IJIRCCE

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

INTERNATIONAL JOURNAL OF INNOVATIVE RESEARCH

IN COMPUTER & COMMUNICATION ENGINEERING

Volume 12, Issue 5, May 2024

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 | A Monthly Peer Reviewed & Referred Journal |

|| Volume 12, Issue 5, May 2024 ||

| DOI: 10.15680/IJIRCCE.2023.1205074 |

Exploration And Implementation Of Video Transmission Via Fm Modulation

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ABSTRACT: This report presents the exploration and implementation of video transmission via Frequency Modulation (FM) using MATLAB software. Beginning with a thorough literature review, the report examines the theoretical foundations and practical considerations of integrating video signals with FM modulation.The implementation phase focuses on MATLAB-based design and development, encompassing algorithm creation for video encoding, FM modulation, transmission simulation, and decoding. System parameters are optimized within MATLAB to ensure robust transmission and high-quality video reception.Experimental validation within MATLAB assesses system performance under varied conditions, evaluating video fidelity, signal robustness, and transmission range. The utilization of FM-based video transmission offers advantages such as efficient spectrum utilization, resistance to noise interference, and compatibility with existing FM infrastructure. These benefits make FM modulation an attractive solution for applications requiring reliable and high-quality video communication over wireless channels.In conclusion the findings have practical implications for industries such as surveillance, remote monitoring, and live event broadcasting, transmission essential.

KEYWORDS: Matlab, modulation, multiplexing, demodulation, demultiplexing, test and analysis

I. INTRODUCTION

This report presents an exploration and implementation of video transmission via Frequency Modulation (FM), utilizing MATLAB software for design and analysis. In contrast to existing papers in the field, which predominantly focus on theoretical frameworks and simulation-based studies, this report bridges the gap between theory and practical implementation. While related papers offer valuable insights into the principles of FM modulation and its application to
video transmission, they often lack a comprehensive examination of the practical aspects involved in system design, implementation, and experimental validation. By leveraging MATLAB's computational capabilities, this report goes beyond theoretical conjecture to deliver a hands-on exploration of FM-based video transmission.The unique contribution of this report lies in its emphasis on practical implementation, where MATLAB serves as a versatile platform for algorithm development, simulation, and performance evaluation. This approach enables a deeper understanding of the challenges and opportunities inherent in FM-based video transmission, fostering a more holistic perspective on the topic.In summary, this report complements existing literature by providing a practical demonstration of FM-based video transmission using MATLAB, thereby enriching the discourse with actionable insights and empirical validation.

Furthermore, while related papers often limit their scope to theoretical discussions or simulation-based studies, this report endeavors to bridge the gap between theory and practical application. By embracing a hands-on approach to FM-based video transmission using MATLAB, this report not only enriches the theoretical discourse but also provides actionable insights into real-world implementation challenges and opportunities.

In summary, this report represents a departure from traditional theoretical discussions by offering a practical exploration of FM-based video transmission using MATLAB.

II. RELATED WORK

Video transmission via FM modulation has been a subject of extensive research and implementation across various domains, particularly in analog television broadcasting and early wireless video transmission systems. Standards such as NTSC, PAL, and SECAM have heavily relied on FM modulation for transmitting video signals over the air, laying the groundwork for understanding its principles and applications. Additionally, in fields like closed-circuit television (CCTV), FM-modulated video transmission systems have been widely deployed for short-distance wireless video

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communication. Research in RF communication has further contributed to the exploration of FM modulation's characteristics, including its signal-to-noise ratio and bandwidth efficiency, essential for optimizing video transmission quality. Moreover, studies conducted during the transition from analog to digital television broadcasting have provided insights into the comparative advantages and disadvantages of FM modulation for video transmission. Today, while digital modulation techniques dominate the landscape of wireless communication, historical and comparative analyses continue to shed light on the role and evolution of FM modulation in video transmission.

III. METHODOLOGY

Explore and implement video transmission via FM modulation, a methodological approach begins with an in-depth review of existing literature spanning analog television broadcasting, wireless video transmission systems, and RF communication. This foundational understanding serves as the backbone for designing a video transmission system. The next step involves comprehending the principles of FM modulation, focusing on essential concepts such as modulation index and carrier frequency. With this knowledge, a system design is formulated, outlining the necessary components like video sources, FM modulators, and antennas. Prototype development follows suit, where individual components are assembled and tested for functionality and compatibility. Signal processing techniques are then implemented to safeguard the video signal's integrity against noise and distortion. Performance evaluation ensues through experimentation, measuring key parameters like SNR and video quality. Fine-tuning the system optimizes its efficiency, while validation and testing ensure real-world applicability. Finally, documentation consolidates the methodology, results, and recommendations for future endeavors. This methodological framework facilitates a systematic exploration and implementation of video transmission via FM modulation, ensuring robustness and reliability in the process.

IV. EXPERIMENTAL RESULTS

The results obtained from the experimental tests are analyzed to assess the effectiveness and reliability of the implemented video streaming system. Graphs, charts, and statistical analysis are used to visualize and interpret the performance metrics under different test scenarios. Key findings, trends, and observations are discussed to provide insights into the system's behavior and limitations.These results are shown below the figures.

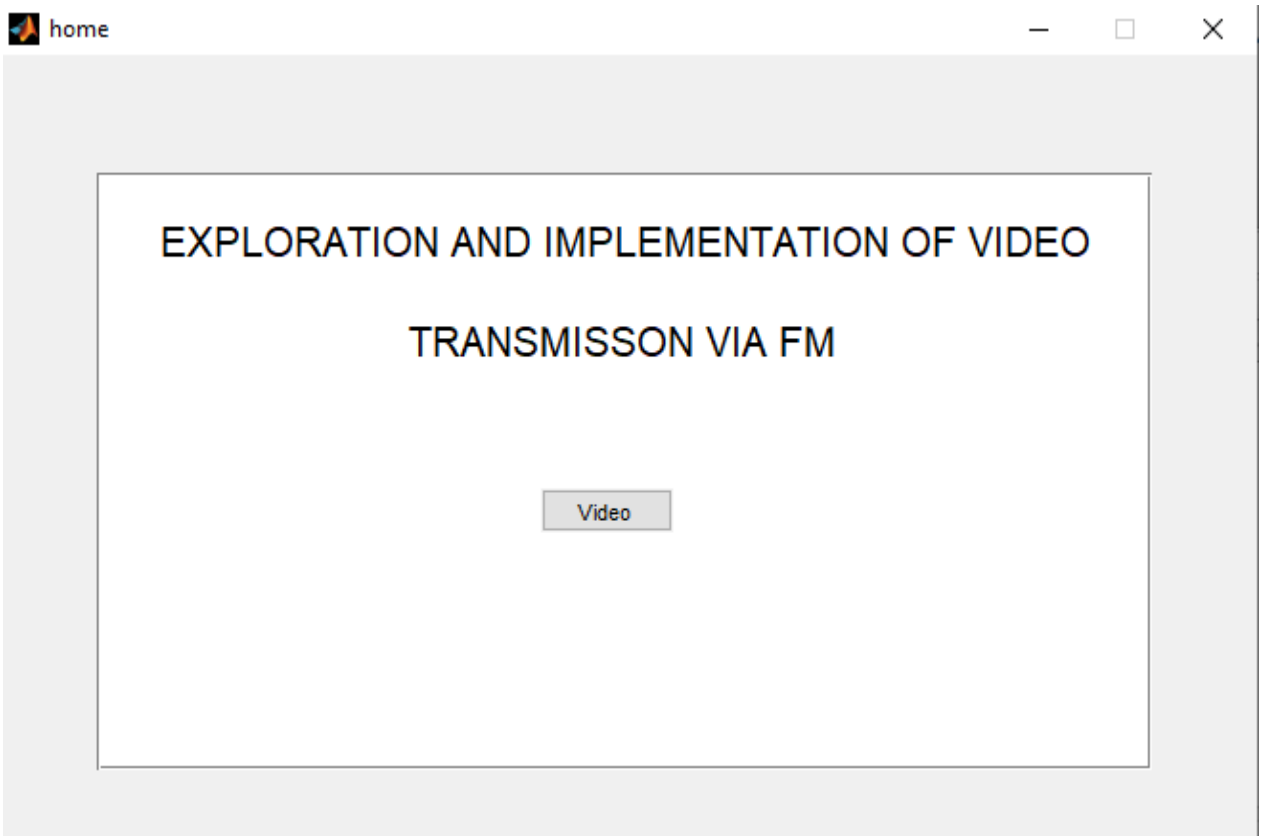

Fig. 1

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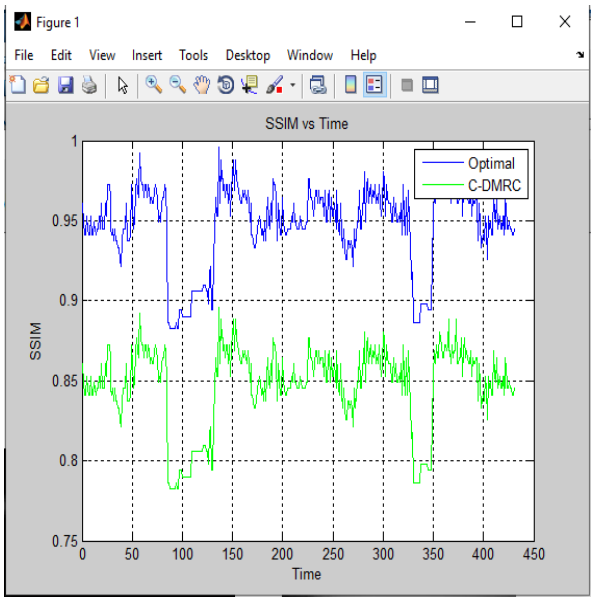

Fig. 2.a

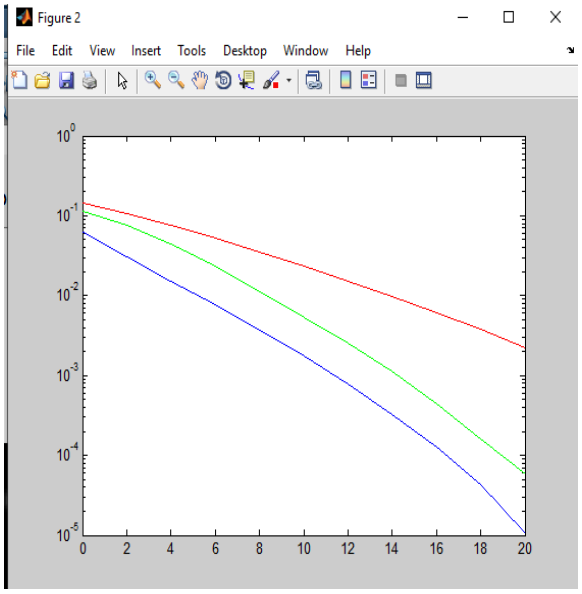

Fig. 2.b

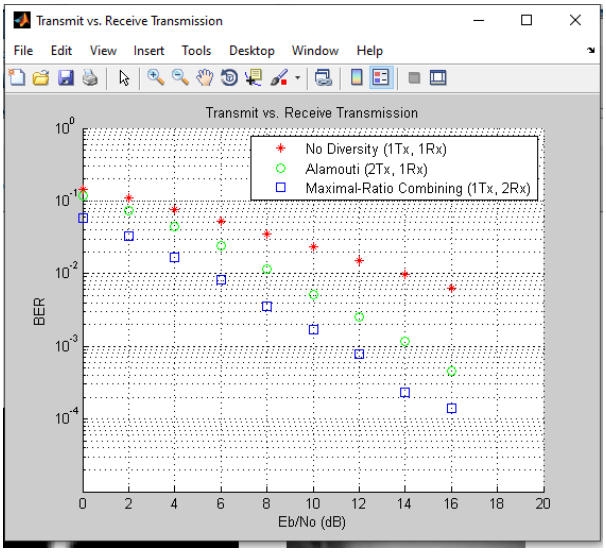

Fig. 2.c

Fig. 2. Implementation of video source (a) ssm vs time (b) processing source (c) transmit vs receive transmission using MATLAB -TECHSTACK software.

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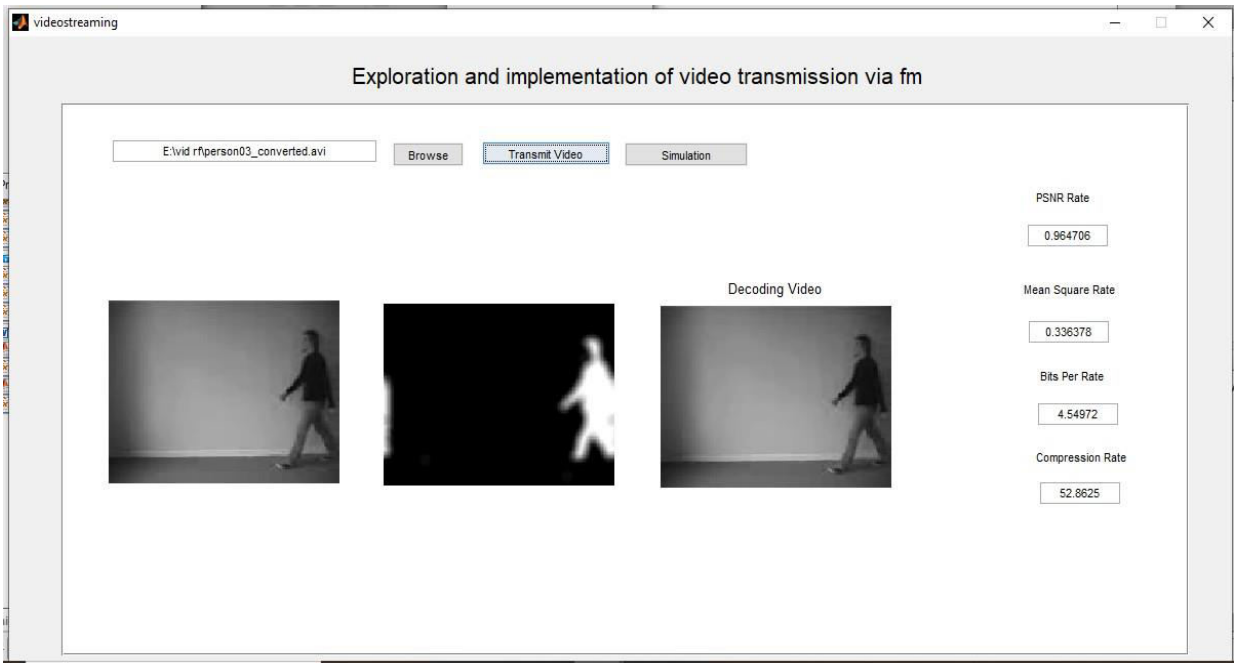

Fig. 3 By using this coding,we can utilizing the below formatted output (videostreaming).

V. CONCLUSION

The exploration and implementation of video transmission via FM present both opportunities and challenges. While technically feasible, significant considerations exist regarding signal quality, bandwidth utilization, and regulatory compliance. Further research and development are warranted to optimize video transmission over FM for improved reliability and user experience. Additionally, exploring alternative technologies or hybrid approaches may offer complementary solutions to address the limitations of FM transmission for video. Overall, this study highlights the potential for innovation in multimedia broadcasting but underscores the need for comprehensive technical, regulatory, and user-centric considerations in its implementation.

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