IJIRCCE

e-ISSN: 2320-9801 | p-ISSN: 2320-9798

INTERNATIONAL JOURNAL OF INNOVATIVE RESEARCH

IN COMPUTER & COMMUNICATION ENGINEERING

Volume 12, Special Issue 1, March 2024

1st International Conference on Machine Learning, Optimization and Data Science

Organized by

Department of Computer Science and Engineering, Baderia Global Institute of Engineering and Management, Jabalpur, India

INTERNATIONAL STANDARD SERIAL NUMBER INDIA

Impact Factor: 8.379

International Journal of Innovative Research in Computer and Communication Engineering

| e-ISSN: 2320-9801, p-ISSN: 2320-9798| www.ijircce.com | |Impact Factor: 8.379 || Monthly Peer Reviewed & Refereed Journal |

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QOS in Wireless Sensor Network-Fault Tolerance and Efficient Bandwidth Allocation

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ABSTRACT: Wireless sensor networks are an integral part of Industrial Revolution 4.0. The traffic efficiency of any network depends on link failures and available bandwidth. This paper discusses route discovery in case of a link failure and a control system approach for efficient bandwidth allocation. Control system approach has been attempted to address the twin issues of link failure and bandwidth allocation.

The main function of Wireless networks is to gather information about various types of parameters, notably process variables in industries, air quality variables in ambient air monitoring, weather forecasting, cyclonic alertness, congestion and other parameters in traffic routing. The outputs from WSN are feed into Plant systems either to display or control the variables. Naturally for efficient, reliable display and control of parameters continuous supply of information from WSN to Plant systems is important. Hence improving Quality of Service Parameters like signal to noise ratio, fault tolerance, Band width allocation, and stability and load balancing is vital while designing a WSN. We discuss about two QOS parameters in WSN namely Fault Tolerance in case of Link failures and Efficient Bandwidth Allocation. Links here are wireless in nature.

KEYWORDS: Wireless Sensor Network (WSN), Proportional Integral Controller (PID), Programmable Logic Controller (PLC), Distributed Control Systems (DCS), Data Acquisition System (DAS), Quality Of service (QOS).

I. INTRODUCTION

Computerization and automation in industry has led to digitization of manufacturing industries [1]. Advanced machine learning, data mining, Internet of things, wireless sensor networks, artificial intelligence, self organizing and learning networks, ERP, cloud computing are many facets of Industry 4.0.Most significant factor is availability of real time data which is reliable, accurate and precise. The term Industry 4.0 is synthesis of advanced manufacturing techniques and the Internet of Things to create intelligent manufacturing systems. When we say intelligent it means they are interconnected, communicate, analyse and feedback information (intelligence) into decision support systems and physical components. The main function of Wireless networks is to gather information about various types of parameters, notably process variables in industries, air quality variables in ambient air monitoring, weather forecasting, cyclonic alertness, congestion and other parameters in traffic routing. The output from WSN is feed into Plant systems either to display or control the variables. Naturally for efficient, reliable display and control of parameters continuous supply of information from WSN to Plant systems is important. Hence improving Quality of Service Parameters like signal to noise ratio, fault tolerance, Band width allocation, and stability and load balancing is vital while designing a WSN.We discuss about two QOS parameters in WSN namely Fault Tolerance in case of Link failures and Efficient Bandwidth Allocation. Links here are wireless in nature.

II. RELATED WORK

Industry 4.0 offers a revolutionary paradigm shift where in subjectivity of human nature in decision making could be completely eliminated. The term Industry 4.0 is synthesis of advanced Manufacturing techniques and the Internet of Things to create intelligent manufacturing systems. Many manufacturing process have optimized process parameters increasing yield, recurring periodic defects were being identified, material moving machineries organized in an optimized way in logistic terminals and ports depending on likely arrival of materials.(nature and quantity Foundations of Industry 4.0.Wireless sensors are basic components of Internet of Things (IoT) and Industry 4.0. IOT connects sensors and hence data from them to decision making systems via cloud [2]. Raw data from these are gathered,