



**AN ENERGY EFFICIENT ROUTING
MECHANISM IN WIRELESS SENSOR
NETWORK**

by

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DEDICATION

Dedicated this work to Allah; my lord; the Master and my Creator; my great teacher and messenger, Mohammed (May Allah bless and grant him), who taught us the purpose of life; my homeland Jordan; my great parents, who never stop giving of themselves in countless ways; my dearest husband, who leads me through the valley of darkness with light of hope and support; my beloved brothers and sisters; my beloved Mother whom I can't force myself to stop loving. To all my family, the symbol of love and giving; my friends who encourage and support me, all the people in my life who touch my heart,

I dedicate this research.

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LIST OF ABBREVIATIONS

<u>Symbol</u>	<u>Description</u>
ARPANET	Advanced Research Projects Agency Network
BS	Base-Station
CH	Cluster Head
CMT	Cable Mode Transition
CMU	Carnegie Mellon University
CS_pop	Cluster_Sub_population
CSM	Clustering Selection Method
CV	Cluster Value
DARPA	Defense Advanced Research Projects Agency
DEEC	Distributed Energy-Efficient Clustering
DGs	Designated Gateways
DSN	Distributed Sensor Networks
GAs	Genetic Algorithms
GPS	Global Positioning System
HT	Hard Threshold
LEACH	Low-Energy Adaptive Clustering Hierarchy
MESP	Minimum Energy and Shortest Path
MIT	Massachusetts Institute of Technology
NFER	Near-field electromagnetic ranging
PEGASIS	Power-Efficient Gathering in Sensor Information Systems
pop	population
PSO	Particle Swarm Optimization
RIM	Radio Interferometric Measurements

RSSI	Received Signal strength Indicator
ST	Soft Threshold
STD	standard deviation
TDoA	Time Difference of Arrival
TEEN	Threshold sensitive Energy Efficient sensor Network protocol
ToA	Time of Arrival
TSP	Traveling Sales Person
WSN	Wireless Sensor Networks

TABLE OF CONTENTS

<u>Title</u>	<u>Page</u>
Cover Page.....	I
قرار لجنة المناقشة.....	I
Authorization form	II
آية قرآنية.....	III
DEDICATION.....	IV
ACKNOWLEDGMENTS	V
LIST OF ABBREVIATIONS.....	VII
TABLE OF CONTENTS.....	IX
LIST OF TABLES.....	XII
LIST OF FIGURES	XIII
ABSTRACT.....	XV
CHAPTER ONE INTRODUCTION.....	1
1.1 Introduction.....	1
1.2 Overview.....	2
1.3 Problem Statement.....	4
1.4 Research Importance	4
1.5 Research Objectives and Limitations	5
CHAPTER TWO LITERATURE REVIEW AND RELATED WORKS.....	7
2.1 Background and Literature Review	7
2.2 Wireless Sensor Networks (WSN)	9
2.3 Application of Wireless Sensor Network	11
2.3.1 Area Monitoring Applications.....	11
2.3.2 Environmental Applications.....	11
2.3.3 Health Applications.....	12
2.3.4 Industrial Applications	12
2.3.5 Other Applications.....	12
2.4 Distance Measurement Techniques in WSN Localization	12
2.4.1 Received Signal Strength Indicator (RSSI):.....	15

2.4.2	Time-of-Arrival (ToA):	15
2.4.3	Time Difference of Arrival (TDoA):.....	15
2.4.4	Near-field electromagnetic ranging (NFER):.....	16
2.4.5	Radio Interferometric Measurements (RIM):.....	16
2.5	Low-Energy Adaptive Clustering Hierarchy (LEACH).....	16
2.5.1	Limitations of LEACH	18
2.6	Power-Efficient Gathering in Sensor Information Systems (PEGASIS)	20
2.6.1	PEGASIS Algorithm Detail	21
2.6.2	Advantages of PGEASIS:.....	22
2.6.3	Disadvantages of PEGASIS	23
2.7	Distributed Energy-Efficient Clustering (DEEC).....	24
2.8	CH-leach	24
2.9	Threshold sensitive Energy Efficient sensor Network protocol (TEEN)	25
2.9.1	TEEN drawback	26
2.10	Traveling Sales Person Problem (TSP) Idea:	27
2.11	Increase the WSNs lifetime	28
2.12	Cluster Selection Method (CSM)	29
CHAPTER THREE	PROPOSED MODEL.....	36
3.1	Methodology and Implementation.....	36
3.2	Proposed Protocol (MESP).....	36
3.3	Overview.....	45
3.4	Implementation	45
CHAPTER FOUR	EXPERIMENTAL RESULTS AND DISCUSSION	48
4.1	Overview.....	48
4.2	Experimental Results	50
CHAPTER FIVE	CONCLUSION AND FUTURE WORK	63
5.1	CONCLUSION.....	63
5.2	FUTURE WORK.....	63
References	64

Appendices.....	75
Appendix I:	75
Appendix II:.....	79
Appendix III:	80
Appendix VI	81
Appendix V.....	82
الملخص	83

LIST OF TABLES

Table #	Description	Page
TABLE 3.1:	PROTOCOLS PROPERTIES	44
TABLE 4.1:	DEFAULTS VALUES OF THE EXPERIMENTS	49
TABLE 4.2:	PERFORMANCE OF ROUTING PROTOCOLS WITH PERCENTAGE OF DEAD NODS	54
TABLE 4.3:	PERFORMANCE OF ROUTING PROTOCOLS WITH PERCENTAGE OF DEAD NODES	56
TABLE 4.4:	PERFORMANCE OF ROUTING PROTOCOLS WITH DIFFERENT AREA SIZE	61

LIST OF FIGURES

Figure #	Description	Page
FIGURE 2.1:	LOCALIZATION METHODS.	13
FIGURE 2.2:	POSITION MEASUREMENT TECHNIQUES.	14
FIGURE 2.3:	DISTANCE MEASUREMENT TECHNIQUES.	14
FIGURE 2.4:	CLUSTERING OF NETWORK	17
FIGURE 2.5:	CHAIN FORMATION IN PEGASIS USING GREEDY ALGORITHM	21
FIGURE 2.6:	DATA TRANSMISSION	22
FIGURE 2.7:	OPERATIONAL FLOW OF TEEN	26
FIGURE 2.8:	CLUSTERING INDIVIDUALS IN POPULATION	30
FIGURE 2.9:	THE PROPOSED CLUSTER SELECTION OPERATOR METHOD (CSM)	31
FIGURE 2.10:	PSEUDO CODE FOR PROPOSED SELECTION METHOD CSM	34
FIGURE 3.1 :	THE AREA WITH NODES INITIALIZE	37
FIGURE 3.2:	TEEN PROTOCOL SCHEME	38
FIGURE 3.3:	LEACH PROTOCOL SCHEME & CH-LEACH PROTOCOL	38
FIGURE 3.4	DEEC PROTOCOL SCHEME	39
FIGURE 3.5:	PEGASIS PROTOCOL SCHEME	39
FIGURE 3.6:	MESP PROTOCOL SCHEME	40
FIGURE 3.7:	SOLVING TSP PROBLEM WITH CSM METHOD	41
FIGURE 3.8:	MESP FLOWCHART	42
FIGURE 3.9:	MESP PSEUDO CODE FORMAT	43
FIGURE 4.1:	THE PERFORMANCE RESULT OF ROUTING PROTOCOLS AT 500 NODES.	50
FIGURE 4.2:	THE PERFORMANCE RESULT OF ROUTING PROTOCOLS AT 200 NODES	511
FIGURE 4.3:	THE PERFORMANCE RESULT OF ROUTING PROTOCOLS AT 100 NODES	52
FIGURE 4.4:	THE PERFORMANCE RESULT OF ROUTING PROTOCOLS AT 1000 NODES	53
FIGURE 4.5:	THE AVERAGE PROTOCOLS OVER 100 RANDOM LOCATION OF SINK & STATION	55

FIGURE 4.6: THE PERFORMANCE RESULT OF ROUTING PROTOCOLS AT AREA SIZE OF 1000 ×1000	57
FIGURE 4.7: THE PERFORMANCE RESULT OF ROUTING PROTOCOLS AT AREA SIZE OF 500 ×500	58
FIGURE 4.8: THE PERFORMANCE RESULT OF ROUTING PROTOCOLS AT AREA SIZE OF 100 ×100	59
FIGURE 4.9: THE PERFORMANCE RESULT OF ROUTING PROTOCOLS AT AREA SIZE OF 50 ×50	60

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ABSTRACT

The Wireless Sensor Networks (WANS) has several methods such as PEGASIS, LEACH, TEEN and other methods to create, connect and communicate with sensor network nodes. A new method operator method, called Minimum Energy and Shortest Path (MESP) routing method has been proposed. We focused on the choice of shortest path minimum number of nodes, connection from sink till Base-Station to improve and increase the performance of the method. Such a proposed method is to be implemented using the Clustering Selection Method (CSM) which has been adopted for 100 nodes with a 10000 different arrangement of nodes location to test the proposed method MESP opposite of others. MESP method is used to select, manage and connect the nodes between Base-Station (BS) and sink with best performance and minimum power consumption too. It has been tested and compared with other methods such as PEGASIS, LEACH, DEEC, CH-leach and TEEN. Also, we suggested in MESP two ways of

connection for future works. The experiments' tests found that MESP method achieved the best results with less number of dead nodes compared with the other different methods. Moreover, from the experiments' results, we found that MESP was the best method and more efficient than TEEN with 13.6% after test them on 10000 different scenarios at 100 nodes.

CHAPTER ONE
INTRODUCTION

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INTRODUCTION

1.1 Introduction

A Wireless Sensor Network (WSN) is a wireless network organized system created up of spatially assigned personal devices known as indication nodes to keep a history of real or ecological conditions and able to work with little client lifestyle [1, 2,3, 4, 5]. That in the server a historical table of data and nodes information. Wireless sensor network operates in a cooperative and distributed manner called sensor nodes. These nodes report sensed data to a central Base-Station. It sense and collect data from a target domain, process the data, and transmit the information back to specific station. The communication among these nodes achieved by means of a unique channel. Thus, shared access of the channel requires the establishment of a MAC protocol among the sensor nodes.

Usually, nodes equipped with a:

- sensing device,
- low capacity processor,
- short-range wireless transceiver,
- sensor embedded in the physical environment,
- their inherent limited energy resource storage,
- the characteristic of the channel that only a single node can transmit a message at any given time.

Special kinds, it harvests ambient energy from the sensor's environment, and there a various number of ambient energy sources, and offering the potential for self-powered;

power source into a package currently about two cubic inches in size - networked autonomous sensor nodes. The power consumption in wireless sensor nodes is worst. Even if data rate through nodes are least [6, 7, 8, 9, 10].

A WSN system incorporates a gateway that provides wireless connectivity back to the wired world and distributed nodes. How to reduce the energy consumption of WSN so that the lifetime of WSN can be prolonged is one of the hottest spots. Routing protocols have significant impact on the overall energy consumption of sensor networks. Energy consumption for the routing protocols with direct communication, minimum transmission energy and low adaptive energy clustering hierarchy.

1.2 Overview

A routing protocol uses software and routing algorithms to determine optimal network data transfer and communication paths between network nodes. Routing protocols facilitate router communication and overall network topology understanding. A routing protocol is also known as a routing policy [16].

Every network routing protocol performs three basic functions [17]:

- Discovery - identify other routers on the network
- Route management - keep track of all the possible destinations (for network messages) along with some data describing the pathway of each
- Path determination - make dynamic decisions for where to send each network message

The sensor nodes communicate together by many wirelessly strategies. These strategies administrated by routing protocols. There are different types of routing protocols that can be categorized depending on set of metrics like [18]: