

DEDICATION

“Success consists of going from failure to failure without loss of enthusiasm Success is to be measured not so much by the position that one has reached in life as by the obstacles which he has overcome.”

Booker T. Washington.

We dedicate our success to the failures we faced, the obstacles we overcame and to the people who were there supporting us, raising our spirits high whenever accomplishment seems impossible. Thanks to their presence in our lives we had no fear of failure; we knew for sure that whenever we hit the bottom their loving hearts will lift us up.

To you mother for holding my hand since my day one in life. Without your tender, guiding and sometimes over protecting touch I would have never become who I am today, I am your creation.

*To my mountain, who taught me to stand high, to feel proud of whom I am and not to fear falling rocks because I am stronger.
To you father.*

To you my friends, who know me, but love me anyway. Without you I can never make do in this world.

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Table of Contents

DEDICATION.....	I
ACKNOWLEDGMENT	II
CONTENTS.....	III
LIST OF FIGURES.....	VI
LIST OF TABLES	VIII
ABBREVIATIONS.....	IX
ABSTRACT.....	XII
<i>المستخلص.....</i>	XIII
Chapter One: Introduction.....	1
1.1 General Review.....	1
Parasite Types.....	2
Hemozoin	2
Hemozoin Production.....	3
1.2 Problem Statement.....	3
1.3 Objectives.....	3
1.4 Methodology	4
1.5 Thesis layout.....	4
Chapter Two: Literature Review.....	5
2.1 Microscopic Diagnosis	5
2.2 Rapid Diagnostic Tests (RDTs)	5
2.3 ELISA (The enzyme-linked immunosorbent assay).....	6
2.4 PCR (polymerase chain reaction)	7
2.5 Automatic malaria diagnosis based on giemsa stained blood smear images	8
Computer vision for microscopy diagnosis of malaria.....	8

Recognition of Blood Cell Images Based on Color Fuzzy Clustering.....	8
Malaria diagnose using Neural Network Architecture	9
2.6 Non-invasive Malaria Diagnose methods.....	10
Detection of malaria using human saliva	10
The detection of Plasmodium falciparum in human saliva samples using PCR.....	10
PCR detection of Plasmodium falciparum in human urine samples	11
Transdermal Diagnosis of Malaria Using Vapor Nanobubbles.....	12
Chapter Three: Theoretical Background.....	14
3.1 Background.....	14
3.2 Malaria Parasite Life cycle.....	14
3.3 Clinical signs and Symptoms of Malaria.....	19
3.4 Disease situations.....	19
3.5 Optical Properties of Biological Tissues.....	20
3.5.1 Absorption Theory.....	21
Absorption Characteristics of blood.....	23
Absorption Characteristics of water.....	24
Absorption Characteristics of melanin.....	25
Absorption Characteristics of skin.....	26
Absorption Characteristics of Subcutaneous adipose tissue.....	27
Absorption Characteristics of muscles.....	28
Absorption Characteristics of Mucous membrane.....	28
3.5.2 Light scattering.....	29
3.5.3 Reflection and Refraction.....	30
Chapter Four : The Proposed System	32
4.1 Design Concept	32
4.2 Circuit Components	32

Laser Diode Line Module	32
Permanent magnet.....	34
IR Si photodiode.....	34
Operational amplifier.....	35
Microcontroller.....	37
LCD.....	37
Breadboard power supply module.....	39
4.3 Cuvette Design.....	39
Teflon Characteristics.....	40
4.4 Block Diagram.....	41
4.5 MikroC PRO program.....	41
4.6 Algorithm.....	42
4.7 Simulation.....	47
4.8 Mathematical Model.....	48
4.9 Implementation.....	50
Chapter Five : Results and Discussion	51
5.1 Result1	51
5.2 Discussion1.....	52
5.3 Result2.....	52
5.4 Discussion2	53
Chapter Six: Conclusion and Recommendations	54
6.1 Conclusion.....	54
6.2 Recommendations.....	54
References.....	55

APPENDIXES

Appendix A (Pickit3 programmer datasheet)

Appendix B (Micro C Code)

Appendix C (Microcontroller datasheet)

Appendix D (Photodiode datasheet)

Appendix E (LCD datasheet)

Appendix F (LM324 datasheet)

Appendix G (Laser Diode Module datasheet)

Appendix H (Acceptance Letter AINAC 2017)

List of Figures

Figure 1.1 a) Structure of Hemozoin, b) Micrographs of hemozoin (indicated by white arrows)	2
Figure 1.2 Methodology block diagram.....	4
Figure 2.1 ELISA Test	7
Figure 2.2 Experimental laboratory prototype of a malaria diagnostic device with the pulsed laser and the integrated probe shown being scanned across a human wrist.....	13
Figure 3.1 Malaria parasite life cycle.....	15
Figure 3.2 Parasited red blood cells “Falciparum trophozoites”.....	17
Figure 3.3 P. vivax gametocytes/schizont , Gemetocytes: spherical shaped.....	17
Figure 3.4 P. malariae, Band shaped trophz	18
Figure 3.5 P.ovale, a) Trophz compact and rounded not amoeboid , b) schizonts and gametocyte similar to P.vivax , c) Number of merozoite 6- 12 RBC young	18
Figure 3.6 Geometry of reflection, refraction, absorption, and scattering	21
Figure 3.7 Light travels through the medium as absorption interaction	22
Figure 3.8 Hemoglobin absorption coefficient in the range 500-1200 nm	24
Figure 3.9 Water absorption coefficient in the Range 500-1200 nm.....	25
Figure 3.10 Absorption coefficient for Eumelanin (Grey curve) and Pheomelanin (black curve)	26
Figure 3.11 Skin optical penetration depth in the Range 500-1200nm...27	27
Figure 3.12 Lipid absorption coefficient in the Range 500-1200nm.....	28

Figure 3.13 Penetration depth of 500-1200nm Light in human mucosa.	29
Figure 3.14 Geometry of specular reflection and refraction.....	31
Figure 4.1 Laser diode line module.....	33
Figure 4.2 The absorption spectrum of hemozoin molecules in the IR from 800-1080nm	33
Figure 4.3 neodymium magnet Nd ₂ Fe ₁₄ B	34
Figure 4.4 0.6T magnetic field produced neodymium magnet Nd ₂ Fe ₁₄ B measured using teslameter	34
Figure 4.5 IR Si photodiode.....	35
Figure 4.6 LM324 Operation amplifier.....	35
Figure 4.7 Current-voltage converter circuit	36
Figure 4.8 summing and differential amplifiers.....	36
Figure 4.9 Microcontroller chip (PIC16F877A)	37
Figure 4.10 LCD	38
Figure 4.11 Interfacing LCD with PIC16F877A microcontroller chip.....	38
Figure 4.12 Breadboard power supply module	39
Figure 4.13 Black Teflon cuvette 3D image	40
Figure 4.14 Block diagram of the proposed system	41
Figure 4.15 Whole circuit simulation	48
Figure 4.16 The implemented prototype	50

List of Tables

Table 3.1: Optical properties of human tissues in vitro	31
Table 4.1: LCD pin interfacing with microcontroller.....	39
Table 4.2: Absorption coefficient of finger.....	49
Table 5.1: Results of invasive test.....	51
Table 5.2: Results of non-invasive test.....	52

ABBREVIATIONS

µm	Micrometer
ADC	Analog to Digital Converter
ANN	Artificial Neural Network
cm	Centimeter
DC	Direct Current
DNA	Deoxyribonucleic Acid
ELISA	Enzyme-Linked Immunosorbent Assay
FP-PCR	Filter Paper Polymerase Chain Reaction
GND	Ground
Hb	De-oxygenated Hemoglobin
HbO₂	Oxygenated Hemoglobin
IR	Infrared
LASER	Light Amplification by Stimulated Emission of Radiation
LCD	Liquid Crystal Display
LED	Light Emitting Diode
M	Molar
mA	Milliamp
mm	Millimeter
MOT	Magneto-Optical Technique
mV	Millivolt
nm	Nanometer
OP Amp	Operation amplifier
P. F	Plasmodium Falciparum
P.M	Plasmodium Malaria
P.O	Plasmodium Ovale
P.V	Plasmodium Vivax
PCR	Polymerase Chain Reaction

Pfdhfr	Plasmodium falciparum dihydrofolate reductase
PfHRP	Plasmodium falciparum histidine rich protein
RBC	Red Blood Cell
RDTs	Rapid Diagnostic Tests
SSA	Sub-Saharan Africa
T	Tesla
UV	Ultra Violet
WHO	World Health Organization

Abstract

This study concerns with developing a trustworthy technique for detecting hemozoin (the waste product of malarial parasitic action on hemoglobin) in blood by detecting the intensity of IR LASER beam ,passing through human finger or blood sample, when interacting with hemozoin particles on application of a magnetic field in both non-invasive and invasive way. The proposed system consists a Laser infrared source, pair of permanent magnets and embedded processing system.

This study was validated by preliminary experiments across seventeen patients and twenty one blood sample, the obtained results showed that the developed method has accuracy of (93.75%) for patients and accuracy of (95.24%) for blood samples. less pain, small duration and more comfortable malaria test will be presented by this study.

المستخلص

تهتم هذه الدراسة بتطوير نظام لاكتشاف جزيئات الهيموزوين (الناجمة عن امتصاص الهيموغلوبين بواسطة طفيليات الملاريا) الموجودة في الدم وذلك بتحديد شدة ليزر الأشعة تحت الحمراء المرئية بصورة مباشرة من خلال الأصبع أو عينة الدم وذلك بعد تفاعله مع جزيئات الهيموزوين تحت تأثير مجال مغناطيسي دائم . يتكون النظام المقترح من مصدر ليزر للأشعة تحت الحمراء ، زوج من المغنطيسات الدائمة و نظام معالجة مضمن .

تم إثبات هذه الدراسة من خلال استخدام هذا النظام لإختبار (١٧) شخص و (٢١) عينة دم و أظهرت نتائج التجارب أن النموذج يعمل بدقة إختبار 93.75% في حالة الفحص على الأشخاص مباشرة و بدقة إختبار 95.24% في حالة الفحص على عينة الدم . وفر هذا النظام فحص للملاريا بصورة أقل ألما و في فترة زمنية قصيرة و براحة أكبر.