RESEARCH ARTICLE OPEN ACCESS

Hack Recognition In Wireless Sensor Network

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Abstract:
A wireless sensor network can get separated into multiple connected components due to the failure of some of its nodes, which is called a "cut". In this article we consider the problem of detecting cuts by the remaining nodes of a wireless sensor network. We propose an algorithm that allows like every node to detect when the connectivity to a specially designated node has been lost, and one or more nodes (that are connected to the special node after the cut) to detect the occurrence of the cut. The algorithm is distributed and asynchronous: every node needs to communicate with only those nodes that are within its communication range. The algorithm is based on the iterative computation of a fictitious "electrical potential" of the nodes. The convergence rate of the underlying iterative scheme is independent of the size and structure of the network.

Key Terms: Wireless networks, sensor networks, network separation, detection and estimation, iterative computation.

I. INTRODUCTION

Wireless sensor networks (WSNs) are a promising technology for monitoring large regions at high spatial and temporal resolution. In fact, node failure is expected to be quite common due to the typically limited energy budget of the nodes that are powered by small batteries. Failure of a set of nodes will reduce the number of multi-hop paths in the network. Such failures can cause a subset of nodes – that have not failed – to become disconnected from the rest, resulting in a "cut". Two nodes are said to be disconnected if there is no path between them. We consider the problem of detecting cuts by the nodes of a wireless network. We assume that there is a specially designated node in the network, which we call the source node. The source node may be a base station that serves as an interface between the network and its users. Since a cut may or may not separate a node from the source node, we distinguish between two distinct outcomes of a cut for a particular node. When a node u is disconnected from the source, we say that a DOS (Disconnected from Source) event has occurred for u. When a cut occurs in the network that does not separate a node u from the source node, we say that CCOS (Connected, but a Cut Occurred Somewhere) event has occurred for u. By cut detection we mean: Detection by each node of a DOS event when it occurs, and Detection of CCOS events by the nodes close to a cut, and the approximate location of the cut. By "approximate location" of a cut we mean the location of one or more active nodes that lie at the boundary of the cut and that are connected to the source. Nodes that detect the occurrence and approximate locations of the cuts can then alert the source node or the base station. To see the benefits of a cut detection capability, imagine that a sensor that wants to send data to the source node has been disconnected from the source node. Without the knowledge of the network's disconnected state, it may simply forward the data to the next node in the routing tree, which will do the same to its next node, and so on. However, this message passing merely wastes precious energy of the nodes; the cut prevents the data from reaching the destination. Therefore, on one hand, if a node were able to detect the occurrence of a cut, it could simply wait for the network to be repaired and eventually reconnected, which saves onboard energy of multiple nodes and prolongs their lives. On the other hand, the ability of the source node to detect the occurrence and location of a cut will allow it to undertake network repair. Thus, the ability to detect cuts by both the disconnected nodes and the source node will lead to the increase in the operational lifetime of the network as a whole. A method of repairing a disconnected network by using mobile nodes has been proposed. Algorithms for detecting cuts, as the one proposed here, can serve as useful tools for such network repairing methods. A review of prior work on cut detection in sensor networks and others, is included in the Supplementary Material .In this article we propose a distributed algorithm to detect cuts, named the Distributed Cut Detection (DCD) algorithm. The algorithm allows each node to detect DOS events and a subset of nodes to detect CCOS events. The algorithm we propose is distributed and asynchronous: it involves only local communication between neighboring nodes, and is robust to temporary communication failure between node pairs. A key component of the DCD algorithm is a distributed iterative computational step through which the nodes compute their (fictitious) electrical potentials. The convergence rate of the computation is independent of the size and structure of the network. The DOS detection part of the algorithm is applicable to arbitrary networks; a node only needs to communicate a scalar variable to its eighbors. The CCOS detection part of the algorithm is limited to networks that are deployed in 2D Euclidean spaces, and nodes need to know their own positions. The position information need not be highly accurate. The proposed algorithm is an extension of our previous work, which partially examined the DOS detection problem.

II. SYSTEM ANALYSIS

2.1 EXISTING SYSTEM

Wireless Multimedia Sensor Networks (WMSNs) has many challenges such as nature of wireless media and multimedia information transmission. Consequently traditional mechanisms for network layers are no longer acceptable or applicable for these networks. Wireless sensor network can get separated into multiple connected components due to the failure of some of its nodes, which is called a “cut”. Existing cut detection system deployed only for wired networks.

Disadvantages

1. Unsuitable for dynamic network reconfiguration.
2. Single path routing approach.

2.2 PROPOSED SYSTEM

Wireless sensor networks (WSNs) are a promising technology for monitoring large regions at high spatial and temporal resolution .Failure of a set of nodes will reduce the number of multi-hop paths in the network. Such failures can cause a subset of nodes – that have not failed – to become disconnected from the rest, resulting in a “cut”. Two nodes are said to be disconnected if there is no path between them. We consider the problem of detecting cuts by the nodes of a wireless network. We assume that there is a specially designated node in the network, which we call the source node .Since a cut may or may not separate a node from the source node, we distinguish between two distinct outcomes of a cut for a particular node. When a node u is disconnected from the source, we say that a DOS (Disconnected frOm Source) event has occurred for u. When a cut occurs in the network that does not separate a node u from the source node, we say that CCOS (Connected, but a Cut Occurred Somewhere) event has occurred for u. By cut detection we mean detection by each node of a DOS event when it occurs, and detection of CCOS events by the nodes close to a cut, and the approximate location of the cut. In this article we propose a distributed algorithm to detect cuts, named the Distributed Cut Detection (DCD) algorithm. The algorithm allows each node to detect DOS events and a subset of nodes to detect CCOS events. The algorithm we propose is distributed and asynchronous: it involves only local communication between neighboring nodes, and is robust to temporary communication failure between node pairs The convergence rate of the computation is independent of the size and structure of the network.

2.3 SYSTEM STUDY

The feasibility of the project is analyzed in this phase and business proposal is put forth with a very general plan for the project and some cost estimates. During system analysis the feasibility study of the proposed system is to be carried out. This is to ensure that the proposed system is not a burden to the company. For feasibility analysis, some understanding of the major requirements for the system is essential.

Three key considerations involved in the feasibility analysis are

- ECONOMICAL FEASIBILITY
- TECHNICAL FEASIBILITY
- SOCIAL FEASIBILITY

2.3.1 ECONOMICAL FEASIBILITY

This study is carried out to check the economic impact that the system will have on the organization. The amount of fund that the company can pour into the research and development of the system is limited. The expenditures must be justified. Thus the developed system as well within the budget and this was achieved because most of the technologies used are freely available. Only the customized products had to be purchased.

2.3.2 TECHNICAL FEASIBILITY

This study is carried out to check the technical feasibility, that is, the technical requirements of the system. Any system developed must not have a high demand on the available technical resources. This will lead to high demands on the available technical resources. This will lead to high demands being placed on the client. The developed system must have a modest requirement, as only minimal or null changes are required for implementing this system.

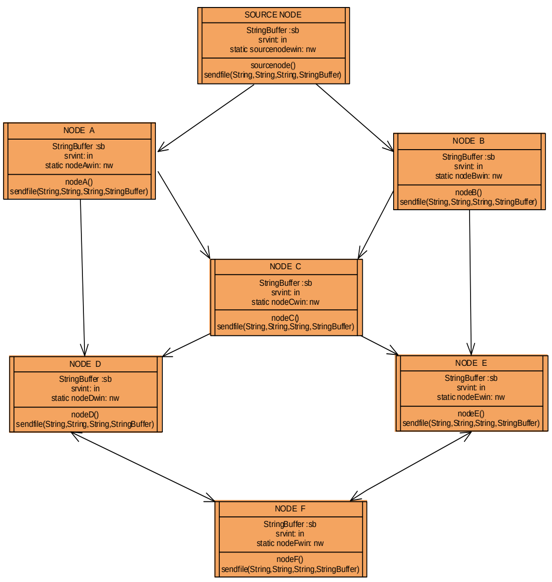
2.3.3 SOCIAL FEASIBILITY

The aspect of study is to check the level of acceptance of the system by the user. This includes the process of training the user to use the system efficiently. The user must not feel threatened by the system, instead must accept it as a necessity. The level of acceptance by the users solely depends on the methods that are employed to educate the user about the system and to make him familiar with it. His level of confidence must be raised so that he is also able to make some constructive criticism, which is welcomed, as he is the final user of the system.

III. IMPLEMENTATION

Implementation is the stage of the project when the theoretical design is turned out into a working system. Thus it can be considered to be the most critical stage in achieving a successful new system and in giving the user, confidence that the new system will work and be effective. The implementation stage involves careful planning, investigation of the existing system and it's constraints on implementation, designing of methods to achieve changeover and evaluation of changeover methods.

Class Diagram:



Module Description

Distributed Cut Detection

The algorithm allows each node to detect DOS events and a subset of nodes to detect CCOS events. The algorithm we propose is distributed and asynchronous: it involves only local communication between neighboring nodes, and is robust to temporary communication failure between node pairs. A key component of the DCD algorithm is a distributed iterative computational step through which the nodes compute their (fictitious) electrical potentials. The convergence rate of the computation is independent of the size and structure of the network.

Cut

Wireless sensor networks (WSNs) are a promising technology for monitoring large regions at high spatial and temporal resolution. In fact, node failure is expected to be quite common due to the typically limited energy budget of the nodes that are powered by small batteries. Failure of a set of nodes will reduce the number of multi-hop paths in the network. Such failures can cause a subset of nodes – that have not failed – to become disconnected from the rest, resulting in a "cut". Two nodes are said to be disconnected if there is no path between them.

Source Node

We consider the problem of detecting cuts by the nodes of a wireless network. We assume that there is a specially designated node in the network, which we call the source node. The source node may be a base station that serves as an interface between the network and its users.Since a cut may or may not separate a node from the source node, we distinguish between two distinct outcomes of a cut for a particular node.

Ccos and Dos

When a node u is disconnected from the source, we say that a DOS (Disconnected frOm Source) event has occurred for u. When a cut occurs in the network that does not separate a node u from the source node, we say that CCOS (Connected, but a Cut Occurred Somewhere) event has occurred for u. By cut detection we mean

(i) Detection by each node of a DOS event when it occurs, and

(ii) Detection of CCOS events by the nodes close to a cut, and the approximate location of the cut.

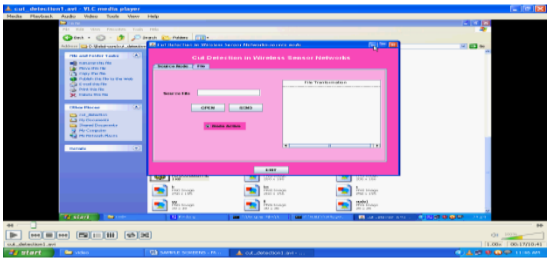
Network Separation

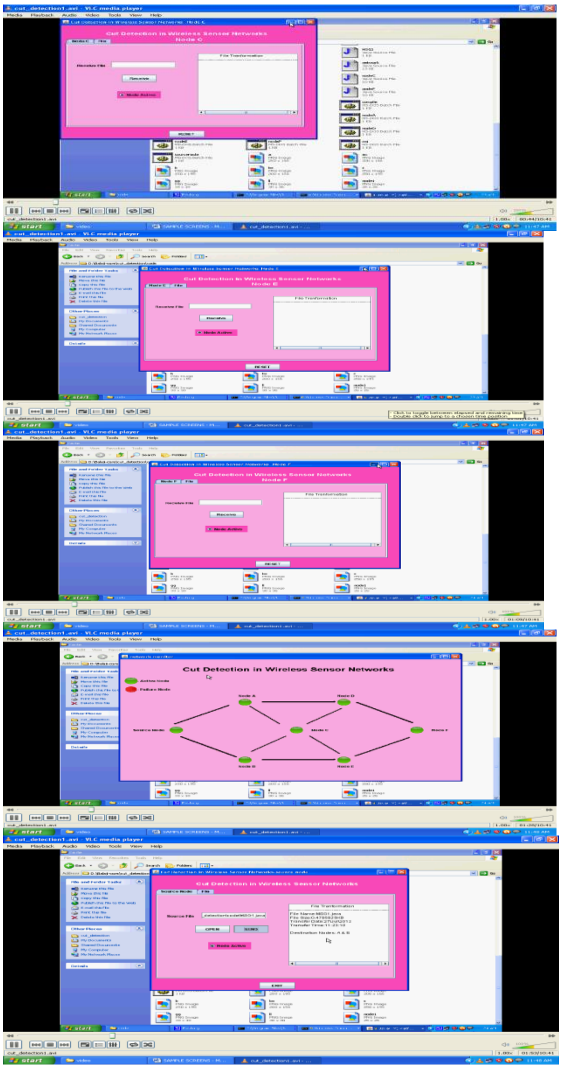
Failure of a set of nodes will reduce the number of multi-hop paths in the network. Such failures can cause a subset of nodes – that have not failed – to become disconnected from the rest, resulting in a "cut". Because of cut, some nodes may separate from the network, that results the separated nodes can't receive the data from the source node.

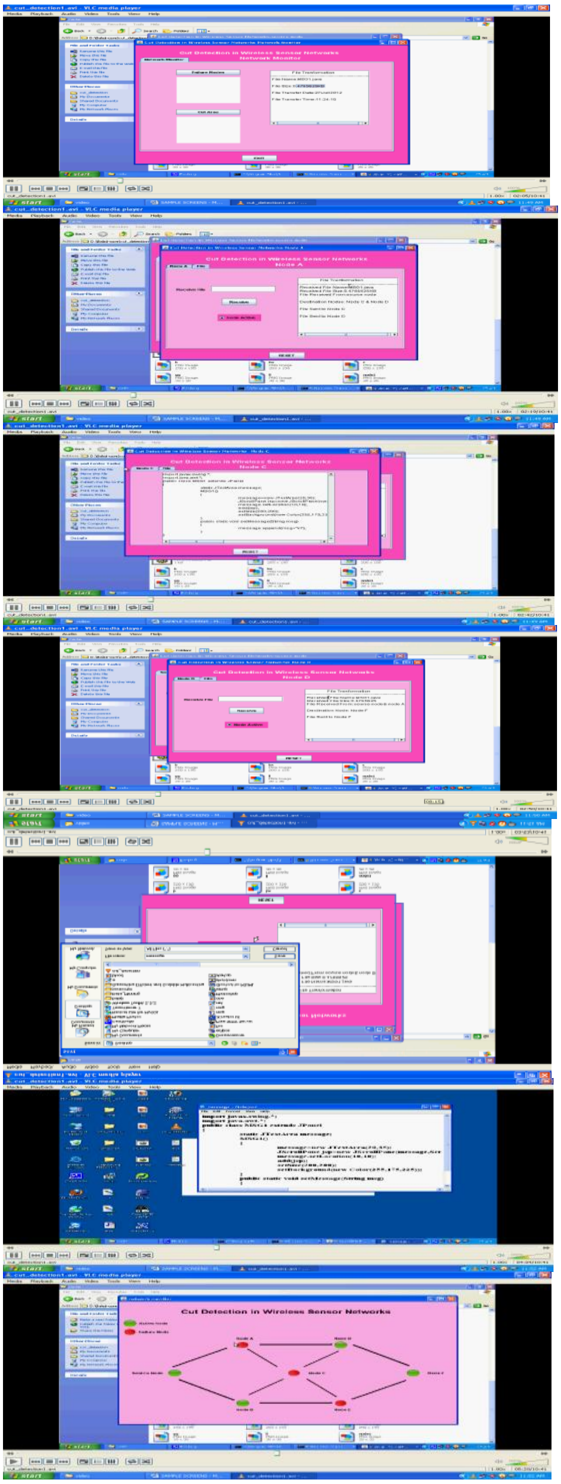
CCOS Detection Performance

Recall that the CCOS detection part of the algorithm is not applicable to 3D networks, so it was only tested on networks, the path of the probes and their originating nodes in the network. Two probes were triggered by nodes close to the cut on the upper right corner; both of them were absorbed when the length of their path traversed exceeded 'max hops, which led to correctly detecting CCOS events. Among three probes that were triggered by nodes near small holes in this network, one of them—near the hole in the upper left corner—failed to find a path back to its originating node, leading to an erroneous declaration of an CCOS event by the absorbing node. The probability of a CCOS1/0 error in this case is therefore 0.33. It summarizes the performance of the CCOS detection part of algorithm. The CCOS detection error probabilities are 0 except in case of the network. Simulation studies reported in the Supplementary Material, which can be found on the Computer Society Digital Library at that imprecise position information has little effect on the performance of the CCOS detection part of the algorithm.

IV SCREEN SHOTS







V CONCLUSION

The DCD algorithm we propose here enables every node of a wireless sensor network to detect DOS (Disconnected frOm Source) events if they occur. Second, it enables a subset of nodes that experience CCOS (Connected, but Cut Occurred Somewhere) events to detect them and estimate the approximate location of the cut in the form of a list of active nodes that lie at the boundary of the cut/hole.

The DOS and CCOS events are defined with respect to a specially designated source node. The algorithm is based on ideas from electrical network theory and parallel iterative solution of linear equations. Numerical simulations, as well as experimental evaluation on a real WSN system consisting of micaZ motes, show that the algorithm works effectively with a large classes of graphs of varying size and structure, without requiring changes in the parameters. For certain scenarios, the algorithm is assured to detect connection and disconnection to the source node without error. A key strength of the DCD algorithm is that the convergence rate of the underlying iterative scheme is quite fast and independent of the size and structure of the network, which makes detection using this algorithm quite fast. Application of the DCD algorithm to detect node separation and reconnection to the source in mobile networks is a topic of ongoing research.

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