



UNIVERSITI TEKNIKAL MALAYSIA MELAKA

Development of an Educational Kit to the secondary school students about the Concept of Electric Current flow using Diode and Electrical Circuit.

This report is submitted in accordance to the requirement of Universiti Teknikal Malaysia Melaka (UTeM) for the Bachelor of Electronics Engineering Technology (Telecommunication) with Honours.

by

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APPROVAL

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ABSTRACT

In recent years, Malaysia is developing in term of education, especially in primary, secondary and tertiary levels so that Malaysia can be on par with other countries. In this era, students are more concerned on something that can be seen via the experiment apart from prioritising the theory only. At the same time, the education of our country inclining towards technology lately makes the students pay less attentions to the theory and give more priority to the technology. Therefore, the tools related to the education have been created and used in Malaysia to bring the education standard in Malaysia to a higher level. One of the source for the educational kit is the classroom learning which has grown massively due to the latest technology that is being used in educational fields. These tools can help the students to understand the theory easily if theory can be experimented in the classroom itself. Some studies have indicated that students, especially high school students which is in Form Four and Form Five who majored in Physics have problems to understand the electrical and electronic theory and circuits where it is known as the toughest subject. Thus, E-Circuit Educational Kit has been created to teach the secondary school student on how the current flows via the diode and electrical circuit where it can help the students to understand the concept and electrical circuit easily in a simpler way.

ABSTRAK

Sejak kebelakangan ini, Malaysia semakin membangun dari segi pendidikan terutamanya dalam pendidikan sekolah rendah, menengah mahupun pengajian tinggi supaya Malaysia dapat mencapai pendidikan yang setaraf dengan negara yang lain. Pada era millineum ini, pelajar lebih mementingkan sesuatu yang dapat dilihat melalui eksperimen selain daripada memberi keutamaan kepada teori. Pada masa yang sama, pendidikan negara kita semakin membangun ke arah teknologi dan pelajar kurang memberi perhatian terhadap teori dan memberi keutamaan kepada teknologi. Oleh itu, satu alat berkaitan dengan pendidikan telah dicipta and digunakan di Malaysia untuk membawa taraf pendidikan Malaysia ke peringkat yang lebih tinggi. Salah satu sumber yang dapat mengaplikasikan alat tersebut ialah melalui sesi Pembelajaran dan Pengajaran (PNP). Alat tersebut dapat membantu pelajar untuk memahami sesuatu teori dengan lebih mudah sekiranya teori tersebut dapat diterangkan melalui eksperimen. Beberapa kajian telah menyatakan bahawa pelajar terutamanya pelajar sekolah menengah iaitu pelajar Tingkatan Empat dan Tingkatan Lima yang mengambil jurusan Fizik mengalami masalah untuk memahami teori berkaitan dengan subjek elektrik dan elektronik di mana ia merupakan salah satu subjek yang sukar. Justeru, E-Litar iaitu alat yang berkaitan dengan pendidikan telah dicipta di mana ia boleh membantu pelajar untuk memahami konsep asas elekrikal dan litar elektrikal secara mudah dan cepat.

DEDICATION

Firstly, I would like to thank to God and Divine Grace HDG for giving me strength and persistence to accomplish my project successfully. Besides, I would like to express my immense gratitude to my supervisor, Mr. Amar Faiz bin Zainal Abidin for his continues support of my study and for his patience, motivation and his tremendous knowledge on the topic. His guidance has helped me in this study in term of conducting the experiments. His technical knowledge and expertise has helped me to understand this study better. I would also like to express my sincere gratitude to Madam Rahaini binti Mohd Said for her guidance in writing the thesis. I could not have imagined finishing the experiments without their guidance. I would also like to take this opportunity to thank my friends and family for their continuous spiritual support and The Faculty of Engineering Technology (FTK) for providing the necessary infrastructure, equipment and expertise in order for me to successfully complete my research. However, this achievement has been pleasant experience in developing E-Circuit educational Kit.

TABLE OF CONTENT

	PAGE
TABLE OF CONTENTS	viii
LIST OF TABLES	xiii
LIST OF FIGURES	xiv
LIST OF APPENDICES	xx
LIST OF SYMBOL	xxi
LIST OF ABBREVIATIONS	xxii
CHAPTER 1 INTRODUCTION	1
1.1 Background of Study and Motivation	1-2
1.2 Problem Statement	3
1.3 Objectives	3
1.4 Scope of the Project	4
1.5 Contribution of Work	4
1.6 Organisation Thesis	5

CHAPTER2	LITERATURE REVIEW	6
2.1	Overview	6
2.2	Overview of Previous Research	6
2.2.1	Development of Educational Content for Electronic Circuit Learning.	6-7
2.2.2	The Educational Kit on how to teach and learn the Operational Amplifier	7-9
2.2.3	The Educational IoT Lab Kit and Gamification for Energy Awareness in European Schools	10-11
2.2.4	Design and Development of a Modular Robotic Kit “Cube Bot” for Educational Purposes	12-13
2.2.5	Educational Design Kit for Synopsys Tools with a set of Characterized Standard Cell Library	14-17
2.2.6	Educational Kit including Separable Alphanumeric Symbol	18-19
2.2.7	Educational Writing Board Kit	19-20
2.2.8	Educational Tool Kit	20-22
2.2.9	Kit for Assembly of Electrical Circuit	23-24
2.2.10	Electronic Educational Game set having Communicating Elements with Radio Frequency Tag	24-25

2.2.11 A Low Cost and Simple Arduino Based Educational	
Robotic Kit	26-28
2.2.12 Arithmetic Teaching Aid Kit	29-30
2.2.13 Educational Kit for Instruction and Testing of	
Electrical Circuits	30-31
2.2.14 Electrical Experiment Kit	32-33
2.2.15 Electrical Instruction Kit and Connector Therefor	33-35
2.2.16 Kit for Teaching Characteristic and use of Electrical Device	35-36
2.2.17 Circuit Toy Assembly	37-38
2.2.18 Fostering Science and Technology Interest in Chilean Children	
with Educational Robot Kits	39-40
2.3 The Educational Kit	41-42
2.4 Basic Concept of Current (Ohm's Law)	43-44
2.5 The Series Circuit	44-45
2.6 The Parallel Circuit	45-46
2.7 Comparison of Previous Educational Kit and E-Circuit	
Educational Kit	47-49
2.8 Improvement	49

CHAPTER3	METHODOLOGY	50
3.1	Overview	50-53
3.2	Overall Physical Look of E-Circuit Educational Kit	54
3.3	Project Block Diagram	54
3.4	Material	55
3.4.1	Arduino Mega 2560	55
3.4.2	Bluetooth HC-05	56
3.4.3	747 Shift Register	57
3.4.4	RG LED'S	57-58
3.4.5	Diode	58-59
3.4.6	Resistor	59-60
3.4.7	Jumpers	60
3.5	Software	61
3.6	Build of Material	62
3.7	Project Costing	63
3.8	Flowchart	64-65
CHAPTER4	RESULT AND DISCUSSION	
4.1	Overview	66

4.2	Outcomes of the tested LEDS	66-68
4.3	Simulation of the E-Circuit Educational Kit via the Proteus Software	69-70
4.4	Output of the Proteus Simulation for the E-Circuit Kit	70-85
4.5	Outcomes from the E-Circuit Kit	86-93
4.6	Testing LEDS according Questions and Answers via the Arduino codes	94-108
4.7	Adding Diode and Resistor on the circuit	109
4.8	MIT Apps Inventor creation	110-113
CHAPTER5 CONCLUSION		
5.1	Conclusion	114
5.2	Recommendation	115
REFERENCES		116-117
APPENDICES		
	Appendix 1	118-128
	Appendix 2	129-256

LIST OF TABLES

TABLE	TITLE	PAGE
Table 2.1	The comparison between previous and current educational kit.	47-48
Table 2.2	The components used in the educational kit which is used to practice the electronic circuit design for the beginners/ kids.	49
Table 3.1	The Gantt chart of FYP 1.	52
Table 3.2	The Gantt chart of FYP 2.	53
Table 3.3	The cost of E-Circuit Educational Kit's component.	63
Table 4.1	The output of the Proteus Simulation on the E-Circuit Educational Kit.	70-85
Table 4.2	The possibilities output in term of Answers from the E-Circuit.	86-93
Table 4.3	MIT Apps Inventor for the E-Circuit Educational Kit.	110-113

LIST OF FIGURES

FIGURE	TITLE	PAGE
Figure 2.1	The prototype of the assembly kit which has been develop for the educational contents specifically in electronic circuit learning.	7
Figure 2.2	The schematic of the reconfigurable circuit of the Op-Amp uA741.	8
Figure 2.3	The overall architecture of the electronic kit.	9
Figure 2.4	The electronic kit process by using external instruments which is oscilloscope and function generator.	9
Figure 2.5	The internal look of the Educational IoT Lab Kit by using Arduino and Raspberry Pi.	11
Figure 2.6	The overall lab kit's physical look where the student used the lab kit to visualize the temperature reading in different classroom of the school building.	11
Figure 2.7	The base physical look of the Modular Robotic Kit Cube.	13
Figure 2.8	The inner part of the physical look of the Modular Robotic Kit Cube.	13
Figure 2.9	The flow of the Analogue Design.	15
Figure 2.10	The flow of the Digital Design.	16
Figure 2.11	The schematic of the D flip-flop in Digital design.	17
Figure 2.12	The schematic and layout circuit of the D flip-flop in Digital design.	17
Figure 2.13	The overall look of the Educational Kit with Separable Alphanumeric Symbol.	19

Figure 2.14	The physical look of Educational Writing Board Kit.	20
Figure 2.15	The overall look of the Educational Tool Kit.	21
Figure 2.16	The first stencil contained with several of geometric shapes.	22
Figure 2.17	The second layer of stencil that has been included with calendars.	22
Figure 2.18	The physical look of the Assembly Kit of Electrical Circuit.	24
Figure 2.19	The Electronic Game set having Communicating Element physical look with a Radio Frequency Tag.	25
Figure 2.20	The overall look of the Low Cost Robotic Kit.	28
Figure 2.21	The overall physical look of Arithmetic Teaching Aid Kit.	30
Figure 2.22	The exact look of the Educational Kit for Instruction and Testing Electrical Circuits.	31
Figure 2.23	The physical look of Electrical Experiment Kit	33
Figure 2.24	The top view of the Electrical Instruction Kit and Connector and it's physical look.	35
Figure 2.25	The overall view of the Kit for Teaching Characteristic and the use of Electrical Device.	36
Figure 2.26	The physical look of the Circuit Toy Assembly Kit.	38
Figure 2.27	The overall view of Educational Kit Robot.	40
Figure 2.28	The physical look of the Arduino Mega 2560 used in the E-Circuit Educational Kit.	42
Figure 2.29	The mathematical expression of Ohm's Law.	43
Figure 2.30	The basic electrical circuit of Ohm's Law.	44
Figure 2.31	The mathematically expression for the resistor in Series Electrical Circuit.	44

Figure 2.32	The mathematical expressions of Ohm's Law in Series Electrical Circuit.	45
Figure 2.33	The schematic circuit of Series.	45
Figure 2.34	The mathematical expression for the resistor in Parallel Electrical Circuit.	46
Figure 2.35	The mathematical expression for the resistor in Parallel Electrical Circuit.	46
Figure 2.36	The schematic circuit of Parallel and the mathematical expression for current in a Parallel Circuit.	46
Figure 2.37	The overall view of the educational kit to practice the electronic circuit design for the beginners/ kids.	48
Figure 3.1	The flowchart of FYP 1.	50
Figure 3.2	The flowchart of FYP 2.	51
Figure 3.3	The overall physical look of E-Circuit Educational Kit.	54
Figure 3.4	The overall physical look of E-Circuit Educational Kit.	54
Figure 3.5	The block diagram of E-Circuit Educational Kit.	54
Figure 3.6	The Arduino Mega 2560 which has been used in E-Circuit Educational Kit.	55
Figure 3.7	The model of Bluetooth HC-05 used in E-Circuit Educational Kit.	56
Figure 3.8	The shift register which has been used in the E-Circuit Educational Kit.	57
Figure 3.9	The RG LED which has been used in the E-Circuit Education Kit.	58
Figure 3.10	The diode used in E-Circuit Educational Kit.	59
Figure 3.11	Various type of resistors .	60

Figure 3.12	The jumpers which has been used in E-Circuit Educational Kit.	60
Figure 3.13	The overall look of Arduino IDE software.	61
Figure 3.14	The components used throughout the project.	62
Figure 3.15	Flowchart of E-Circuit Educational Kit.	64-65
Figure 4.1	The LEDES on the breadboard turned to green according to it's coding once the Arduino Mega is connected to the circuit.	66
Figure 4.2	The overall LEDES on the three breadboard has been connected to the Arduino Mega and LEDES turned to green colour.	67
Figure 4.3	The LEDES turned to red right after it connected to Arduino Mega based on the coding.	67
Figure 4.4	All the three circuit turned to red once it has been connected to Arduino Mega.	68
Figure 4.5	The simulation circuit of the E-Circuit Educational Kit constructed on the Proteus software.	69
Figure 4.6	The LEDES lights up to red according to the Question 1.	94
Figure 4.7	Those LEDES turned to green according to the Answer 1.	95
Figure 4.8	The outcomes of first output of the correct answer possibility in the range of 207.	96
Figure 4.9	The second possibility's output in the range of 223 showed the answer is correct.	96
Figure 4.10	The output of third possibility of answer in the range of 203.	97
Figure 4.11	The final possibility of correct answer in the range of 235.	97
Figure 4.12	Those LEDES turned to red in colour according to Question 2.	98
Figure 4.13	The colour of the LEDES changed to green based on the Answer 2.	98

Figure 4.14	The first possibility of correct answer for Question 2 which from range 75.	99
Figure 4.15	The second output of possibility in term of correct answer in the range of 79.	100
Figure 4.16	The third possibility of correct answer in the range of 95.	100
Figure 4.17	The outcomes of the fourth output of the correct answer possibilities.	101
Figure 4.18	The final possibility of correct answer which is in the range of 111.	101
Figure 4.19	The LEDES of A1-A8, D1-D8, E1, E2 and E4 turned to red where it represent the Question 3.	102
Figure 4.20	Those LEDES lights up to green according to the codes of Answer 3.	102
Figure 4.21	The possibilities of correct answer for Question 3 which is in the range of 219.	103
Figure 4.22	The LEDES lights up to red based on Question 4.	104
Figure 4.23	The LEDES turned from red to green once the Arduino and Bluetooth device detect the correct answer for Question 4.	104
Figure 4.24	The only possibility of answer in the range of 91 for this particular Question 4.	105
Figure 4.25	LEDES turned to red in colour according to Question 5.	106
Figure 4.26	All the LEDES turned from red to green based on the Question 5 codes.	106
Figure 4.27	The first possibility of correct answer for the Question 5 in the range of 120.	107
Figure 4.28	One of the possibilities of correct answer in the range of 121 of Question 5.	107
Figure 4.29	The final possibility of answer in the range of 122 in term of correct answer.	108

Figure 4.30	The Diode and Resistor of 1K ohms has been constructed in series on the breadboard.	109
Figure 4.31	The circuit of the Diode and Resistor has been connected to the Arduino Mega according to its pin via the Arduino codes.	109

LIST OF APPENDICS

APPENDIX	TITLE	PAGE
Appendix 1	The input and output of the Diode and LEDS obtained from the Proteus Simulation	118-128
Appendix 2	The output possibilities of Answers obtained from the Proteus Simulation according to input of the possibilities in term of Questions.	129-256

LIST OF SYMBOL

V - Voltage

I - Current

R - Resistance

Ω - Ohm

LIST OF ABBREVIATIONS

3D	- 3 Dimension
MC	- Component Module
IOT	- Internet of Things
PDK	- Educational Process Design Kit
EDA	- Electronic Design Automation
CCS	- Composite Current Source
FYP	- Final Year Project
LED	- Light Emitting Diode
PWM	- Pulse Width Modulation
PIO	- Peripheral Input
CRT	- Cathode Ray Tubes
IDE	- Integrated Development Environment
AC	- Alternating Current
DC	- Direct Current

CHAPTER 1

INTRODUCTION

1.1 Background of the study and motivation

Presently, studying environment is changing rapidly, particularly in primary and secondary schools, since children are too fascinated with technology gadgets nowadays. They are not very interested in theory as it made them feel bored so they personally love something as a gadget even in classroom learning. However, most schools are lack of material, and equipment tends to lead the students to miss out on the opportunity to pursue what they have learned in an experimental form. As said by (Appleton, 2006), most teachers and laboratory assistants don't have adequate background and poor pedagogical knowledge in handling experiments as they are graduated from a Research Institute rather than a Technical Institute. Even though everything can be done in fingertips, students are still unable to overcome the challenge where they still lack of knowledge as they can only read or watch videos of a subject, but sadly students have not been able to recreate the feeling of experimentation with what the students have discovered (Gibbons, 2003).

Due to the problem and challenges faced by the students at the moment, teaching tools have become the topic of research aim to study and focus on where an Educational kit has been created to overcome the issues. Using the educational kit, the concept of current flow via the diode and the basic electrical circuit can be discovered experimentally. This would encourage the student in Form Four and Form Five to gain more knowledge about the current flow concept, specifically secondary school student. To date, the educational kit has been frequently used as educational tools in schools as well as

governmental and private educational institutions. In addition, it can lead the classroom learning more fun and pleasant by having an educational kit because it is known as a hands-on kit where students will have fun while experimenting with the concept of current flows.

On the other hand, electricity plays a key role in the life of the human being where electricity is needed anywhere and anytime. According to the Malaysian Ministry of Education Law, any electrical and electronic studies from the secondary school itself should be exposed to the students via the Physics syllabus. As stated by (Stohr-Hunt, 1996), most students face problems with the concept of how the electrical current flows in an electrical circuit. In fact, any electrical and electronic subject are known as the toughest. It would be very useful for the students to understand clearly regarding the principle of the current flow by having an educational kit since it is in the form of hands-on hardware.

Essentially, the E-Circuit educational kit is in the form of a hardware where it is used to teach the concept of current flows in an easier way through the diode and electrical circuit. This kit was designed specifically for high school students for those in Form 4 and Form 5, particularly for those who took the Physics subjects. By having an E-Circuit kit, the students will be able to understand the performances of the basic electrical circuits, how the current flows, the conditions and the failures faced from the electric circuits. Therefore, those students will get used and familiar with the electrical circuits, components and formulas. This would attract those students and lead the classroom learning more fun instead of tedious and complicated.