Ayman Abdel Kader Ismail

A Thesis Submitted To The
Faculty of Computers & Information
Cairo University
In Partial Fulfillment of Doctor
of Philosophy In
Information Technology

Under the Supervision of

Prof. Sanaa El_Ola Hanafi Ahmed
Vice Dean for Education and Students Affairs

Prof. Imane Aly Saroit Ismail
Information Technology Department

V-0

CAIRO
December 2007

Approval Sheet

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December 2007

Statement

I certify that this work has not been accepted in substance for any academic degree and is not being concurrently submitted in candidature for any other degree.

Any portion of this thesis for witch I am indebted to other source are mentioned and explicit references are given.

Student Name: Ayman Abdel Kader Ismail

Signature:

Date: 2 / 12 / **2007**

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Ayman A. Ismail

Abstract

Since several centuries, light get the attention in many situations like determine the coast and ports for ships and airplanes. It still used in communication between ships in the sea, determine the high buildings where a flash laps are positioned at every side of the building and high tours. Old Arab and Muslim society used sun positions and daylight to identify the pray time and use the moon to determine the months start.

On the other hand Greek and Roman use the sun to determine the start and end of the year. General phenomena were used in many different situations in human life. Along many centuries scientists start to analyze the nature of light and its phenomena where the speed of light was determined, wavelengths and frequencies, absorbing, reflection, refraction and transmittance of light have many studies.

In the last century electromagnetic waves was used to transmit analog and digital signals. Semiconductors materials were used to invent transistors and many electronic circuits which led to fast progress in the field of information by this time. In the last decade, optical fiber was used to transmit signals with very high speed, which make the nodes, switches and computer devices, bottlenecks for transmission and receiving digital signals. The research trends moved towards the use of opt-electrical circuits, which still suffer of the same disadvantages of electrical circuits.

The new trend of research is inventing all optical digital circuits that work on optical inputs and output. Many researches was introduces in the visible range of electromagnetic spectrum and most of theses depends on absorption properties of light and suffer of high power signals required at the input ports and high heating of the circuits operation. With of the previous these circuits are working in the nano and pico second regime.

This thesis introduces a new proposed design for elementary digital circuits (NOT, AND and OR). The proposed design use optical tools like mirrors, lenses, attenuators and amplifiers as the base of the design. The inputs and outputs have the same wavelengths and frequencies the operations of the circuits do not change the

inputs to other wavelengths. These circuits use the range of infrared as inputs and outputs. The main idea is using phase shift of one beam and make it interfere with the other beam as destructive / constructive interference phenomena of the light and working in femto second regime.

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