



Wireless Multimedia Sensor Network: A Review

Authors

Ruchi Singh¹, Meenakshi Pant²

¹Banasthali University

Rajasthan

Email: *er.singhruchi29@gmail.com*

²Banasthali University,

Rajasthan

Email: *minileo23@gmail.com*

Abstract: Wireless Sensor Network (WSN) is emerging field of research for multimedia communication. A wireless sensor network (WSN) is a network of spatially distributed devices using sensors in a dense manner. This network monitors the physical or environment conditions. In the past, conventional data communication was the major interest in research community. Now the growing needs of technology develop research space for multimedia communication. This envisioned the applications may able to capture information in the form of multimedia such as image, audio and video. The popularity of these applications highlighted the limitations or technical challenges of multimedia communication. In this paper, a review on the application areas and technical challenges on the multimedia communication of the WSN is presented.

Keywords: WSN, Multimedia Communication, Conventional Data Communication, Spatially Distributed Devices

1. Introduction

Wireless Sensor Networks (WSNs) that primarily uses the analog form of modulation for the carrier have drawn an eye catching deliberation among the various research communities in past fold of years. This potential expansion in the conventional communication applications leverages the scope of research among multifarious environmental entities. The ascendancy of (WSNs) will envision a mark of its usability and vogue to an integral fraction of human's daily life. Currently the point of reference for WSN is now dispersing towards large count of application areas. A vast range of research efforts are focused on the communication protocols and architecture. Researchers examine the key challenges of WSN that include in it lanes of random network topology, limited computational power, scalability, power and storage restricted consumption, scalability, error-prone network medium etc. These challenges give a next step shift to (WMSN) that unwrap the new vision to existing (WSN) in terms of challenges

that (WSN) faced. However (WMSN) has its own key featured limitations as application specific QoS constraints, coverage area, high bandwidth demand, heterogeneous multimedia reliability etc. The spacious range of WSN applications requires multimedia communication like images, audios and videos.

The main goal of WSN deployment is to communicate in a reliable and efficient fashion. A WSN typically has little or no physical infrastructure [7]. A WSN is a network of wirelessly connected devices using sensors deployed in a dense manner. These devices capable of sensing information from the physical environment, process the extracted information and transmit it to main location. Most deployed sensor networks gather information like temperature, pressure, or humidity. Most of these applications have low bandwidth requirements and are not stringent delay constraint. These

applications do not impose strict rules over the delivery unlike multimedia data. Unlike traditional WSNs, a WMSN has its own constraints [7]. Due to the limitations of the multimedia communication over WSN made it a challenging task. The delay involved in conventional applications does not cause severe adverse effects. Multimedia communication has strict constraint on delay, bandwidth, power consumption. Many solutions exist

for wireless networks but due to its limitations these cannot be applied to multimedia communication. Research in WMSNs aims to meet the technical challenges in the multimedia communication [7].

The rest of the paper is organized as follows. In section 2, we discuss the major application areas of multimedia communication. The limitations or technical challenges of multimedia communication in WSN are discussed in section 3. Finally the paper is concluded in Section 4.

2. Applications of Multimedia Communications

Wireless Multimedia Sensor Networks (WMSNs) will be seen in many application areas, which are discussed below:

2.1 Surveillance

Video and audio sensors will be used to enhance surveillance applications. These systems will be used against crime and terrorist attacks. These systems extend the ability of armed and defence forces to monitor public, private and border areas [2] [6].

2.2 Personal and Health Care

Multimedia sensor can be used to monitor the behavior of elderly people and study their behavior to identify the cause of illness. Patients will carry sensors embedded into wearable gadgets to monitor body temperature, blood pressure, pulse rate, breathing activity [2] [6].

2.3 Monitoring

These systems will be used to monitor the traffic on highways and in big cities. These enhance the ability of traffic agencies to identify the traffic rules violator, and capture images in case of accidents to resolve issues [2] [6].

2.4 Industrial Applications

Multimedia content can be used to locate the time critical industrial process control. Images can be extracted to locate the defects in the final products [2] [6].

2.5 Smart homes

Images, audio or video will be captured to detect unwanted activities. This enables the single person to monitor a large area [4].

2.6 Habitat monitoring

Several projects on environmental monitoring requires image capture to monitor the water level near critical places [2] [1].

3. Technical Challenges

There are several factors that affect the multimedia communication delivery over application layer. These factors are addressed below:

3.1 High Bandwidth Requirements

Multimedia data, especially video, requires high data rate to deliver effectively. Hence transmission techniques need to be enhanced for high data rate [6].

3.2 Delay Constraints

The delay introduced to the multimedia data by processing time or by communication latency is of great interest in multimedia communication. The application level requirements cannot be met till this delay is introduced in the multimedia stream.

3.3 Variable Channel Capacity

In wired networks, capacity of each link is fixed. However, in wireless networks, it depends on the radio range of devices. Hence, capacity at each link is environment dependent and can be bursty in nature [6].

3.4 Resource Constraints

Sensor devices have constraint in terms of memory, processing power. Hence, these resources should be effectively used [6].

3.5 Power Consumption

The severe power consumption during processing and communication is a bottleneck in multimedia communication. Hence, energy or battery related issues must be addressed [4].

3.6 Production Cost

However, in the case of multimedia WSN, the sensor device is able to capture audio, video and image. In terms of capturing and processing multimedia data, it would result high cost for commercial applications [4].

4. Conclusion

In this paper, we examined that wireless sensor networks (WSNs) have a wide range of application areas. These areas will cover our professional or personal life as a whole. To meet this, effective solutions are addressed to overcome these challenges. This may leads to provide these applications for commercial usage. Here these applications and challenges are discussed briefly.

References

- [1] Atif Sharif, Vidyasagar Potdar and Elizabeth Chang "Wireless Multimedia Sensor Network Technology: A Survey" Digital Ecosystems and Business Intelligence Institute, Curtin University of Technology, Perth, Western Australia, 978-1-4244-3760-3/09/\$25.00 © 2009 IEEE, p. 606
- [2] Broadband Wireless networking Lab "Wireless Multimedia Sensor Networks (WMSN)" school of Electrical and Computer Engineering, Georgia Institute of technology
- [3] Chung Ta Li "Security of Wireless Sensor Networks: Current Status and Key Issues" Department of Information Management, Tainan University of Technology, Taiwan
- [4] Eren Gurses and Ozgur B. Akan "Multimedia Communication in Wireless Sensor Networks" Middle East Technical University, Ankara, Turkey, 06531
- [5] Ian F. Akyidiz, Tommaso Melodia and Kaushik R. Chowdhury, 5 October, 2006 "A survey on wireless multimedia sensor networks" Broadband and Wireless Networking Laboratory, School of Electrical and Computer Engineering, Georgia Institute of Technology, Atlanta, GA 30332, United States, Computer Networks
- [6] Ian F. Akyidiz, Tommaso Melodia and Kaushik R. Chowdhury "Wireless Multimedia Sensor Networks: Applications and Testbeds" Proceedings of the IEEE, Vol. 96, No. 10, October 2008
- [7] Jennifer Yick, Biswanath Mukherjee and Dipak Ghosal, "Wireless sensor network survey" Department of Computer Science, University of California, Davis, CA 95616, United States, Computer Networks
- [8] John A. Stankovic, June 19,2006, "Wireless Sensor Networks" Department of Computer Science, University of Virginia
- [9] Mr. Puneet Garg, Mr. Kunal Saroha and Mrs. Ruchika Lochab "Review of Wireless Sensor Networks- Architecture and Applications" International Journal of Computer Science & Management Studies, Vol. 11, Issue 01,May 2011, ISSN (Online): 2231-5268 [accessed: 8 April, 2014]
- [10] National Instruments, "What is a Wireless Sensor Network?" Publish Date: May 05, 2012
- [11] Shashank Khanvilkar, Faisal Bashir, Dan Schonfeld and Ashfaq Khokhar "Multimedia Networks and Communication" University of Illinois at Chicago, p. 14-15, 21

Author Profile



Ruchi received the B.Tech degree in Computer Science and Engineering from Moradabad Institute of Technology in 2012 from Gautam Buddha Technical University, Lucknow. She currently pursuing M.Tech degree in Information Technology from Banasthali University, Rajasthan.



Meenakshi Pant received B.Tech degree in Computer Science and Engineering from Bharat Institute of Technology in 2009 from Uttar Pradesh Technical University, Lucknow and M.Tech degree in Computer Science in 2012 from Banasthali University, Rajasthan. She worked as Hadoop developer in Tata Consultancy Services during 2012-2013.