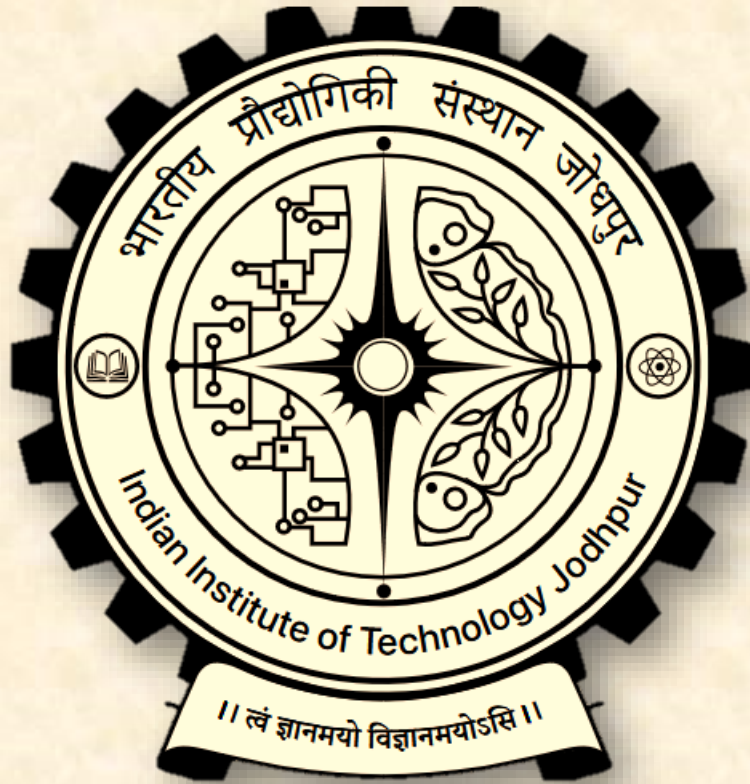


INDIAN INSTITUTE OF TECHNOLOGY JODHPUR



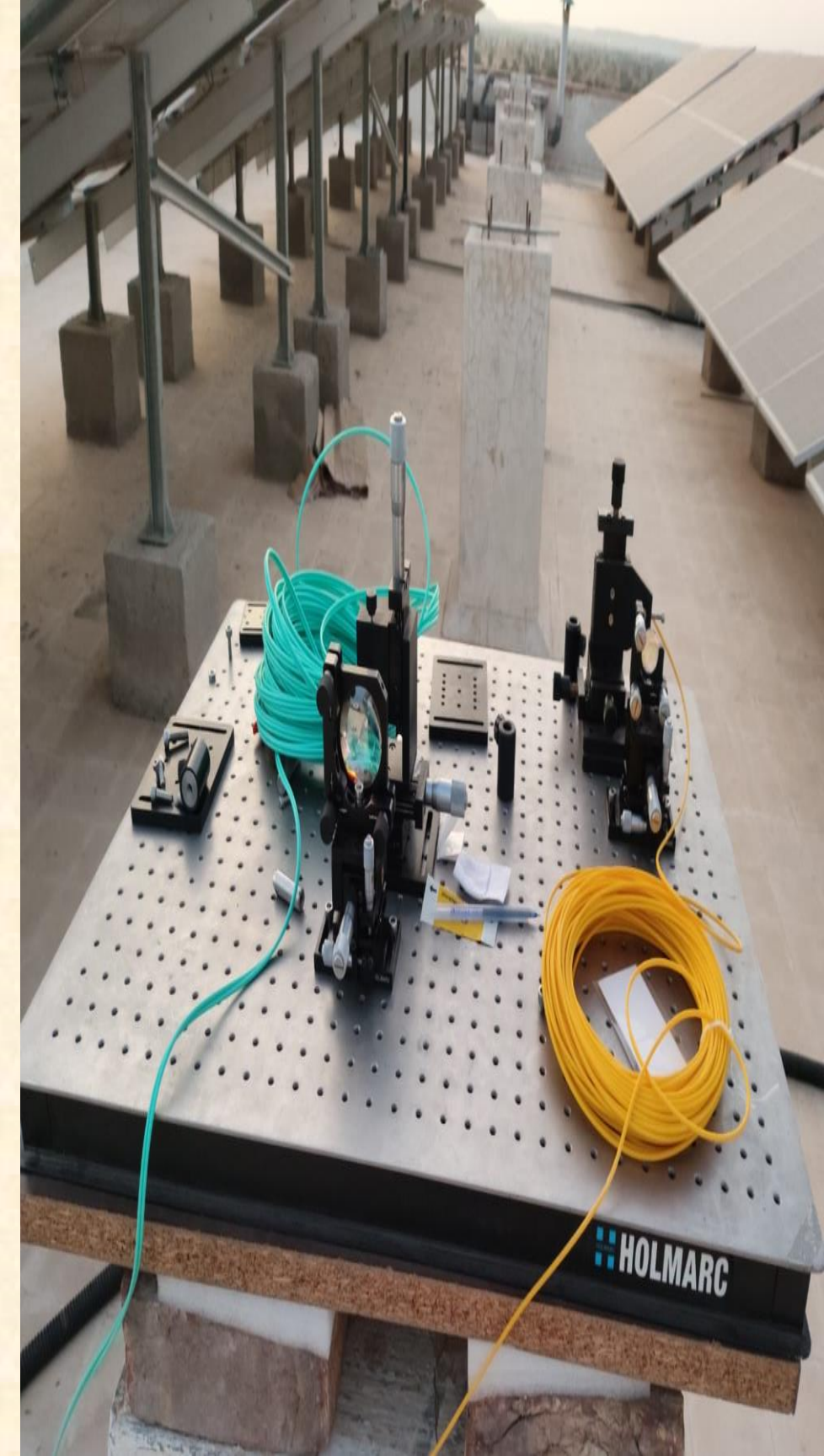
DESIGN CREDIT PROJECT

submitted to :- DR . Ashish Mathur

*submitted by:- Krishna Chaudhary (B22EE090)
Parth Mina (B22EE090)*

Hybrid Communication System: FSO, Fiber, and RF

This presentation explores the design and implementation of a hybrid communication system integrating Free Space Optics (FSO), fiber optics, and RF communication.



Abstract: Bridging the Gap

This project presents the successful transmission of a text message across a hybrid FSO-fiber-RF system. Signal processing, modulation, and demodulation are performed using MATLAB.

Key Features

Integration of FSO, fiber optics, and RF technologies.

Successful text message transmission.

MATLAB for signal processing.

Objectives

Demonstrate the integration of multiple communication media.

Explore the advantages of hybrid systems.

Understand the challenges and limitations of each medium.

System Design and Experimental Setup

The system comprises four stages: signal generation, fiber optic transmission, FSO channel, and reception and processing.

Signal Generation

Text message is converted into binary bits using MATLAB.

Signal is modulated using a square root cosine filter.

1

2

FSO Channel

Optical signal is transmitted across rooftop space.

Signal is reflected by a precisely aligned mirror.

3

4

Fiber Optic Transmission

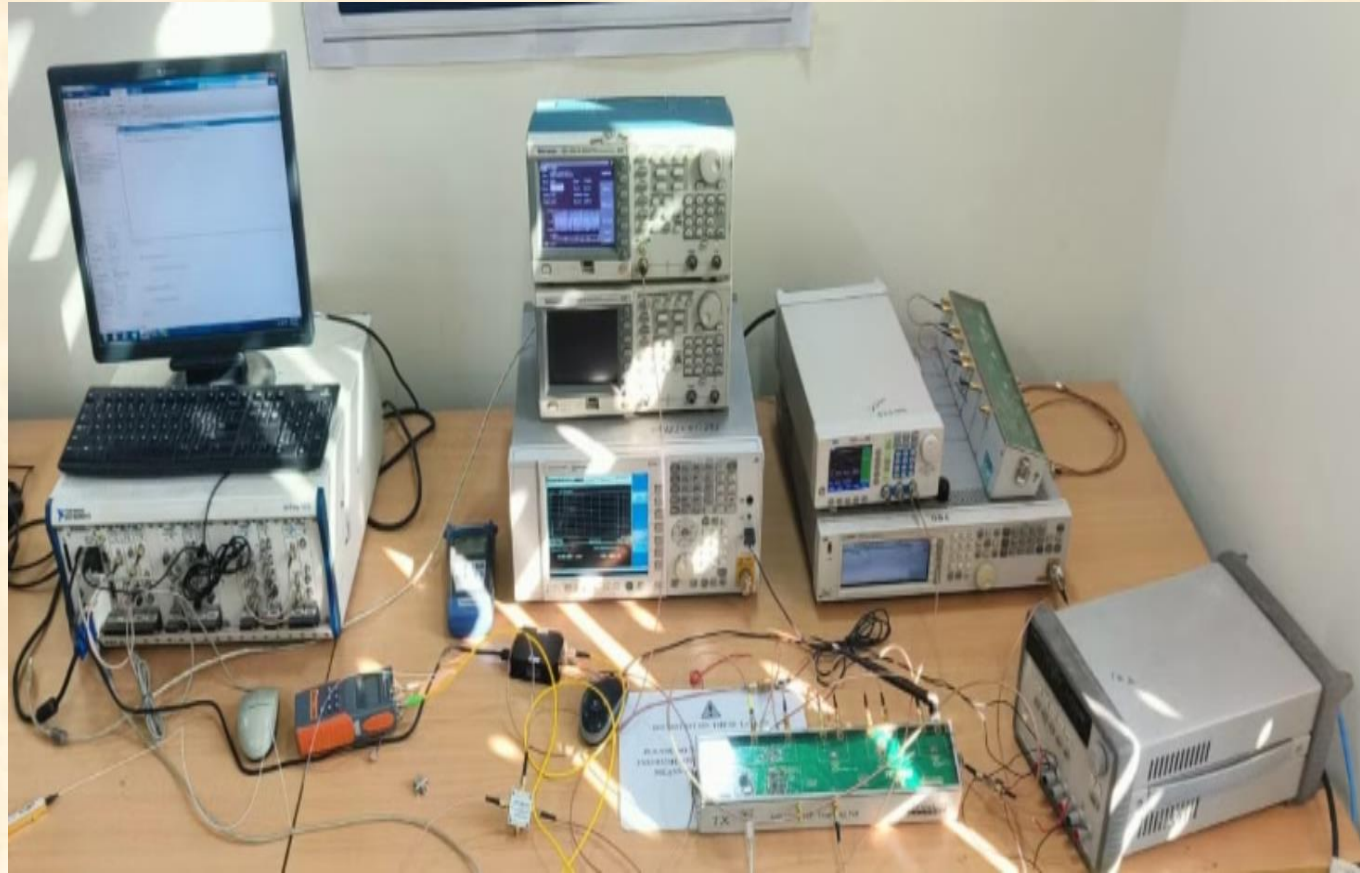
Modulated signal is transmitted through fiber optic cable.

Fiber optic cable ensures low-loss transmission.

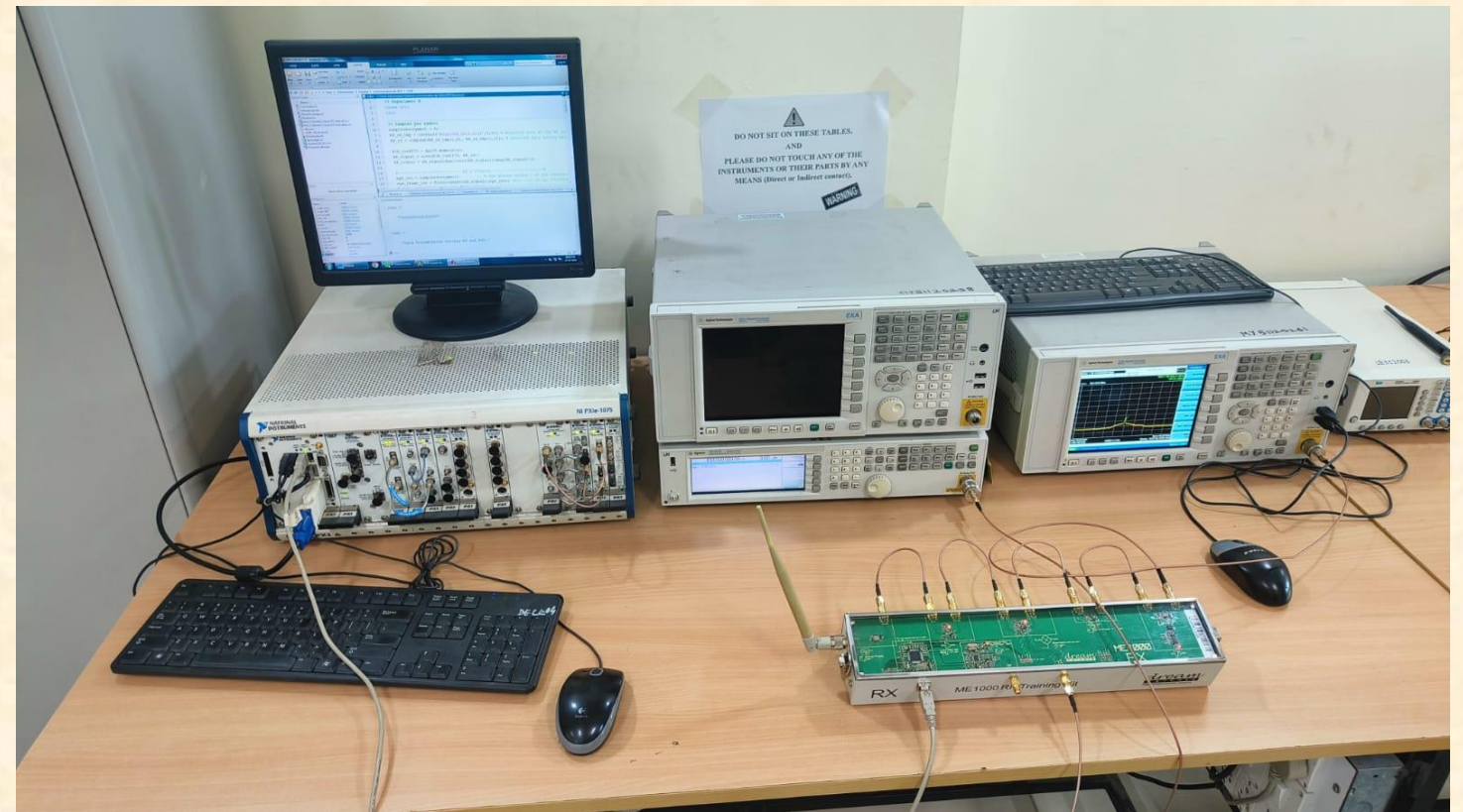
Reception and Processing

Optical signal is converted into an RF signal.

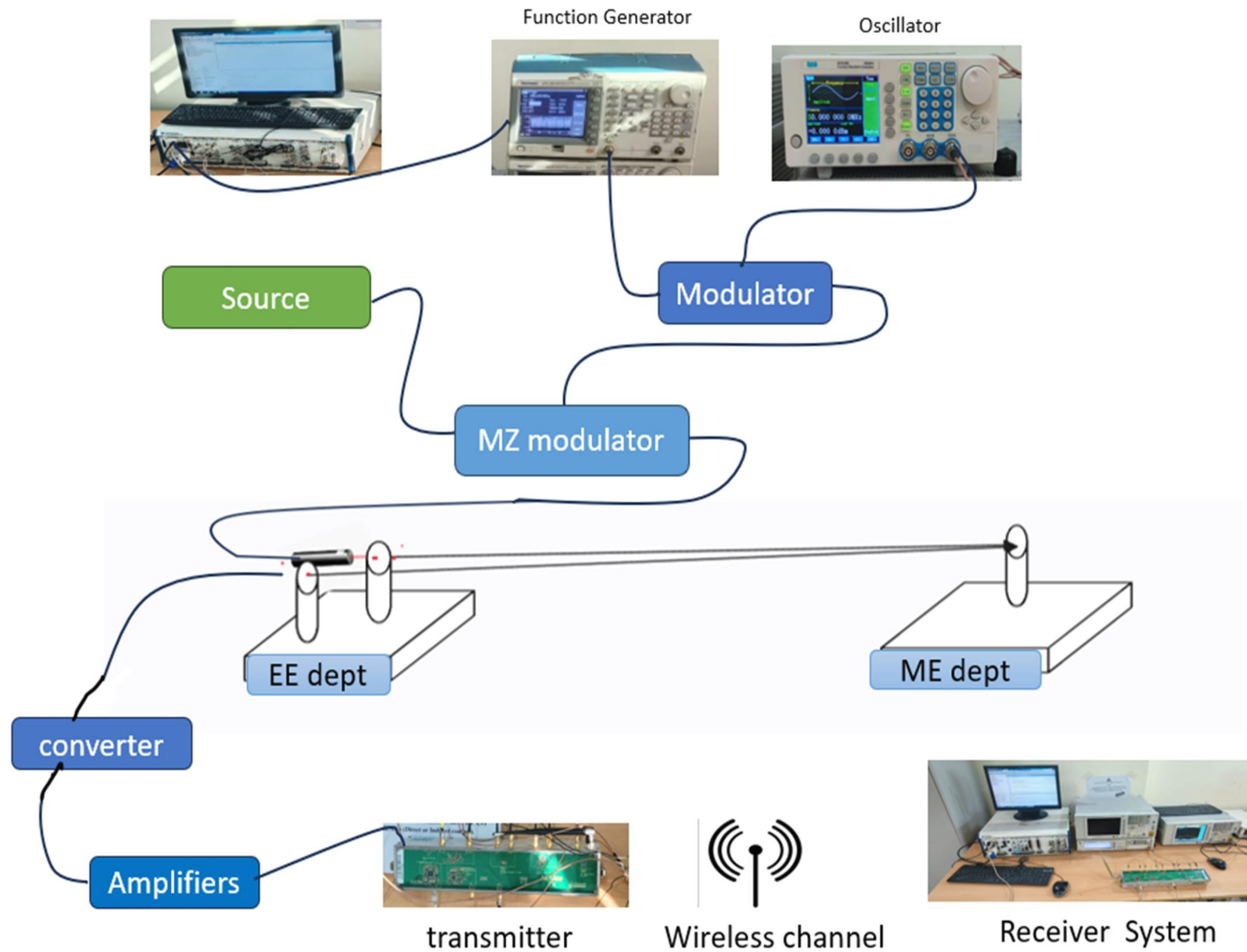
Signal is demodulated and reconstructed using MATLAB.



Transmitter side



Receiver Side



Methodology: A Multifaceted Approach

The experiment leverages diverse techniques for data transmission and processing.

MATLAB

Used for signal conversion, modulation analysis, and reconstruction.

Fiber Optics

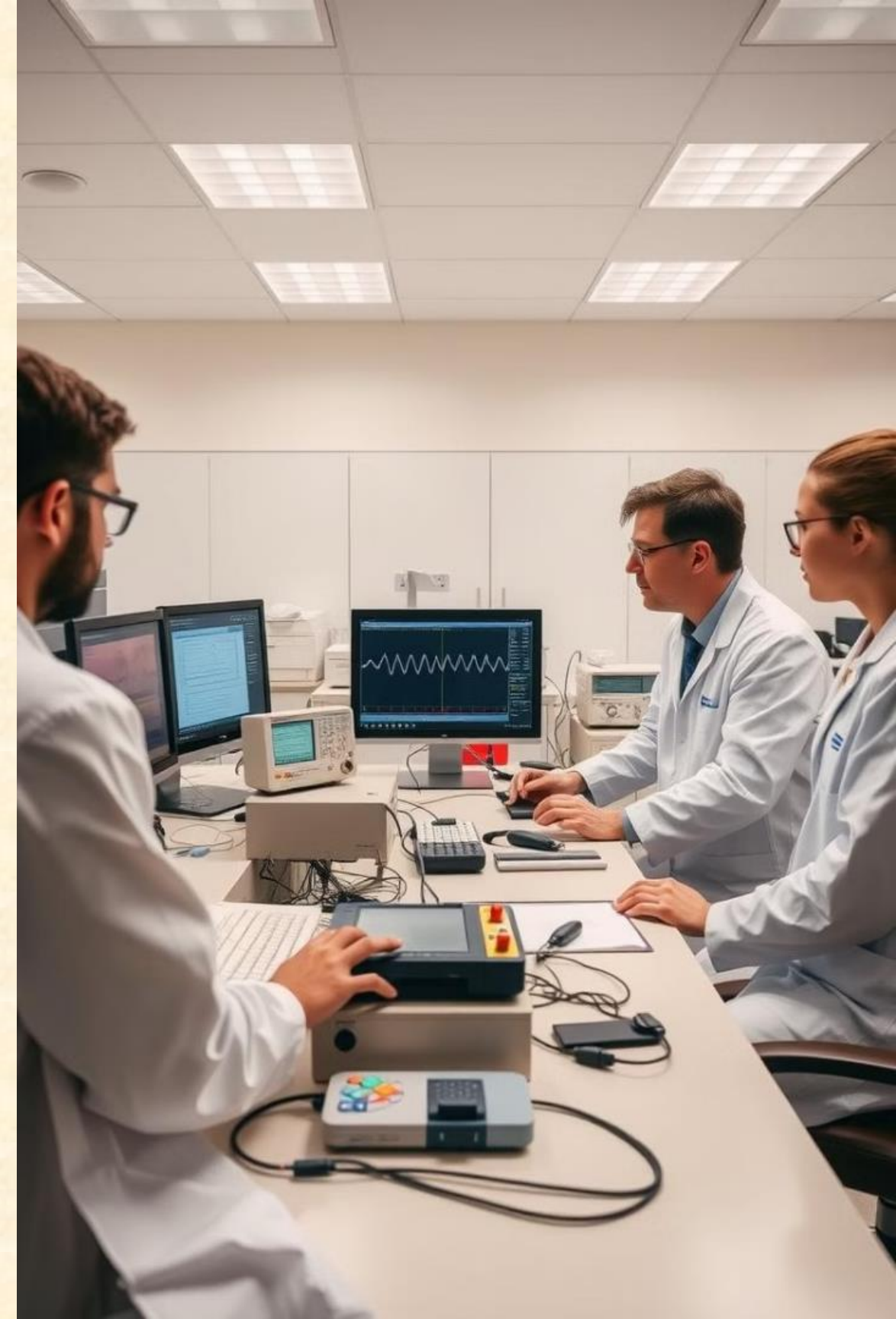
Utilized for low-loss transmission of the RF-modulated signal.

FSO Channel

Implemented for free-space optical transmission over rooftops.

Amplification

Employed to enhance signal strength at critical stages.



Results and Discussion: Successes and Challenges

The experiment yielded successful text message transmission with minimal distortion.



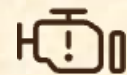
Successful Transmission

Text messages were successfully transmitted with minimal signal distortion.



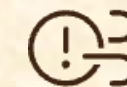
Fiber Optic Efficiency

Fiber optics effectively maintained signal integrity during transmission.



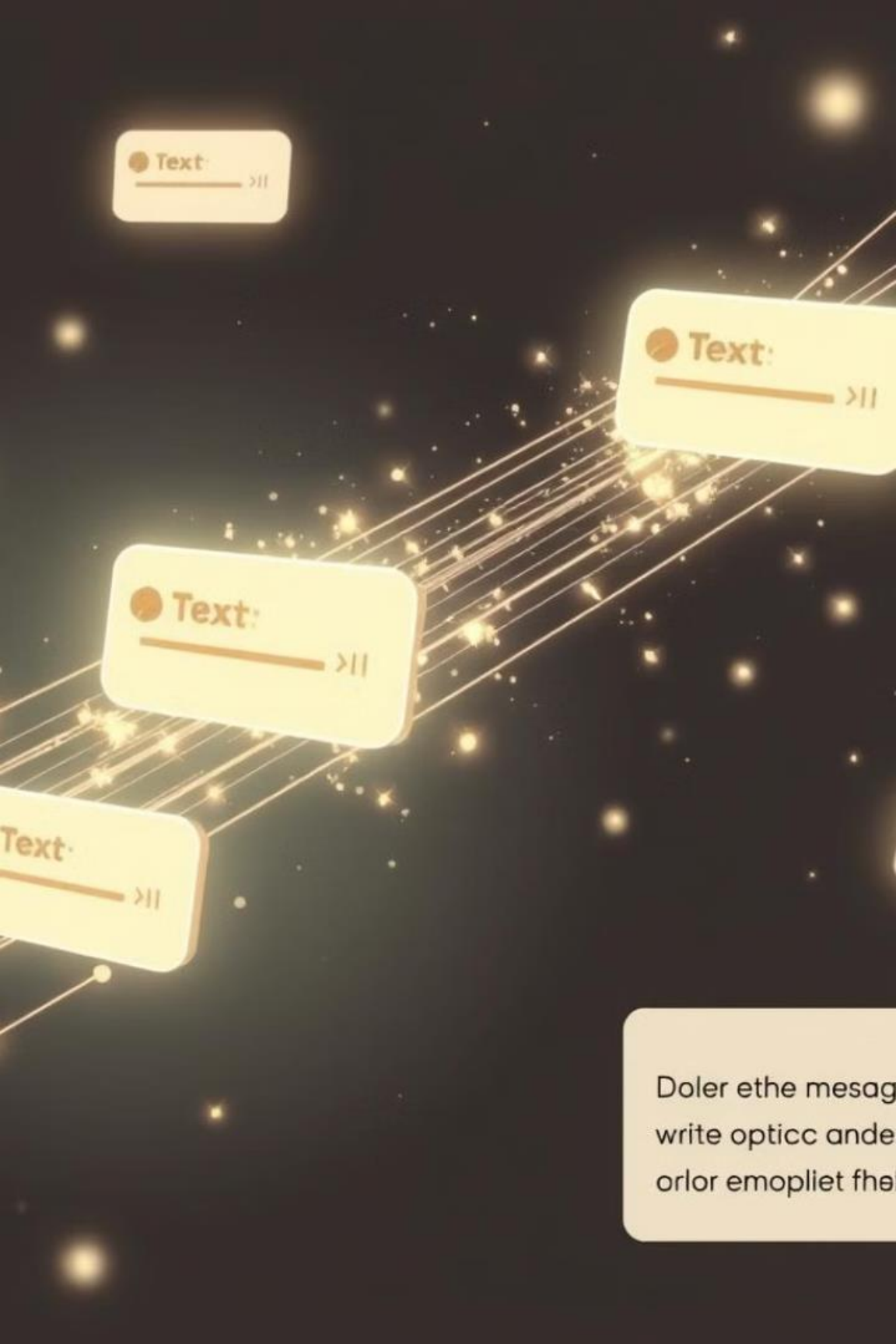
FSO Alignment

Signal alignment in the FSO channel required meticulous calibration.



Conversion Losses

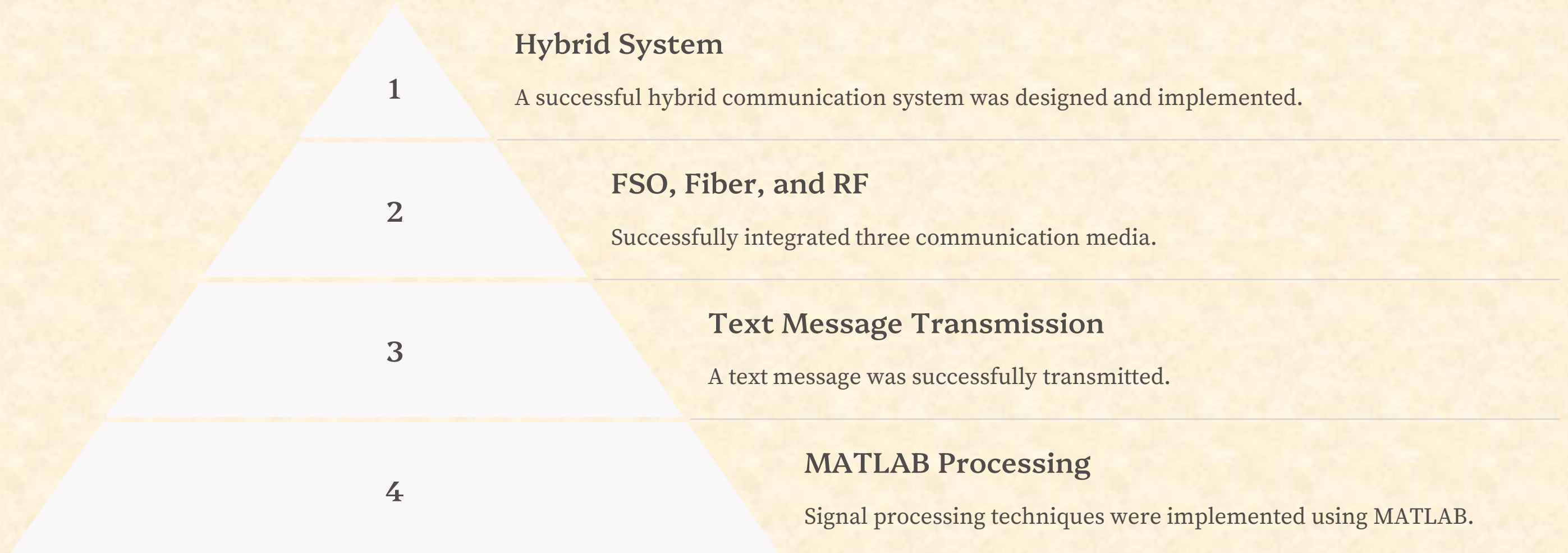
Minor losses occurred during the optical-to-RF conversion stage.



Doler ethe mesag
write opticc ande
orlor emopliet fhe

Conclusion: A Hybrid Triumph

The project successfully demonstrated the feasibility of text message transmission using a hybrid system combining FSO, fiber optics, and RF communication.



Future Scope: Expanding Horizons

The project paves the way for further research and development in the field of hybrid communication systems.

1	<div>Advanced Modulation</div> <div>Exploring higher data rates using advanced modulation techniques.</div>
2	<div>Adaptive Beam Alignment</div> <div>Implementing adaptive beam alignment in the FSO channel.</div>
3	<div>Error Correction</div> <div>Utilizing higher-order error correction algorithms to minimize data loss.</div>
4	<div>Real-Time Multimedia</div> <div>Extending the system for real-time multimedia transmission.</div>



Thank you!