

INTERNATIONAL JOURNAL OF RESEARCH IN COMPUTER APPLICATION & MANAGEMENT

I
J
R
C
M



A Monthly Double-Blind Peer Reviewed Refereed Open Access International e-Journal - Included in the International Serial Directories

Indexed & Listed at:

Ulrich's Periodicals Directory ©, ProQuest, U.S.A., EBSCO Publishing, U.S.A., Cabell's Directories of Publishing Opportunities, U.S.A.

as well as in Open J-Gate, India (link of the same is duly available at Inlibnet of University Grants Commission (U.G.C.))

Registered & Listed at: Index Copernicus Publishers Panel, Poland

Circulated all over the world & Google has verified that scholars of more than 1500 Cities in 141 countries/territories are visiting our journal on regular basis.

Ground Floor, Building No. 1041-C-1, Devi Bhawan Bazar, JAGADHRI – 135 003, Yamunanagar, Haryana, INDIA

www.ijrcm.org.in

CONTENTS

Sr. No.	TITLE & NAME OF THE AUTHOR (S)	Page No.
1.	BUDGETARY TRADE-OFFS BETWEEN MILITARY AND EDUCATION/HEALTH EXPENDITURES IN DEVELOPING COUNTRIES: A PANEL DATA ANALYSIS <i>A. K. M. SAIFUR RASHID & MD. ZAHIR UDDIN ARIF</i>	1
2.	AN ANALYSIS ON CRITICAL SUCCESS FACTORS FOR NEW PRODUCT DEVELOPMENT IN SMEs OF IRAN'S FOOD AND BEVERAGE INDUSTRIES <i>HOSSEIN SAFARZADEH, REZA TALEIFAR, DR. YASHAR SALAMZADEH & FARHANG MOHAMMADI</i>	7
3.	COMPARATIVE STUDY AND NUMERICAL MODELING OF A CUPOLA FURNACE WITH HOT WIND <i>MICHEL LISSOUCK, FRANÇOIS NJOCK BAYOCK & ARIANE KAMEWE</i>	15
4.	AN ANALYSIS ON THE IMPACT OF QUALITY SERVICE PROVISION ON CUSTOMERS' SATISFACTION IN MICRO- FINANCE INSTITUTIONS IN RWANDA FROM THE CUSTOMER'S PERSPECTIVE - USING THE SERVQUAL MODEL <i>MACHOGU MORONGE ABIUD, LYNET OKIKO & VICTORIA KADONDI</i>	21
5.	FOREIGN AID AND DEVELOPMENT IN AFRICA: IMPLICATION FOR THE MILLENNIUM DEVELOPMENT GOALS (MDG'S) <i>NDUONOFIT, LARRY-LOVE EFFIONG & ONWUKWE, VIVIAN CHIZOMA</i>	27
6.	THE IMPACT OF HRM PRACTICES HAVING A MEDIATING EFFECT OF ORGANIZATIONAL COMMITMENT ON ORGANIZATIONAL PERFORMANCE <i>IFFAT RASOOL & JAMILA KHURDHID</i>	33
7.	ENTREPRENEURSHIP DEVELOPMENT THROUGH HUMAN RESOURCE MANAGEMENT PRACTICES <i>P.MALARVIZHI & DR. P.UMA RANI</i>	37
8.	SELF-MEDICATION IN YOUTH: A SURVEY IN JAIPUR <i>SMRITI OJHA & DR. SUNIL JAKHORIA</i>	41
9.	CUSTOMERS' PERCEPTION TOWARDS SERVICE QUALITY OF INTERNET BANKING SERVICES IN COIMBATORE DISTRICT, TAMIL NADU, INDIA <i>NEETA INDORKER, DR. N. AJJAN, DR. S. D. SIVAKUMAR & D. MURUGANANTHI</i>	45
10.	ECONOMIC PERSPECTIVE OF CHILD LABOR - IT'S IMPLICATIONS AND PREVENTIVE MEASURES: A STUDY ON UNORGANIZED SECTOR IN VISAKHAPATNAM, A.P., INDIA <i>DR. M.V.K. SRINIVAS RAO & B. OMNAMASIVAYYA</i>	50
11.	HAZARDOUS WASTES: INDUSTRIAL CONCENTRATION AND POLLUTION INTENSITY IN ANDHRA PRADESH <i>DR. PRABHA PANTH</i>	55
12.	CHANGING WORK SCENARIO- A CAUSE FOR STRESS AMONGST BANK EMPLOYEES <i>VISHAL SAMARTHA, DR. MUSTIARY BEGUM & LOKESH</i>	62
13.	A STUDY ON CONSUMER BEHAVIOUR OF MINI PUMPS IN DOMESTIC SECTOR <i>G. DEVAKUMAR & DR. G. BARANI</i>	67
14.	SHOPPING MOTIVES OF CONSUMERS TOWARDS ORGANIZED RETAIL SECTOR IN ODISHA <i>CHINMAYEE NAYAK & DR.DURGA CHARAN PRADHAN</i>	74
15.	CURRENT STATUS AND CHALLENGES IN IMPLEMENTING INFORMATION AND COMMUNICATION TECHNOLOGY INITIATIVES IN EDUCATION IN INDIA <i>JAYASHREE SHETTY & DR. FAIYAZ GADIWALLA</i>	78
16.	USING WEB SERVICES IN ENTERPRISE COMPUTING AND INTERNET APPLICATION DEVELOPMENT <i>DR. PANKAJ KUMAR GUPTA</i>	84
17.	TEXT CATEGORIZATION USING FPI METHODOLOGY <i>M. PUSHPA & DR. K. NIRMALA</i>	87
18.	APPLYING AND EVALUATING DATA MINING TECHNIQUES TO PREDICT CUSTOMER ATTRITION: A SURVEY <i>AFAQ ALAM KHAN, NASIR HUSSAIN & PARVEZ ABDULLAH KHAN</i>	90
19.	IMAGE EDGE DETECTION USING MORPHOLOGICAL OPERATION <i>PADMANJALI. A.HAGARGI & DR. SHUBHANGI.D.C</i>	97
20.	PERFORMANCE AND EVALUATION OF CONSUMER FORUMS – A CASE STUDY OF WARANGAL DISTRICT <i>T. VIJAYA KUMAR & M. RADHA KRISHNA</i>	102
21.	PROSPECTS OF TRADITIONAL THERAPY: CONSUMER'S PERCEPTION - AN EMPIRICAL STUDY OF RURAL MARKET WITH SPECIAL REFERENCE TO INDORE DISTRICT <i>SWATI KEWLANI & SANDEEP SINGH</i>	108
22.	STATE FINANCIAL CORPORATIONS AND INDUSTRIAL DEVELOPMENT: A STUDY WITH SPECIAL REFERENCE TO RAJASTHAN FINANCIAL CORPORATION <i>SUSANTA KANRAR</i>	112
23.	A STUDY OF CUSTOMER LOYALTY WITH REFERENCE TO PRIVATE AND PUBLIC SECTOR BANKS IN WESTERN MAHARASHTRA <i>NITIN CHANDRAKANT MALI</i>	118
24.	ANALYSIS OF EARNINGS QUALITY OF SELECTED PUBLIC, PRIVATE AND FOREIGN BANKS IN INDIA <i>SAHILA CHAUDHRY</i>	126
25.	SOLUTION OF MULTICOLLINEARITY BY RIDGE REGRESSION <i>R. SINGH</i>	130
26.	AN IMPACT OF CELEBRITY ENDORSEMENT ON THE BUYING BEHAVIOR OF YOUTH <i>RAVINDRA KUMAR KUSHWAHA & GARIMA</i>	136
27.	A STUDY ON ANALYSIS OF SHARE PRICE MOVEMENTS OF THE SELECTED INDUSTRIES BASED ON NIFTY STOCKS <i>C. SOUNDAR RAJAN & DR. S. SANGEETHA</i>	142
28.	INCREASING NETWORK LIFETIME WITH ANGLED-LEACH PROTOCOL IN WSNs <i>DEEPTI GARG & ROOPALI GARG</i>	147
29.	THE IMPACT OF CONTENTS ON NATIONAL AND INTERNATIONAL UNIVERSITY WEBSITES NAVIGATION BEHAVIOUR <i>SUNITA S. PADMANNAVAR & DR. MILIND J. JOSHI</i>	152
30.	ULTRA SOUND BREAST CANCER IMAGE ENHANCEMENT AND DENOISING USING WAVELET TRANSFORM <i>K. HAKKINS RAJ.</i>	158
	REQUEST FOR FEEDBACK	162

CHIEF PATRON

PROF. K. K. AGGARWAL

Chancellor, Lingaya's University, Delhi
Founder Vice-Chancellor, Guru Gobind Singh Indraprastha University, Delhi
Ex. Pro Vice-Chancellor, Guru Jambheshwar University, Hisar

PATRON

SH. RAM BHAJAN AGGARWAL

Ex.State Minister for Home & Tourism, Government of Haryana
Vice-President, Dadri Education Society, Charkhi Dadri
President, Chinar Syntex Ltd. (Textile Mills), Bhiwani

CO-ORDINATOR

MOHITA

Faculty, Yamuna Institute of Engineering & Technology, Village Gadholi, P. O. Gadhola, Yamunanagar

ADVISORS

DR. PRIYA RANJAN TRIVEDI

Chancellor, The Global Open University, Nagaland

PROF. M. S. SENAM RAJU

Director A. C. D., School of Management Studies, I.G.N.O.U., New Delhi

PROF. S. L. MAHANDRU

Principal (Retd.), MaharajaAgrasenCollege, Jagadhri

EDITOR

PROF. R. K. SHARMA

Professor, Bharti Vidyapeeth University Institute of Management & Research, New Delhi

CO-EDITOR

MOHITA

Faculty, Yamuna Institute of Engineering & Technology, Village Gadholi, P. O. Gadhola, Yamunanagar

EDITORIAL ADVISORY BOARD

DR. RAJESH MODI

Faculty, YanbuIndustrialCollege, Kingdom of Saudi Arabia

PROF. PARVEEN KUMAR

Director, M.C.A., Meerut Institute of Engineering & Technology, Meerut, U. P.

PROF. H. R. SHARMA

Director, Chhatarpati Shivaji Institute of Technology, Durg, C.G.

PROF. MANOHAR LAL

Director & Chairman, School of Information & Computer Sciences, I.G.N.O.U., New Delhi

PROF. ANIL K. SAINI

Chairperson (CRC), Guru Gobind Singh I. P. University, Delhi

PROF. R. K. CHOUDHARY

Director, Asia Pacific Institute of Information Technology, Panipat

DR. ASHWANI KUSH

Head, Computer Science, UniversityCollege, KurukshetraUniversity, Kurukshetra

DR. BHARAT BHUSHAN

Head, Department of Computer Science & Applications, Guru Nanak Khalsa College, Yamunanagar

DR. VIJAYPAL SINGH DHAKA

Dean (Academics), Rajasthan Institute of Engineering & Technology, Jaipur

DR. SAMBHAVNA

Faculty, I.I.T.M., Delhi

DR. MOHINDER CHAND

Associate Professor, Kurukshetra University, Kurukshetra

DR. MOHENDER KUMAR GUPTA

Associate Professor, P.J.L.N. Government College, Faridabad

DR. SAMBHAV GARG

Faculty, M. M. Institute of Management, Maharishi Markandeshwar University, Mullana

DR. SHIVAKUMAR DEENE

Asst. Professor, Dept. of Commerce, School of Business Studies, Central University of Karnataka, Gulbarga

DR. BHAVET

Faculty, M. M. Institute of Management, Maharishi Markandeshwar University, Mullana

ASSOCIATE EDITORS

PROF. ABHAY BANSAL

Head, Department of Information Technology, Amity School of Engineering & Technology, Amity University, Noida

PROF. NAWAB ALI KHAN

Department of Commerce, Aligarh Muslim University, Aligarh, U.P.

ASHISH CHOPRA

Sr. Lecturer, Doon Valley Institute of Engineering & Technology, Karnal

SAKET BHARDWAJ

Lecturer, Haryana Engineering College, Jagadhri

TECHNICAL ADVISORS

AMITA

Faculty, Government M. S., Mohali

MOHITA

Faculty, Yamuna Institute of Engineering & Technology, Village Gadholi, P. O. Gadholi, Yamunanagar

FINANCIAL ADVISORS

DICKIN GOYAL

Advocate & Tax Adviser, Panchkula

NEENA

Investment Consultant, Chambaghat, Solan, Himachal Pradesh

LEGAL ADVISORS

JITENDER S. CHAHAL

Advocate, Punjab & Haryana High Court, Chandigarh U.T.

CHANDER BHUSHAN SHARMA

Advocate & Consultant, District Courts, Yamunanagar at Jagadhri

SUPERINTENDENT

SURENDER KUMAR POONIA

CALL FOR MANUSCRIPTS

We invite unpublished novel, original, empirical and high quality research work pertaining to recent developments & practices in the area of Computer, Business, Finance, Marketing, Human Resource Management, General Management, Banking, Insurance, Corporate Governance and emerging paradigms in allied subjects like Accounting Education; Accounting Information Systems; Accounting Theory & Practice; Auditing; Behavioral Accounting; Behavioral Economics; Corporate Finance; Cost Accounting; Econometrics; Economic Development; Economic History; Financial Institutions & Markets; Financial Services; Fiscal Policy; Government & Non Profit Accounting; Industrial Organization; International Economics & Trade; International Finance; Macro Economics; Micro Economics; Monetary Policy; Portfolio & Security Analysis; Public Policy Economics; Real Estate; Regional Economics; Tax Accounting; Advertising & Promotion Management; Business Education; Management Information Systems (MIS); Business Law, Public Responsibility & Ethics; Communication; Direct Marketing; E-Commerce; Global Business; Health Care Administration; Labor Relations & Human Resource Management; Marketing Research; Marketing Theory & Applications; Non-Profit Organizations; Office Administration/Management; Operations Research/Statistics; Organizational Behavior & Theory; Organizational Development; Production/Operations; Public Administration; Purchasing/Materials Management; Retailing; Sales/Selling; Services; Small Business Entrepreneurship; Strategic Management Policy; Technology/Innovation; Tourism, Hospitality & Leisure; Transportation/Physical Distribution; Algorithms; Artificial Intelligence; Compilers & Translation; Computer Aided Design (CAD); Computer Aided Manufacturing; Computer Graphics; Computer Organization & Architecture; Database Structures & Systems; Digital Logic; Discrete Structures; Internet; Management Information Systems; Modeling & Simulation; Multimedia; Neural Systems/Neural Networks; Numerical Analysis/Scientific Computing; Object Oriented Programming; Operating Systems; Programming Languages; Robotics; Symbolic & Formal Logic and Web Design. The above mentioned tracks are only indicative, and not exhaustive.

Anybody can submit the soft copy of his/her manuscript **anytime** in M.S. Word format after preparing the same as per our submission guidelines duly available on our website under the heading guidelines for submission, at the email address: infoijrcm@gmail.com.

GUIDELINES FOR SUBMISSION OF MANUSCRIPT

1. **COVERING LETTER FOR SUBMISSION:**

DATED: _____

THE EDITOR
IJRCM

Subject: SUBMISSION OF MANUSCRIPT IN THE AREA OF

(e.g. Finance/Marketing/HRM/General Management/Economics/Psychology/Law/Computer/IT/Engineering/Mathematics/other, please specify)

DEAR SIR/MADAM

Please find my submission of manuscript entitled ' _____ ' for possible publication in your journals.

I hereby affirm that the contents of this manuscript are original. Furthermore, it has neither been published elsewhere in any language fully or partly, nor is it under review for publication elsewhere.

I affirm that all the author (s) have seen and agreed to the submitted version of the manuscript and their inclusion of name (s) as co-author (s).

Also, if my/our manuscript is accepted, I/We agree to comply with the formalities as given on the website of the journal & you are free to publish our contribution in any of your journals.

NAME OF CORRESPONDING AUTHOR:

Designation:

Affiliation with full address, contact numbers & Pin Code:

Residential address with Pin Code:

Mobile Number (s):

Landline Number (s):

E-mail Address:

Alternate E-mail Address:

NOTES:

- a) The whole manuscript is required to be in **ONE MS WORD FILE** only (pdf. version is liable to be rejected without any consideration), which will start from the covering letter, inside the manuscript.
- b) The sender is required to mention the following in the **SUBJECT COLUMN** of the mail:
New Manuscript for Review in the area of (Finance/Marketing/HRM/General Management/Economics/Psychology/Law/Computer/IT/Engineering/Mathematics/other, please specify)
- c) There is no need to give any text in the body of mail, except the cases where the author wishes to give any specific message w.r.t. to the manuscript.
- d) The total size of the file containing the manuscript is required to be below **500 KB**.
- e) Abstract alone will not be considered for review, and the author is required to submit the complete manuscript in the first instance.
- f) The journal gives acknowledgement w.r.t. the receipt of every email and in case of non-receipt of acknowledgment from the journal, w.r.t. the submission of manuscript, within two days of submission, the corresponding author is required to demand for the same by sending separate mail to the journal.

2. **MANUSCRIPT TITLE:** The title of the paper should be in a 12 point Calibri Font. It should be bold typed, centered and fully capitalised.

3. **AUTHOR NAME (S) & AFFILIATIONS:** The author (s) **full name, designation, affiliation (s), address, mobile/landline numbers**, and **email/alternate email address** should be in italic & 11-point Calibri Font. It must be centered underneath the title.

4. **ABSTRACT:** Abstract should be in fully italicized text, not exceeding 250 words. The abstract must be informative and explain the background, aims, methods, results & conclusion in a single para. Abbreviations must be mentioned in full.

5. **KEYWORDS:** Abstract must be followed by a list of keywords, subject to the maximum of five. These should be arranged in alphabetic order separated by commas and full stops at the end.
6. **MANUSCRIPT:** Manuscript must be in **BRITISH ENGLISH** prepared on a standard A4 size **PORTRAIT SETTING PAPER**. It must be prepared on a single space and single column with 1" margin set for top, bottom, left and right. It should be typed in 8 point Calibri Font with page numbers at the bottom and centre of every page. It should be free from grammatical, spelling and punctuation errors and must be thoroughly edited.
7. **HEADINGS:** All the headings should be in a 10 point Calibri Font. These must be bold-faced, aligned left and fully capitalised. Leave a blank line before each heading.
8. **SUB-HEADINGS:** All the sub-headings should be in a 8 point Calibri Font. These must be bold-faced, aligned left and fully capitalised.
9. **MAIN TEXT:** The main text should follow the following sequence:

INTRODUCTION**REVIEW OF LITERATURE****NEED/IMPORTANCE OF THE STUDY****STATEMENT OF THE PROBLEM****OBJECTIVES****HYPOTHESES****RESEARCH METHODOLOGY****RESULTS & DISCUSSION****FINDINGS****RECOMMENDATIONS/SUGGESTIONS****CONCLUSIONS****SCOPE FOR FURTHER RESEARCH****ACKNOWLEDGMENTS****REFERENCES****APPENDIX/ANNEXURE**

It should be in a 8 point Calibri Font, single spaced and justified. The manuscript should preferably not exceed **5000 WORDS**.

10. **FIGURES & TABLES:** These should be simple, crystal clear, centered, separately numbered & self explained, and **titles must be above the table/figure. Sources of data should be mentioned below the table/figure.** It should be ensured that the tables/figures are referred to from the main text.
11. **EQUATIONS:** These should be consecutively numbered in parentheses, horizontally centered with equation number placed at the right.
12. **REFERENCES:** The list of all references should be alphabetically arranged. The author (s) should mention only the actually utilised references in the preparation of manuscript and they are supposed to follow **Harvard Style of Referencing**. The author (s) are supposed to follow the references as per the following:
 - All works cited in the text (including sources for tables and figures) should be listed alphabetically.
 - Use **(ed.)** for one editor, and **(ed.s)** for multiple editors.
 - When listing two or more works by one author, use --- (20xx), such as after Kohl (1997), use --- (2001), etc, in chronologically ascending order.
 - Indicate (opening and closing) page numbers for articles in journals and for chapters in books.
 - The title of books and journals should be in italics. Double quotation marks are used for titles of journal articles, book chapters, dissertations, reports, working papers, unpublished material, etc.
 - For titles in a language other than English, provide an English translation in parentheses.
 - The location of endnotes within the text should be indicated by superscript numbers.

PLEASE USE THE FOLLOWING FOR STYLE AND PUNCTUATION IN REFERENCES:**BOOKS**

- Bowersox, Donald J., Closs, David J., (1996), "Logistical Management." Tata McGraw, Hill, New Delhi.
- Hunker, H.L. and A.J. Wright (1963), "Factors of Industrial Location in Ohio" Ohio State University, Nigeria.

CONTRIBUTIONS TO BOOKS

- Sharma T., Kwatra, G. (2008) Effectiveness of Social Advertising: A Study of Selected Campaigns, Corporate Social Responsibility, Edited by David Crowther & Nicholas Capaldi, Ashgate Research Companion to Corporate Social Responsibility, Chapter 15, pp 287-303.

JOURNAL AND OTHER ARTICLES

- Schemenner, R.W., Huber, J.C. and Cook, R.L. (1987), "Geographic Differences and the Location of New Manufacturing Facilities," Journal of Urban Economics, Vol. 21, No. 1, pp. 83-104.

CONFERENCE PAPERS

- Garg, Sambhav (2011): "Business Ethics" Paper presented at the Annual International Conference for the All India Management Association, New Delhi, India, 19–22 June.

UNPUBLISHED DISSERTATIONS AND THESES

- Kumar S. (2011): "Customer Value: A Comparative Study of Rural and Urban Customers," Thesis, Kurukshetra University, Kurukshetra.

ONLINE RESOURCES

- Always indicate the date that the source was accessed, as online resources are frequently updated or removed.

WEBSITES

- Garg, Bhavet (2011): Towards a New Natural Gas Policy, Political Weekly, Viewed on January 01, 2012 <http://epw.in/user/viewabstract.jsp>

INCREASING NETWORK LIFETIME WITH ANGLED-LEACH PROTOCOL IN WSNs

DEEPTI GARG
STUDENT
UIET
PANJAB UNIVERSITY
CHANDIGARH

ROOPALI GARG
ASST. PROFESSOR
UIET
PANJAB UNIVERSITY
CHANDIGARH

ABSTRACT

Increasing scalability, network lifetime and load balancing are important factors for wireless sensor networks. Clustering is a useful technique through which we can affect these factors. In this paper, we propose a new method of clustering (Angled-LEACH) which prolongs network lifetime. Links between nodes in sensor networks are vulnerable to breakage because of the dynamic nature of the networks. Angled-LEACH is based on the direction of the adjacent mobile nodes of the networks. Each pair of nodes that are taking part in the transmission should ideally be moving in the same or similar direction. This helps in reducing the traffic and delay in the network. It also helps in having less number of collisions between the nodes and hence helps in energy efficiency and increases network lifetime. Simulation results demonstrate that using the proposed method offers significant improvement in network lifetime in comparison with the LEACH and SEP methods.

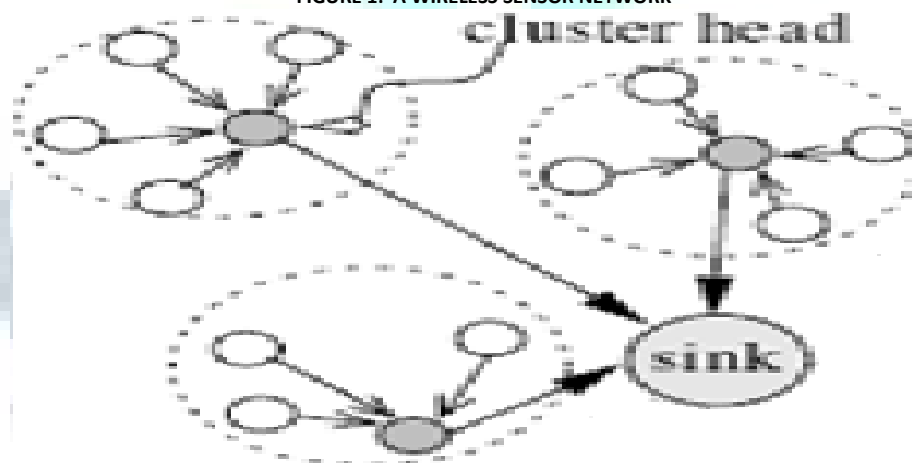
KEYWORDS

WSN, Network Protocols, Clustering, Energy Efficiency, Delay, Traffic, LEACH, SEP.

INTRODUCTION

Wireless sensor networks are being used all over the world in many applications including traffic monitoring, military surveillance, habitat monitoring, combat field reconnaissance, object tracking, etc. This has been made practically feasible by significant advances in micro electro-mechanical systems (MEMS) technology, radio communications and digital electronics. Sensors are tiny devices that are deployed in an ad-hoc manner in the area of interest to monitor events and gather data about the environment. The WSNs consist of hundreds or thousands of inexpensive sensor nodes. They have the ability of sensing, data processing and communicating with each other. Basic features of sensor networks are self-organizing capabilities, mobility of nodes, dynamic network topology, multi-hop routing, limited computational and communication power, node failures, short-range broadcast communication and large scale of deployment. The WSNs have features of flexibility and scalability. Multi-hopping in the networks can cause a sensor node to communicate with a node which is far away from it. In WSNs, each of the sensor nodes collects and route data either to an external base station (BS) or to other sensors. Therefore, each node plays the dual role of data originator and data router in a multi-hop sensor network. A sensor node is a microelectronic device which can only be equipped with a limited power source. The sensor nodes communicate either among each other or directly to an external base station. A base station may be a fixed or mobile node which helps in communications among the sensor nodes. The sensor nodes are self organizing in nature. A large number of sensor nodes are distributed over large geographic regions. They collaborate with each other to accomplish the task. Networking together thousands of sensor nodes allows users to accurately monitor a remote environment by combining the data from the individual nodes. The following figure represents a WSN where sensor nodes send the data to their respective cluster heads and they further send the data to the sink node.

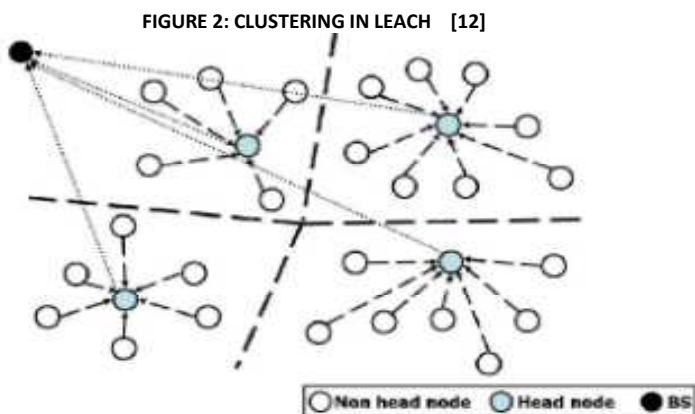
FIGURE 1: A WIRELESS SENSOR NETWORK



The key limitations of WSNs are the storage, data processing and efficient energy consumption. Due to dense deployment nature of WSNs, the node batteries of these sensor nodes are difficult to recharge. Also it is not feasible to replace the batteries of thousands of nodes. Hence, energy awareness and maximizing the lifetime of the sensors are essential design issues in WSNs. The WSN protocols can be classified into two types, planar routing protocol and hierarchical routing protocol. Hierarchical routing based clustering not only advance network scalability and reduces delay, but also it supports data aggregation [15] to prolong the network lifetime. In WSNs, it is seen from the literature, 70% of the total energy is consumed for data transmission. Hence the methods used for data collection and transmission can greatly help in achieving energy efficiency. Since long transmissions consume much more energy, we can minimize long transmissions with clustering and reduce data redundancy in the transmissions to conserve the scarce energy resources. The sleep-awake cycles, clustering etc techniques have been proposed for reducing the energy consumption.

RELATED WORK

LEACH: LEACH (Low Power Adaptive Clustering Hierarchy) is a hierarchical clustering method in WSNs. In this algorithm, a node randomly elects itself to become cluster head and then broadcasts an advertisement message to all of the remaining nodes.



The nodes receiving the message join the nearest cluster head. Once the cluster heads are formed, the sensor nodes send information to the base station through the corresponding cluster head. This time along with the time required for formation of a cluster is known as a round time. The clustering process repeats after each round. Another set of nodes become the cluster head in other rounds. The CH node creates a TDMA schedule [16] and assigns each child node a time slot when it can transmit. This schedule is broadcast to all the nodes in the cluster. In this approach, there is a formula in which every node has probability to be cluster head in every round. At the beginning of every round, every node chooses a random number between 0 and 1. There is a threshold number $T(n)$ which varies in every round. The node can be a cluster head in the current round if the random number chosen by it is less than $T(n)$. The LEACH probability formula is:

$$T(n) = \frac{p(n)}{1 - p(n) * (r \bmod (1/p(n)))} \forall n \in G. [12]$$

Where n is the number of network nodes, r is the number of the round, G is the set of nodes that haven't been cluster head in the last $1/p$ rounds and p is the desired percentage of cluster heads which equals to 0.05. LEACH algorithm has a drawback that it doesn't consider node's residual energy in selecting the CHs. Hence CHs chosen in every round are not always suitable for the network.

THE PROPOSED ANGLED-LEACH

The main motivation of the proposed Angled-LEACH is to reduce the number of collisions between the nodes, the breakage of the links between nodes and the traffic in the network, resulting in a new robust clustering technique, called Angled-LEACH. The model and algorithm of the proposed scheme are given below.

ANGLED-LEACH SCHEME

The Angled-LEACH assumes that the sensor nodes are placed randomly within a WSN and some of the nodes introduce themselves to be the cluster heads by broadcasting advertisement messages to the other nodes. All the nodes would be collecting the data at their respective cluster heads and the cluster heads would be transferring the data to the sink node. This causes links breakage between the nodes and traffic in the network and affects load balancing and hence energy efficiency too. Angled-LEACH scheme calculates the angles between the adjacent nodes. The nodes would be transferring the data to the cluster heads which would be reachable to it and lies in the direction of the destination. This reduces the overall traffic and delay in the network and gives efficient energy utilization.

METHOD OF ANGLED-LEACH

CHECK FOR REACHABILITY OF THE NODES

The reachability of the nodes to the other nearby nodes can be calculated by the distance formula where the distances between the nodes, distances between the nodes and the cluster heads and the distances between the cluster heads and sink node can be calculated.

CALCULATING THE ANGLES BETWEEN THE NODES

The angles of the nodes to their respective cluster heads and the sink node is calculated by the dot product of the position of the nodes, cluster heads and the sink. If the angle calculated lies between 0° and 45° (in the direction of the destination), then the energy utilization is less else the energy utilization is more.

CALCULATING THE TOTAL TIME FOR WHICH THE NETWORK WORKS

The time taken by the algorithm in Matlab can be calculated by tic and toc formulae. The trace of tic and toc can be traced by loading its trace file and then displaying both with the display formula. The more the value of the difference of tic and toc, the more is the efficiency of the algorithm.

PERFORMANCE EVALUATION

The performance analysis of routing protocols is evaluated with the MATLAB simulator. Then our proposed protocol is compared to the LEACH and SEP (Stable Election Protocol) algorithms in terms of the network lifetime.

SIMULATION ENVIRONMENT

In this simulation, our experiment model performed on 100 nodes which were randomly deployed and distributed in a 100×100 square meter area. We assume that all nodes are mobile in nature and can move within the specified area. Our simulation model uses the parameters as shown in table 1.

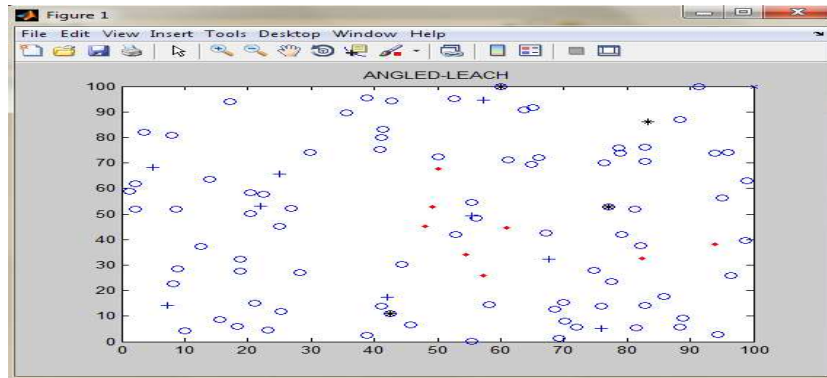
TABLE 1: SIMULATION PARAMETERS

Parameters	Values
Network size	100m * 100m
Location of the sink node	[100,100]
Number of nodes	100
Number of clusters	10
Initial energy of each node	0.5J
Maximum number of rounds	7000
Percentage of CH nodes	0.05
Fraction of advanced nodes	0.1
Additional energy factor between advanced and normal nodes	1

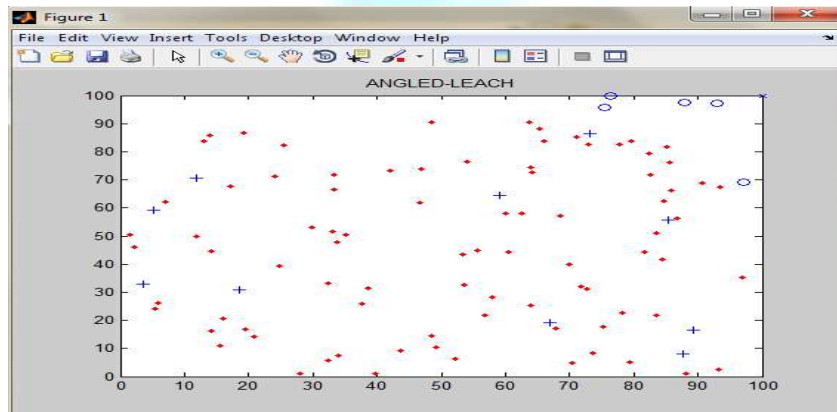
SIMULATION RESULTS

To compare the network lifetime of the algorithms, following results have been observed.

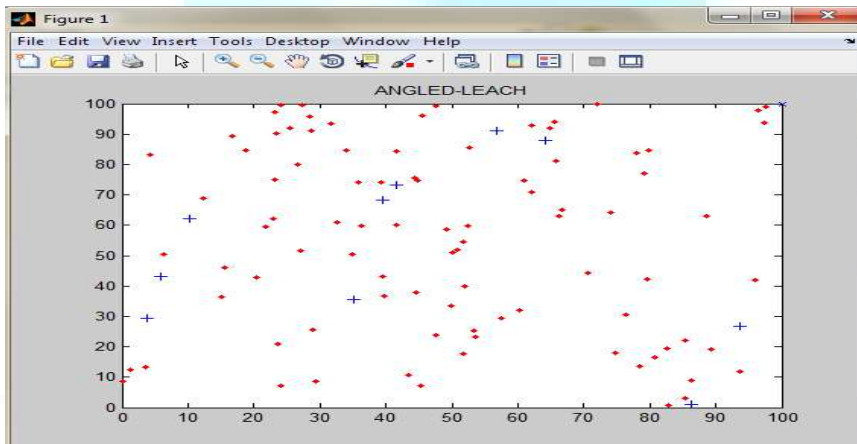
A SNAPSHOT OF THE ANGLED-LEACH NETWORK AFTER 1000 ROUNDS



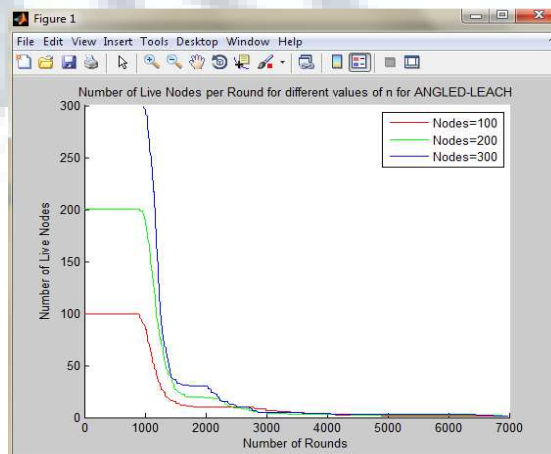
A SNAPSHOT OF THE ANGLED-LEACH NETWORK AFTER 1500 ROUNDS



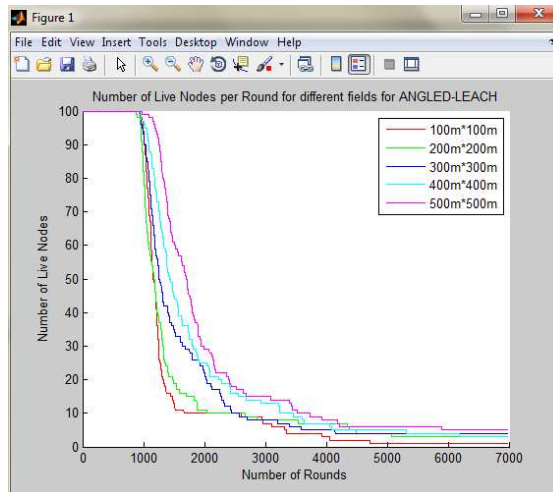
A SNAPSHOT OF THE ANGLED-LEACH NETWORK AFTER 2500 ROUNDS



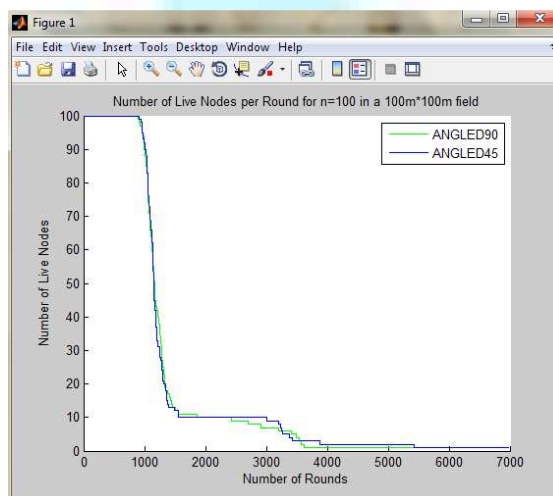
PLOT FOR NUMBER OF LIVE NODES PER ROUND OF ANGLED-LEACH PROTOCOL FOR DIFFERENT NUMBER OF NODES 'n'



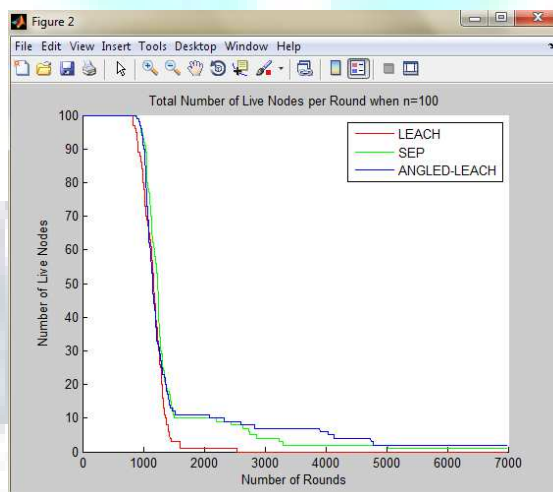
PLOT FOR NUMBER OF LIVE NODES PER ROUND OF ANGLED-LEACH PROTOCOL VARYING THE NETWORK FIELD



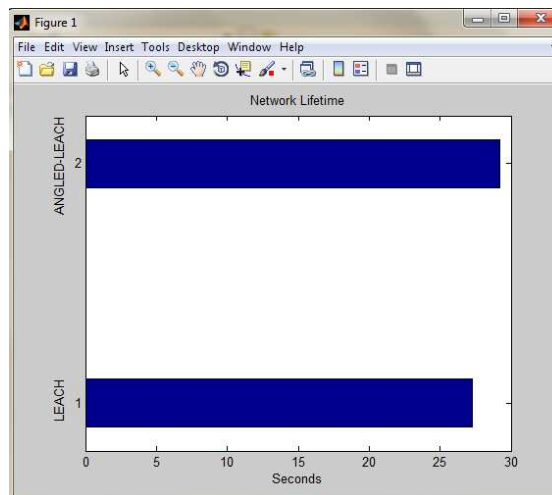
PLOT FOR NUMBER OF LIVE NODES PER ROUND FOR N=100 IN A 100M * 100M FIELD OF ANGLED-LEACH PROTOCOL FOR DIFFERENT ANGLES



PLOT FOR TOTAL NUMBER OF LIVE NODES PER ROUND FOR LEACH, SEP AND ANGLED-LEACH PROTOCOLS WHEN n=100



PLOT BETWEEN NETWORK LIFETIME FOR LEACH AND ANGLED-LEACH PROTOCOLS



CONCLUSIONS

Hierarchical clustering has proven to be an effective approach for efficient energy and bandwidth utilization. We have classified a comprehensive survey of LEACH protocol in WSNs. The clustering algorithms aim to maximize the lifetime of the networks while not compromising data delivery and accuracy. It is seen from the literature that about 70% of the total energy is consumed in data transmission. Hence the methods used for data collection and transmission can greatly help in reducing energy consumption in the networks. Traffic induces delays and most of the nodes may get die due to collisions. Many of the links break due to collisions between the nodes. We can reduce the traffic by having communications between the nodes such that the source and the destinations must lie in the same or similar directions. This will reduce the number of collisions between the sensor nodes, traffic and delay and helps in achieving energy efficiency in the wireless networks. The above simulation results show that Angled-LEACH protocol enhances the network lifetime in comparison with LEACH and SEP.

REFERENCES

1. Jamal N. Al-Karaki and Ahmed E. Kamal, (2004) "Routing Techniques in Wireless Sensor Networks: A Survey", The Hashemite University and The Iowa State University.
2. Ossama Younis, Marwan Krunz, and Srinivasan Ramasubramanian, (2006) "Node Clustering in Wireless Sensor Networks: Recent Developments and Deployment Challenges", University of Arizona.
3. Femi A. Aderohunmu, Jeremiah D. Deng, and Martin K. Purvis, (2009) "Enhancing Clustering in Wireless Sensor Networks with Energy Heterogeneity", Department of Information Science, University of Otago, New Zealand.
4. Kemal Akkaya, and Mohamed Younis, (2003) "A survey on Routing Protocols for Wireless Sensor Networks", Department of Computer Science and Electrical Engineering, University of Maryland, Baltimore County, Baltimore, MD 21250, USA.
5. Ameer Ahmed Abbasia and Mohamed Younis, (2007) "A Survey on Clustering Algorithms for Wireless Sensor Networks", Baltimore County, Baltimore, MD 21250, USA.
6. Vivek Mhatre, Catherine Rosenberg, (2003) "Design guidelines for wireless sensor networks: communication, clustering and aggregation", School of Electrical and Computer Engineering, Purdue University, West Lafayette, IN 47907-1285, USA.
7. Mohammad Mehrani, Jamshid Shanbehzadeh, Abdolhossein Sarrafzadeh, Seyed Javad Mirabedini, and Chris Manford, (2010) "FEED: Fault Tolerant, Energy Efficient, Distributed Clustering for WSN", Auckland, New Zealand.
8. Peyman Neamatollahi, Hoda Taheri, Mahmoud Naghibzadeh, and Mohammad-Hossein Yaghmaee, (2011) "A Hybrid Clustering Approach for Prolonging Lifetime in Wireless Sensor Networks", Iran.
9. Saeed Rasouli Heikalabad, Naeim Rahmani, and Ahmad Habibzad Navin, (2010) "REACH: The New Routing Algorithm based on Energy Aware Clustering Hierarchical for Lifetime Increasing in Wireless Sensor Networks", Iran, Vol 2.
10. V. Loscri, G. Morabito and S. Marano, (2005) "A Two-Level Hierarchy for Low-Energy Adaptive Clustering Hierarchy", Proceedings of Vehicular Technology Conference, vol 3, 1809-1813.
11. Rahmanian, H. Omranpour, M. Akbari, K. Raahemifar, (2011) "A Novel Genetic Algorithm in LEACH-C Routing Protocol for Sensor Networks", IEEE CCECE.
12. Heinzelman W R, Chandrakasan A, Balakrishnan H., (2000) "Energy efficient communication protocol for wireless microsensor networks", The 33rd Hawaii International Conference on System Sciences, Hawaii.
13. Akramul Azim and Mohammad Mahfuzul Islam, (2009) "Hybrid LEACH: A Relay Node Based Low Energy Adaptive Clustering Hierarchy for Wireless Sensor Networks", Proceedings of the 2009 IEEE 9th Malaysia International Conference on Communications.
14. Neetesh Purohit, Himanshu Agrawal, Ankit Jain, (2011) "A New Scheme for Cooperative Communication in LEACH based Wireless Sensor Network", IEEE, ICIN.
15. Peng Ren, Jiansheng Qian, Leida Li, Zhikai Zhao, Xiaobin Li, (2010) "Unequal Clustering Scheme Based LEACH for Wireless Sensor Networks", IEEE, ICCEC.
16. Rupesh Mehta, Abhishek Pandey & Pratik Kapadia, (2012) "Reforming Clusters Using C-LEACH in Wireless Sensor Networks", IEEE, International Conference on Computer Communication and Informatics (ICCCI -2012), Jan. 10 – 12, 2012, Coimbatore, INDIA.
17. Yuhua Liu, Yongfeng Zhao, Jingju Gao, (2009) "A New Clustering Mechanism Based On LEACH Protocol", IEEE International Joint Conference on Artificial Intelligence.
18. Guofeng Hou, K. Wendy Tang, (2006) "Evaluation of LEACH Protocol Subject to Different Traffic Models", The 1st International Conference on Next Generation Network, Korea.
19. Ji Peng, Wu Chengdong, Zhang Yunzhou, Chen Fei, (2011) "A Low-Energy Adaptive Clustering Routing Protocol of Wireless Sensor Networks", National Nature Science Foundation under Grant, IEEE.
20. Haosong Gou and Younghwan Yoo, (2010) "An Energy Balancing LEACH Algorithm for Wireless Sensor Networks", Seventh International Conference on Information Technology, IEEE.
21. Peyman Neamatollahi, Hoda Taheri, Mahmoud Naghibzadeh and Mohammad-Hossein Yaghmaee, (2011) "A Hybrid Clustering Approach for Prolonging Lifetime in Wireless Sensor Networks", International Symposium on Computer Networks and Distributed Systems (CNDS), IEEE.
22. Lu Tao, Zhu Qing-Xin, Zhang Luqiao, (2010) "An Improvement for LEACH Algorithm in Wireless Sensor Network", IEEE.

REQUEST FOR FEEDBACK

Dear Readers

At the very outset, International Journal of Research in Computer Application and Management (IJRCM) acknowledges & appreciates your efforts in showing interest in our present issue under your kind perusal.

I would like to request you to supply your critical comments and suggestions about the material published in this issue as well as on the journal as a whole, on our E-mail infoijrcm@gmail.com for further improvements in the interest of research.

If you have any queries please feel free to contact us on our E-mail infoijrcm@gmail.com.

I am sure that your feedback and deliberations would make future issues better – a result of our joint effort.

Looking forward an appropriate consideration.

With sincere regards

Thanking you profoundly

Academically yours

Sd/-

Co-ordinator

ABOUT THE JOURNAL

In this age of Commerce, Economics, Computer, I.T. & Management and cut throat competition, a group of intellectuals felt the need to have some platform, where young and budding managers and academicians could express their views and discuss the problems among their peers. This journal was conceived with this noble intention in view. This journal has been introduced to give an opportunity for expressing refined and innovative ideas in this field. It is our humble endeavour to provide a springboard to the upcoming specialists and give a chance to know about the latest in the sphere of research and knowledge. We have taken a small step and we hope that with the active co-operation of like-minded scholars, we shall be able to serve the society with our humble efforts.

Our Other Journals

