

***Sudan University of Science and
Technology
College of Postgraduate Studies***

Design and Construction of a Controlled Laser Switch

***A thesis submitted to the institute of laser as a
partial fulfillment of requirement for the
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بسم الله الرحمن الرحيم

قال تعالى

((الله نور السموات والارض مثل
نوره كمشكاة فيها مصباح المصباح
فى زجاجة الزجاج كأنها كوكب درى
يوقد من شجرة مباركة زيتونة لا
شرقية ولا غربية يكاد زيتها يضى ولو
لم تمسه نار نور على نور يهدى
الله لنوره من يشاء ويضرب الله
الأمثال للناس والله بكل شئ عليم))

صدق الله العظيم
((الايه 35 من سوره النور

Dedication

I dedicate this thesis

TO my Father Souls

***TO my
Mother***

And

***TO
my fiancée***

Mohammed

Acknowledgement

I am so grateful to Dr. Mubarak Almahal who supervised this thesis. And also I thank prof. Nafi Abd Alateef for all his help and fruitful advices. My thank fall short to his great help and kind guidance. My thanks to Dr. Gais Abd Alstar who provided valuable equipment. My thanks to Dr. Elfatih Ahmed Hassan, Department of Chemistry. A lot of thanks to my brother Osama. I thank Dr. Hussien Yousif of the Department of Statistics and Computers in Shendi University.

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thanks to everyone who helped me during my work. Thanks before and after to God.

Abstract

A laser control system was designed and constructed in this work. Diode laser with wavelength 670nm and output power 1mW was used to operate the 555 timer and JK flip-flop for a different time intervals. The time high had been calculated and measured through the capacitor value of the circuit.

The response of the electronic circuit was tested to work with different lasers. (i.e. He-Ne laser 632.8nm with output power 1mW, diode laser 820nm with output power 75mW, and using the diode laser 670nm, with output power 1mW).

The electronic circuit was responded for all the lasers with wavelength in the visible portion only.

To operate the circuit by a single laser wavelength, a suitable filter was selected, then the circuit had been operate with the diode laser 670nm only.

This means that the electronic circuit was controlled and operated using one laser as switch.

The operation of the circuit by using specific laser for different distances was tested, and showed that the maximum distance for the diode laser (670nm), was 50meter.

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الخلاصة

في هذا البحث تم تصميم وتشغيل منظومة تحكم الكترونية تعمل بالليزر. أستخدم ليزر الثنائى ذي الطول الموجى 670 نانوميتر وبقدرة 1 مللى وات لتشغيل الموقت (555) وكذلك مرجاح JK وبفترات زمنية مختلفة حيث تم حساب وقياس زمن التشغيل من خلال تغيير قيمة المكثف في الدائرة.

تم اختبار استجابة الدائرة الالكترونية للعمل مع ليزرات مختلفة مثل ليزر الهليوم نيون (632.8) نانومتر بقدرة 1 مللى وات وليزر الثنائى (820) نانومتر بقدرة 75 مللى وات وليزر الثنائى (670) نانومتر بقدرة 1 مللى وات. استجابت الدائرة الالكترونية لليزرات ذات الأطوال الموجية المرئية فقط.

بهدف جعل الدائرة الالكترونية تعمل بليزر واحد تم اختيار مرشح مناسب حيث استجابت الدائرة لليزر الثنائى (670) نانوميتر فقط ولم تستجيب لليزرات الأخرى ووفقا لذلك تم التحكم في تشغيل الدائرة الالكترونية بواسطة ليزر ذى طول موجى واحد.

كما تم اختبار وتشغيل الدائرة بواسطة الليزر المحدد على بعد
ولمسافات مختلفة حيث أمكن تشغيل الدائرة حتى مسافة (50) متر.

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Chapter One

Introduction and Basic

Concepts

Chapter Two

Experimental Part

Chapter Three

Results And Discussion

