CONTENTS

ENDORSEMENT LETTER ii
STATEMENT OF ORIGINALITY iii
ABSTRACT iv
AUTHOR'S FOREWORD v
ACKNOWLEDGEMENT vi
Content vii
List of Figures ix
List of Tables xi

1. INTRODUCTION 1
1.1 Background 1
1.2 Objectives and Benefits 2
1.3 Problem Formulation 2
1.4 Scope and Limitation 2
1.5 Research Method 2
1.6 Structure of Thesis 3
1.7 Time Schedule 3

2. LITERATURE REVIEW 5
2.1 Routing Protocol for Low-Power and Lossy Network 5
2.2 WSN Routing Protocols 8
2.3 Type of Attacks on RPL 13

3. SYSTEM DESIGN AND EXPERIMENTAL SETUP 18
3.1 System Design 18
3.1.1 Software 18
3.1.2 Hardware 18

3.2 Experimental Setup 19
3.2.1 Evaluation Parameters 21
3.2.2 Implementation of Attack Scenarios 22
3.2.3 Simulation Experiment 23

4. RESULT AND ANALYSIS 26
4.1 Result 26
4.1.1 Reference Network Simulation Result 26
4.1.2 Hello Flood Attack Simulation Result 27
4.1.3 Version Number Modification Attack Simulation Result 29
4.1.4 Blackhole Attack Simulation Result 31
4.2 Analysis 32
4.2.1 Estimated Network's Lifetime Measurement 32
4.2.2 Packet Delivery Ratio Measurement 36
4.2.3 End-to-end Delay Measurement 37
4.2.4 Routing Overhead Measurement 38
4.2.5 Countermeasure for Mitigation 39

5. CONCLUSION AND SUGGESTION 42
5.1 Conclusion 42
5.2 Suggestion 42

REFERENCES 44