Location of Base Station in WSN Using Harmony Search Algorithm

Latha M.N, Kruthi P Bhaskar, Prasad A Y

Abstract— In remote sensor systems (WSNs), the area of the base station (BS) in respect to sensor hubs is an essential thought in saving system lifetime. High vitality consump-tion principally happens amid information correspondence between sensor hubs and the BS, in both single and multi-bounce foundations. A WSN outline with dynamic BS migration is there-fore alluring as this may delay the system operational lifetime. In any case, situating the BS alongside every sensor hub may bring about information gathering inertness. The redesign of sensor hubs into groups and the decision of a delegate hub from each bunch, known as a group head (CH), as a "communicator" between each bunch and the moving BS seems to maintain a strategic distance from this inactivity issue and upgrade the vitality use in WSNs. In this paper, we propose a vitality proficient system display that powerfully migrates a versatile BS inside a bunch based system foundation utilizing an agreement look calculation. To begin with, this model designates sensor hubs into an ideal number of bunches in which every sensor hub be-yearns to the most suitable group. Taking after this, the ideal CHs are looked over the other bunches' sensors with a specific end goal to equally convey the part of the CHs among the sen-sors. This framework changes progressively in light of the quantity of alive hubs, with the goal that heap adjusting is accomplished among sensor hubs. Therefore, the ideal area of the moving BS is resolved between the CHs and the BS, keeping in mind the end goal to decrease the separations for correspondence. At long last, detecting and information transmission happens from every sensor hub to their separate CH, and CHs thus total and send this detected information to the BS. Simulation comes about show abnormal amounts of enhancements in system lifetime, information conveyance and vitality utilization contrasted with static and irregular portable BS organize display.

***Index Terms*—About four key words or phrases in alphabetical order, separated by commas.**

I. Introduction

Remote sensor systems (WSNs) trade off of information transmitting sensor hubs that are sore to their environment. WSNs have been used in different applications, for instance manor observing, fiasco administration, mechanical robotization and outskirt assurance . The central segments of a sensor hub are a microcontroller, handset, outside memory, control source and at least one sensors. A sensor hub has a constrained vitality source, normally as a battery. Dependent upon the application, substitution of the battery can be unbalanced and absurd. The creator of [30] has built up a hypothetical system for considering system flexibility, in which sensor hubs with lacking battery level are displayed as "somewhat useful", and has demonstrated that deficient battery level can be extremely adverse. Ideally, a sensor node should use as little energy as possible under the circumstances in order as to expand the WSN's lifetime. A large proportion of the energy consumption originates from the two primary tasks: (i) sensing the field; and (ii) uploading/communicating sensor node readings to a focal location known as the base station (BS). For communication in particular, energy expenditure is highly influenced by a node's location and its physical distance from the BS . In a multi-hop network, sensor nodes closer to the BS are the most energy-consuming, since additional energy is required to hand-offthe forwarded messages from other nodes, in addition to communicating their own messages. Conversely, in a single-hop network, the sensor nodes that are furthest

Manuscript received May, 2017.
Author 1: ***Latha m n ,Information science, vtu,rrce,Bangalore,India,8951220573.***
Second Author name*, Kruthi p bhaskar ,Information science,VTU,rrce,Bangalore,India,9482503094.*
Third Author name*, ASST PROF. Prasad A Y, Information science,VTU,rrce,Bangalore,India,9986079877.*

away from the BS (at the boundary of the sensing field) consume the most energy, as the sensed data is directly transmitted to the BS . Since the location of the BS is the main influence on the WSNs overall operational lifetime, determining the best location for the BS is therefore crucial, depending on the network configuration. Utilizing a mobile rather than a static BS is one approach for enhancing network lifetime by fundamentally moderating network energy use . With this configuration, the mobility of the BS permits data to be gathered from every sensor node in the sensing region by moving it closer to the transmitting node. In this way, and taking account of accessibility and feasibility, repositioning the BS to be nearest to the transmitting node can improve overall energy usage . The main question at this stage is whether it is worthwhile to move the BS next to each node in the given network. Sometimes, especially in a large network configuration, answering this may not be effective, since latency can be increased for data gathering. This in turn creates a major performance bottleneck, as the relocation of the mobile BS may take a long time in the case of a large sensing field. These conditions may not meet the strict delay requirements imposed by certain critical real-time applications .

II. Procedure for Paper Submission

A. Review Stage

Submit your manuscript electronically for review.

B. Final Stage

When you submit your final version, after your paper has been accepted, prepare it in two-column format, including figures and tables.

C. Figures

As said, to insert images in *Word,* position the cursor at the insertion point and either use Insert | Picture | From File or copy the image to the Windows clipboard and then Edit | Paste Special | Picture (with "Float over text" unchecked).

The authors of the accepted manuscripts will be given a copyright form and the form should accompany your final submission.

III. Units

Use either SI (MKS) or CGS as primary units. (SI units are strongly encouraged.) English units may be used as secondary units (in parentheses). **This applies to papers in data storage.** For example, write "15 Gb/cm^2 (100 Gb/in^2)." An exception is when English units are used as identifiers in trade, such as "3½ in disk drive." Avoid combining SI and CGS units, such as current in amperes and magnetic field in oersteds. This often leads to confusion because equations do not balance dimensionally. If you must use mixed units, clearly state the units for each quantity in an equation.

The SI unit for magnetic field strength *H* is A/m. However, if you wish to use units of T, either refer to magnetic flux density *B* or magnetic field strength symbolized as $\mu_0 H$. Use the center dot to separate compound units, e.g., "A·m^2."

IV. Helpful Hints

This area exhibits the radio vitality dispersal model of the system under thought.

1. Radio vitality dissemination display

The remote correspondence subsystem of the sensor hubs, the handset, disseminates vitality when transmitting and getting information. Transmission obliges vitality to run the radio hardware and the power intensifier, while the collector needs vitality to run the radio gadgets . The vitality disseminated in conveying a message of b - bits over a separation d is computed as takes after:

E T x = E elec ×b + E fs ×b ×d 2 , d ≤d 0 (1)

E T x = E elec ×b + E mp ×b ×d 4 , d > d 0 (2)

E elec speaks to the expended vitality expected to work the handset circuit. In light of the transmitting separation d and the worthy piece blunder rate, the vitality use in transmitting b - bits of information is meant by E fs if there should be an occurrence of the free space model and E mp for the multipath blurring model . Eq. 1 speaks to the instance of the free space display, which is connected when the transmission remove d is lower than a predefined limit d 0 ; generally Eq. (2) is connected, which speaks to the instance of the multipath show.

Here, in this we built up a vitality proficient dynamic grouping convention for WSNs. The basic point of this convention is to take care of the issue of finding the ideal number of bunches in group based steering conventions. This convention It is isolated into two sections: the initial segment manages the ideal development of the system framework, where the ideal number of groups and their individuals are figured naturally, without obstruction from the system originator. The creators built up another HS-based calculation entitled DCHS-WSN for this reason. This calculation runs once, amid the introduction venture of the system. The second some portion of the convention is isolated into two phases: the detecting and sending stage, and the CH re-decision organize. These two phases are rehashed in rounds until the last hub.

DCHSWSN ALGORITHM

Step 1. DCHS-WSN parameters As in the HS calculation, DCHS has a few parameters, each of which has its own specific part. These parameters are portrayed as takes after.

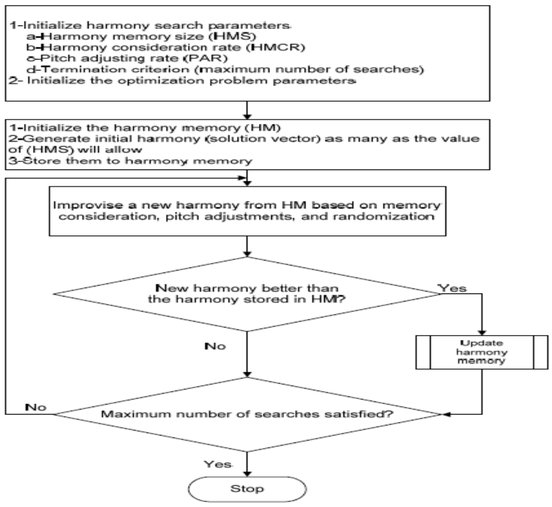
1. Amicability memory estimate (HMS) (i.e., number of arrangement vectors, harmonies, in agreement memory);
2. Agreement memory considering rate (HMCR), where HMCR ∈ [0, 1] (i.e., HMCR is the likelihood of picking new concordance memory vector (HMV) choice factors from arrangement vectors put away in congruity memory);
3. Pitch changing rate (PAR), where PAR ∈ [0, 1] (i.e., PAR is the likelihood of modifying the recently created HMV choice factors that are chosen from the concordance memory);
4. Ceasing rule (NI) (i.e., the most extreme number of cycles and impromptu creations).

Step 2. Introduction of amicability memory In HS, the arrangement of arrangement vectors, the concordance memory vector.

Step 3. Improvise a new harmony The core process of the HS optimization algorithm and its derived algorithm, i.e., DCHS-WSN, is the improvisation of a new solution vector in each iteration of the algorithm. The importance of this process lies in the balance between two main concepts: i) the exploration and ii) the exploitation of the search space in order to reach an optimal state. The improvisa tion process of a new solution vector, $a\_ = (a\_1 , a\_2 , a\_3 , \cdots, a\_{CHMaxNo})$, is based on three main factors: memory consideration, random consideration and pitch adjustment. Each new HMV $a\_$ inherits the valuesof itsdecision variables fromthe HMVs stored in the HM (i.e., memory consideration) with a probability of HMCR. However, this memory consideration factor has been modified in this paper to increase the speed of the searching process for the optimal solution in comparison with the original one, while ensuring the quality of the produced solution. The random selection of the new decision variable from the HM is replaced with a selection from the best HMV. This idea was proposed and mimics the concept of the best particle selection process of the PSO algorithm.

Step 4. Update the harmony memory In this step, the new vector is compared with the least effective HM solution in terms of the objective function. If it is better, the new vector is included in the HM and the least effective harmony is excluded.

Step 5. Check the stopping criterion Steps 3 and 4 are repeated until the maximum number of iterations (NI) is reached. Once reached, the best HMV is selected.



A. *References*

1. K. Akkaya , M. Younis , W. Youssef , Positioning of base stations in wireless sensor networks, IEEE Commun. Mag. 45(4) (2007) 96–102 .
2. I.F. Akyildiz , W. Su , Y. Sankarasubramaniam , E.Cayirci ,Wirelesssensornetworks:asurvey,Comput.Networks38(4)(2002)393–422 .
3. O.M. Alia , A decentralized fuzzy c-means-based energy-efficient routing protocol for wireless sensor networks, Sci. World J. 2014 (2014) . Article ID 647281, 9 pages
4. O.M. Alia , R. Mandava , The variants of the harmony search algorithm: an overview, Artif. Intell. Rev. 36(1) (2011) 4 9–6 8 .
5. O.M. Alia , Z. Shaaban , A. Basheer , A. Al-Ajouri , A. Alsswey , Musicians'-inspired clustering

protocol for efficient energy wireless sensor networks, in: The Fourth International Conference on Communications and Networking, ComNet-2014, Hammamet, IEEE, 2014, pp. 1–6
).

B. *Equations*

The remote correspondence subsystem of the sensor hubs, the handset, disseminates vitality when transmitting and getting information. Transmission obliges vitality to run the radio hardware and the power intensifier, while the collector needs vitality to run the radio gadgets . The vitality disseminated in conveying a message of b - bits over a separation d is computed as takes after:

E T x = E elec ×b + E fs ×b ×d 2 , d ≤d 0
(1)

E T x = E elec ×b + E mp ×b ×d 4 , d > d 0
(2)

V. Some Common Mistakes

The word “data” is plural, not singular. The subscript for the permeability of vacuum μ_0 is zero, not a lowercase letter “o.” The term for residual magnetization is “remanence”; the adjective is “remanent”; do not write “remnance” or “remnant.” Use the word “micrometer” instead of “micron.” A graph within a graph is an “inset,” not an “insert.” The word “alternatively” is preferred to the word “alternately” (unless you really mean something that alternates). Use the word “whereas” instead of “while” (unless you are referring to simultaneous events). Do not use the word “essentially” to mean “approximately” or “effectively.” Do not use the word “issue” as a euphemism for “problem.” When compositions are not specified, separate chemical symbols by en-dashes; for example, “NiMn” indicates the intermetallic compound $Ni_{0.5}Mn_{0.5}$ whereas “Ni–Mn” indicates an alloy of some composition Ni_xMn_{1-x}.

Be aware of the different meanings of the homophones “affect” (usually a verb) and “effect” (usually a noun), “complement” and “compliment,” “discreet” and “discrete,” “principal” (e.g., “principal investigator”) and “principle” (e.g., “principle of measurement”). Do not confuse “imply” and “infer.”

Prefixes such as “non,” “sub,” “micro,” “multi,” and “"ultra” are not independent words; they should be joined to the words they modify, usually without a hyphen. There is no period after the “et” in the Latin abbreviation “*et al*.” (it is also italicized). The abbreviation “i.e.,” means “that is,” and the abbreviation “e.g.,” means “for example” (these abbreviations are not italicized).

An excellent style manual and source of information for science writers is [9].

VI. Editorial Policy

The submitting author is responsible for obtaining agreement of all coauthors and any consent required from sponsors before submitting a paper. It is the obligation of the authors to cite relevant prior work.

Authors of rejected papers may revise and resubmit them to the journal again.

VII. Publication Principles

The contents of the journal are peer-reviewed and archival. The journal INTERNATIONAL JOURNAL OF ADVANCED RESEARCH IN COMPUTE ENGINEERING & TECHNOLOGY (IJARCET) publishes scholarly articles of archival value as well as tutorial expositions and critical reviews of classical subjects and topics of current interest.

Authors should consider the following points:

1) Technical papers submitted for publication must advance the state of knowledge and must cite relevant prior work.
2) The length of a submitted paper should be commensurate with the importance, or appropriate to the complexity, of the work. For example, an obvious extension of previously published work might not be appropriate for publication or might be adequately treated in just a few pages.
3) Authors must convince both peer reviewers and the editors of the scientific and technical merit of a paper; the standards of proof are higher when extraordinary or unexpected results are reported.
4) Because replication is required for scientific progress, papers submitted for publication must provide sufficient information to allow readers to perform similar experiments or calculations and use the reported results. Although not everything need be disclosed, a paper must contain new, useable, and fully described information. For example, a specimen's chemical composition need not be reported if the main purpose of a paper is to introduce a new measurement technique. Authors should expect to be challenged by reviewers if the results are not supported by adequate data and critical details.

VIII. Conclusion

The primary concern of this work is the problem of building an efficient network model that can utilize the network en- ergy inherent in sensor nodes. This paper presents a harmony search algorithm to address the energy conservation problem in WSNs. Two main approaches are utilized: a clustered-based routing protocol and a mobile base station. The cluster-based network protocol seeks to build a dynamic network infrastructure in which clusters are formed based on the number of live sensor nodes. This is carried out while obtaining the optimal BS position, nearest to all the cluster heads in each round .

REFERENCES

1. K. Akkaya , M. Younis , W. Youssef , Positioning of base stations in wireless sensor networks, IEEE Commun. Mag. 45(4) (2007) 96–102 .
2. I.F. Akyildiz , W. Su , Y. Sankarasubramaniam , E.Cayirci ,Wirelesssensornetworks:asurvey,Comput.Networks38(4)(2002)393–422 .
3. O.M. Alia , A decentralized fuzzy c-means-based energy-efficient routing protocol for wireless sensor networks, Sci. World J. 2014 (2014) . Article ID 647281, 9 pages
4. O.M. Alia , R. Mandava , The variants of the harmony search algorithm: an overview, Artif. Intell. Rev. 36(1) (2011) 4 9–6 8 .

5 O.M. Alia , Z. Shaaban , A. Basheer , A. Al-Ajouri , A. Alsswey , Musicians'-inspired clustering protocol for efficient energy wireless sensor networks, in: The Fourth International Conference on Communications and Networking, ComNet-2014, Hammamet, IEEE, 2014, pp. 1–6 .

Authors: Latha M.N, Kruthi P Bhaskar, Prasad A Y