

# Trust History-based Routing Algorithm to Improve Efficiency and Security in Wireless Sensor Network



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#### Introduction

#### **Routing Algorithm in WSN**

**Trust History Routing Algorithm** 

#### **Introduction: Wireless sensor Network**

A sensor network is composed of a large number of sensor nodes, which are densely deployed either inside the phenomenon or very close to it.

- Random deployment
- Cooperative capabilities



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#### **Introduction: Applications** الجــامـعـة الأهـلـيـة AHLIA UNIVERSITY BAHRAIN SATCOM Rad Backhaul Ra Embedde Wireless Comman UAV Win microcontroller board & wireless transmitter in watertight enclosure **Internet of Things** Watermark® soil moisture sensor ΙοΤ Hospital Enviro SPO<sub>2</sub> ECG BS/G Blood pressure Blood S or with bile device Practitioner with mobile device Router Wi-Fi Medical Sens **Base statio** Wi-Fi gateway (BS/ Medial databa

## **Introduction: Architecture**



Sensors are limited by:

- Energy lifetime
- Slow embedded processors

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Limited memory

### **Introduction: Challenges**



Routing

Algorithm

WSN technology confronts :

- Energy Consumption
- Security
- Reliability
- Scalability

#### **Introduction: Contribution**



Find a new routing algorithm to offer security and efficiency of the network with the different requirements of WSN is the big challenge.

- Efficiency
- Simplicity
- Scalability

The new method is based on the **History** of the correctly connection routes

## **Routing Algorithm in WSN**



The traditional routing algorithms used in wireless communication cannot be deployed in WSN.

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#### **WSN : Network Model**



## **WSN : Network Model**



#### **WSN : Trust History-based Routing Table** الحامعة الأهلية AHLIA UNIVERSITY Node BAHRAIN Correctness connection $M_{j,i+1}$ $M_{j,i+1}$ N $M_{j+1,i+1}$ $M_{j+1,i+1}$ $N_{j+1,1}$ $N_{j+1,i}$ Algorithm 1 Filling RTH table for i = 1 to a do for j = 1 to b do Stage i Stage if $Nj, I \leftrightarrow Mj, i+1$ then i+1 T[j] + +else if $Nj, I \leftrightarrow Nj + 1, 1$ then T[i] + +end if end for end for

#### **WSN : Trust History-based Routing Table** الحــامـعـة الأهــلــة AHLIA UNIVERSITY Node BAHRAIN Correctness connection K : number of iteration $M_{j,i+1}$ 10 $M_{j+1,i+1}$ 7 $N_{j+1,1}$ 5 Node j,i Node j,i+1

Energy consumption for the acknowledge setup



## **WSN : Trust Path Routing algorithm**



The basic idea of TPR is to build a path with the maximum **Trust** Value (TV)

**TV** is the sum of the trust values for **each link** that establishes the corresponding route:

$$TV = Max\left(\sum_{i=1}^{n} TV_{Li}\right)$$

### **WSN : Trust Path Routing algorithm**

N1.3 5 N2.3 2 N2.2 18 RTH 1,2 N1.2 15 12 N2.2 N<sub>1,2</sub>  $N_{1,3}$ N2.1 10 N<sub>1.4</sub> RTH 1,1  $N_{1,1}$ N2.3 17 N<sub>2,2</sub> N2.4 14 N3.3 11 N<sub>2,3</sub> Sink 20 Sink node 2 N3.4 N<sub>2.4</sub> N4.2 4 N3.4 10 N3.3 6 RTH 2,2 RTH 2,4 N<sub>2,1</sub> RTH 2,3 N<sub>3.4</sub> RTH 3,1  $N_{p,2}$ N<sub>3.1</sub>

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15 + 18 + 17 + 14 + 20 = 84

#### **WSN : Trust Path Routing algorithm** امعةالأهلية AHLIA UNIVERSITY BAHRAIN Trust value routing path Network size (number of stages)

### **Conclusion & Future Work**



New routing algorithm based on trust history between nodes. Indeed, our method comprises of two steps:

- Trust History Routing Table
- Trust Path Routing algorithm

Study the scalability and the complexity of this method.