

# Review on Secured Image Transmission with Energy Optimization in Wireless Sensor Network

<sup>1</sup> Shraddha Bhasme, <sup>2</sup> Sampada Deshpande, <sup>3</sup> Surabhi Bhagat

<sup>1</sup> Computer Technology Department, RTMNU,  
Rajiv Gandhi College of Engineering & Research, Nagpur  
Nagpur, Maharashtra, India

<sup>2</sup> Computer Technology Department, RTMNU,  
Rajiv Gandhi College of Engineering & Research, Nagpur  
Nagpur, Maharashtra, India

<sup>3</sup> Computer Technology Department, RTMNU,  
Rajiv Gandhi College of Engineering & Research, Nagpur  
Nagpur, Maharashtra, India

**Abstract** - A wireless sensor network (WSNs) consists of variety of multimedia-based applications like image and video transmission. And applications, multimedia sensor nodes should maximize quality and minimize energy expenditures in communication. The key obstacle to communicating images over WSN has been lack of suitable processing architecture and communication strategies to deal with large volume data. With fast progression of data exchange in electronic way, information security is also becoming more important in data transmission. Because of widely using images in industrial process, it is important to protect confidential image data from unauthorized access. In this paper, we propose a review about transmission structures derived by various researchers for secured and energy-efficient image transmission. It also proposes collaborative image transmission schemes for image sensors to utilize co-relation between sensors and decide transmission and security sharing pattern based on path diversities.

**Keywords** - *Wireless Sensor Network, Image Transmission, Image Security, Image Quality, Routing.*

## 1. Introduction

With the development of low-cost multimedia technologies, imaging sensors and cameras which helps to capture multimedia contents from fields, researchers have drawn their attention and proposed various Wireless Multimedia Sensor Networks (WMSN's). Communication in Wireless Sensor Networks (WSN's) has been restricted because of various factors such as power consumption, high bandwidth demand, security, Quality of Service (QoS) requirements. Wireless Sensor Networks consists of sensor nodes that are powered by small batteries. These sensor nodes are deployed in areas which are being

monitored and these nodes sense and send data to destination. Researchers have mainly focused on pre-processing and compressing images. Transmission of confidential data over WSN has emphasized the need for fast and secure digital communication network to achieve requirements for secrecy and non reproduction of exchanged information. Cryptography provides a method for securing and authenticating the transmission of information over insecure channels. It enables us to store sensitive information or transmit it across insecure network so that unauthorized person cannot acquire it. The urgency for secure exchange of digital data resulted in large quantities of different encryption algorithms which are evaluated on basis of throughput, speed of operation and area requirements.

There are mainly two types of cryptographic algorithms: symmetric and asymmetric algorithms. A symmetric system such as Data Encryption Standard (DES), 3DES, and Advanced Encryption Standard (AES) uses an identical key for sender and receiver; both to encrypt and decrypt data. An asymmetric system such as Rivest-Shamir-Adelman (RSA) Elliptic Curve Cryptosystems (ECC) uses different keys for encryption and decryption. Symmetric cryptosystems is more suitable to encrypt large amount of data with high speed.

In this research, heterogeneous clustered based Wireless Image Sensor Network has been assumed in Image Processing and Transmission since it has various advantages. Homogenous network consists of all sensor nodes which are identical in terms of various metrics like

battery energy and its hardware is very complex to design. Whereas in heterogeneous sensor network two or more different types of nodes with different battery energy and functionality are used.

A wireless network allows users to communicate without any physical medium such as cable, wires. Wireless network offers high data rates at low cost; hence it is widely used now-a-days. They can be organized in various ways. For example, a fixed network infrastructure having access points might be used. With this approach, nodes communicate with other nodes through the access points. Neighbours are defined as the nodes that are located within transmission range. Since work colleagues spend more time together, another protocol may use people at a place of work to forward a message. These types of routing are used in Mobile Social Networks (MSNs). The use of MSNs reduces the resource consumption since messages are only sent to nodes who share a relationship with the destination.

## 2. Related Work

### 2.1 Literature Review on Energy Optimization for Image Transmission

Advancement in Wireless communication enabled development of low cost sensor networks. These can be used in various important areas like military, health etc. I. F. Akyildiz *et al* [1] points out open research issues and intend to spark new interests and development in this field. To increase lifetime of sensor network, researches have been made regarding energy efficiency by using various algorithms and protocols. Research Community has carried out and investigated trade-off between energy consumption and image quality. In [2], performance of source extraction and total energy consumption in sensor network is studied. The main aim of this paper was finding minimum clusters for effective energy minimization. Theoretical and numerical simulation of finding minimum cluster has been derived in this paper.

It was seen that multi-cluster structure has greatly improved the performance. Here Particle Swarm Optimization (PSO) algorithm was used for finding minimum cluster for image transmission. Yang Yu *et al* [3] studied challenging problem of gathering real-time information in WSN and decreasing energy consumption. They proposed optimization algorithm along with approximating time for transmission, transmits the gathered information of local sensor node using distributed online-protocol. It was seen that this method can save energy approximately 90%. In [4], sleep and wake up strategies in solar-powered wireless sensor network where discussed to optimize energy efficiency protocols. C.

Schurgers *et al* [5] derived new technique to enhance routing in sensor network. In addition sleep scheduling would conserve battery power in sensor network, some sensor nodes may be put into sleep state while other nodes remain active for sensing and communication task which is energy efficient saving application. In [6]-[7], several interesting proposals on transmitting images over multi-hop wireless network using multiple paths have been introduced. They utilized independent transmission paths to achieve fault-relieved and healthy image transmission.

Since real time image and video communication was becoming common, W. Yu, Z. Sahinoglu *et al* [8] proposed advance technique of multiple transmit-antennas and receive antennas in WSN. New joint transmission and coding schemes which were used for exploring advantages of multiple antenna system were developed. Based on this idea, this paper proposed unequal power allocation scheme for transmission of JPEG2000 images over WSN. Images are divided into different quality layers.

These different layers are then transmitted simultaneously from different transmit antennas using unequal transmit power. Results show that unequal power allocation scheme provides significant image quality improvement as compared to different equal power allocation schemes. In [9] and [10], researchers investigated the trade-off between energy expenditure and image quality. However, they focused mainly on Image Data Redundancy. Researchers have not extensively discussed how to collaboratively transmit images by exploring path diversity among sensed images in WSNs. This path diversity can provide various opportunities for image transmission over wireless sensor network.

### 2.2 Literature Review on Security of Image Transmission

Image encryption has been increased in recent years. Encryption is used to provide security needed for image applications. Paper proposed by Jolly Shah *et al* [11] classified various encryption schemes and analyse them with respect to various parameters like visual degradation, compression friendliness, format compliance, encryption ratio, speed, and cryptographic security. The security of digital images has become more and more important due to rapid evolution of the Internet in digital world today.

The security of Digital images has attracted more attention recently, and many different image encryption methods have been proposed to enhance security of images in [12]. In [13], it is proposed that AES is used for image encryption and decryption to protect confidential images from unauthorized access.

## 4. Conclusions

In this paper we have reviewed the ways in which image sensors within wireless sensor network can transmit images to end users in optimize manner and methods for image transmission in multi-hop regions. It is found that collaborative image transmissions is determined by image sensors and select the minimum path for transmission. Path Diversity for image transmission also satisfies Image Quality metrics. It was also found that Image Encryption and Decryption using AES was used to protect the sensitive data from unauthorized access. A successful Implementation of AES algorithm is one of the best encryption and decryption standard available till now.

## 4. Future Scope

There are some drawbacks of AES Algorithm. In key based security management, if decryption key is lost or corrupted during transmission, it is difficult to recover the information. We can further remove the limitation of key-based security management.

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