

Sudan University Of  
Science and Technology  
College OF Graduate Studies



# Design & Construction of Laser Guiding System

## تصميم وبناء منظومة توجيه الليزر

Thesis Submitted in partial Fulfillment of the  
requirements for the M.Sc.  
In Laser application in physics

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**أَمَّنْ هُوَ قَانَتْ أَنَاءَ اللَّيْلِ سَاجِدًا وَقَائِمًا يَحْذَرُ الْآخِرَةَ وَيَرْجُو رَحْمَةَ رَبِّهِ قُلْ هَلْ**  
**(يستوي الذين يعلمون والذين لا يعلمون إنما يتذكر أولوا الألباب**  
**(الزمر آية 9).**

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## **Abstract**

We have studied Laser orientation system which is an important instrument for many applications as laser range finder, laser tracking and laser pollution detection. And also we describe how to design and construct laser orientation system by using two stepper motors, plane mirror, laser source and computer software (Bascom – AVR programming language). We have chosen stepper motors because of its easy control and high performance. These stepper motors are directly connected to drivers (ULN2003, microcontroller and max232). When the circuits switched on, microcontroller order a computer to enter the

commands, after computer send right commands to microcontroller throughout the hyper terminal connector, the laser orientation system will be done; after we get the correct orientation they will be another command from the computer to open the laser source in certain time.

We have calculated the orientation angle of the laser beam and notice that in the first motor where a gear is used, error position is very little and step angle also reduced approximately of one to five, compared to other. Of course high performance can be obtained by use of a few types of sensors, which determine the position error of motor and target.

### :الملخص

تم دراسة منظومة توجيه الليزر، التي تعتبر من اهم الاجهزة فى كثير من التطبيقات مثل: الليزر تحديد المدى، لليزر تتبع الهدف ولليزر الكشف عن التلوث. وايضا فى هذا البحث وصفت الطريقة المستخدمة لتصميم المنظومة وذلك باستخدام موتران، مرآة مسيوية، مصدر لليزر، دائرة الكترونية وكمبيوتر. تم التحكم باستخدام لغة الباسك. استخدم الموتور فى هذا البحث نسبة لانه سهل التحكم وجيد الاداء. عندما تفتح الدائرة فان المايكروكنترولر يامر الكمبيوتر بادخال الاوامر المناسبة لتنفيذ الامر المناسب وعندما تنفذ الاوامر بواسطة الكمبيوتر فاننا نحصل على التوجيه المطلوب لتوجيه شعاع الليزر. بعد الحصول على التوجيه المطلوب سوف يكون هناك امر اخر من الكمبيوتر لفتح مصدر الليزر فى اى زمن. تم حساب زاوية توجيه شعاع الليزر ولوحظ فى الموتور الاول ان مقدار الخطأ صغير والزاوية اصغر بمعدل واحد الى خمسة منهما فى الموتور الثانى ويرجع ذلك الى استخدام ترس ثانى مع الموتور الاول وظاهرة

الحركة الاهتزازيه فى الوتور.يمكن الحصول على اداء افضل اذا استخدم بعض انواع المحسسات التى تحدد موضع كل من الموتور والهدف.

### List of figures

| Number | Title  | Page |
|--------|--|------|
| 1-1    | Element of laser   | 2    |
| 2-1    | Specular and Diffuse reflection  | 6    |
| 2-3    | Variable-reluctance stepper motor                                      | 11   |
| 2-4    | Component of aPM motor   | 12   |
| 2-5    | PM stepper motor-90step,45step   | 13   |
| 2-6    | Internal construction of hybrid Stepper motor                          | 14   |
| 2-7    | Cross section of hybrid stepper motor                                  | 14   |
| 2-8    | Disc magnetic motor  | 15   |
| 2-9    | Magnetic flux path through a two-pole stepper motor                    | 16   |
| 2-10 a | One phase on, full step  | 19   |
| 2-10 b | Two phase on, full step  | 20   |
| 2-11   | Half step  | 21   |
| 2-12   | microstepping  | 22   |
| 2-13   | Relation between torque and rotor angular position                     | 22   |
| 2-14   | Relation between Torque and angle position at different holding torque | 23   |

|              |   |    |
|--------------|---|----|
| <b>2-15</b>  | Position accuracy of stepper motor                | 24 |
| <b>2-16</b>  | Torque vs, speed characteristics of stepper motor | 27 |
| <b>2-17</b>  | Single step response vs, time                     | 28 |
| <b>2-18</b>  | Simple Driver                                     | 30 |
| <b>2-19</b>  | Bipolar driver                                    | 31 |
| <b>2-20</b>  | Series & Parallel connection of stepper motor     | 32 |
| <b>2-21</b>  | Speed\Torque curve, series &parallel connect      | 32 |
| <b>2-22</b>  | Wire configuration of stepper motor with 6 leads  | 33 |
| <b>3-1</b>   | Microcontroller Pin's                             | 38 |
| <b>3-2 a</b> | Driver ULN 2803                                   | 43 |
| <b>3-2 b</b> | The driver ULN 2803 connect to stepper motor      | 43 |
| <b>3-3</b>   | Relay, operation &construction                    | 44 |
| <b>3-4</b>   | Max323 Pin's                                      | 45 |
| <b>3-5</b>   | Hyper terminal                                    | 45 |
| <b>3-6</b>   | System setup                                      | 46 |
| <b>2-7</b>   | Circuit design                                    | 47 |

## Contents

Dedication

ii

Acknowledgement

iii

Abstract

vi

Abstract in Arabic

v

List of figures

ix

List of tables

x

## **Chapter one**

1

### **Introduction and basic concept**

1

1-1 Introduction

1

1-2 stepper motor

1

1-3 light reflector

2

1-4 Why laser

2

1-5 Goal of thesis

3

1-6 Thesis Layout

3

1-7 Literature review

4

## **Chapter TWO**

6

## **Theoretical consideration**

### **6**

2-1 Light reflector

6

2-1-1 Reflection from mirror

6

2-1-2 Laser mirror

7

2-2 Laser application

8

2-3 Stepper motor

9

2-3-1 Open and close loop operation

10

2-3-2 Stepper motor types

10

2-3-2-1 Variable reluctance

11

2-3-2-2 Permanent magnet

12

2-3-2-3 Hybrid

14

2-3-3 Size and power

16



2-3-4 rotating magnet

17

2-3-5 Torque generation

18

2-3-6 Phase, poles and stepping angl

19

2-3-7 Stepping mode

20

2-3-8 Relation between torque and angle

23

2-3-9 Step angle accuracy

24

2-3-10 Step position error

25

2-3-11 mechanical parameter

26

2-3-12 Relation between torque and speed

27

2-3-13 Single step response and resonance

28

2-3-14 Stepper motor advantage and disadvantage

30

2-4 Driver

30

2-4-1 Driver overview

30

2-4-2 Driver Types

31

2-4-2-1 Unipolar

31

2-4-2-2 R\L

32

2-4-2-3 Bipolar chopper

32

2-5 Motor wiring configuration

33

2-6 Clockwise/ Anticlockwise

35

2-7 Step sequences

35

2-8 Bascom –AVR language

36

## **Chapter three**

**38**

### **Experimental Part**

**38**

3-1- Microcontroller

38

3-1-1 Pin description

39

|                                    |  |
|------------------------------------|--|
| 3-1-2 Storing program              |  |
| 42                                 |  |
| 3-1-3 Writing the control program  |  |
| 43                                 |  |
| 3-2 ULN203                         |  |
| 43                                 |  |
| 3-3 Relay                          |  |
| 44                                 |  |
| 3-4 Max323                         |  |
| 45                                 |  |
| 3-5 Interfacing system with PC     |  |
| 46                                 |  |
| 3- 6 Circuits design and operation |  |
| 47                                 |  |
| 3-7 System setup                   |  |
| 48                                 |  |

## **Chapter four**

### **49**

|                            |  |
|----------------------------|--|
| 4-1 Results and discussion |  |
| 49                         |  |
| 4-3 Conclusions            |  |
| 51                         |  |
| 4-4 Recommendations        |  |
| 51                         |  |
| 4-5 References             |  |
| 52                         |  |

4-6 Appendix

54

### List of tables

| <b>Number</b> | <b>Title</b>  | <b>Page</b> |
|---------------|---|-------------|
| <b>2-1</b>    | Full step sequence                                    | 34          |
| <b>2-2</b>    | Half step sequence                                    | 34          |
| <b>3-1</b>    | Function of various special features of the<br>Atmega | 40          |
| <b>4-1</b>    | Result of first stepper motor                         | 48          |

|     |                                |    |
|-----|--------------------------------|----|
| 4-2 | Result of second stepper motor | 49 |
|-----|--------------------------------|----|