# Fiber Optic Transmission System Laboratory

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# What Is Fiber Optic Transmission System Laboratory?

A Fiber Optic Transmission System Laboratory is a lab setup used to study, test, and develop fiber optic communication systems. It typically includes:

- Optical Transmitters (lasers, LEDs)
- Optical Fibers (single-mode, multimode)
- Optical Receivers (photodetectors, APDs)
- Signal Processing Equipment (optical amplifiers, multiplexers, demultiplexers)
- Testing Tools (OTDR, power meters, spectrum analyzers)

It is used for research, education, and industry applications in high-speed data transmission.

# Aspects of the Laboratory

One aspect that may not be as crucial in a Fiber Optic Transmission System Laboratory is the physical space or location. While the setup and equipment are essential for research and testing, the specific location of the lab, such as whether it is situated in a particular type of building or geographic area, usually doesn't impact the functionality or outcomes of the lab's work. The focus is generally on the technical equipment and experiments rather than where the lab is located.

# Fiber Optic Experimental Setup

This setup is designed for precision optical experiments using fiber optics. It is mounted on an optical breadboard to minimize vibrations and enclosed in a protective shield to reduce environmental interference.

**Possible Applications:**

- **Optical Communication** – Testing fiber signal transmission and wavelength properties.
- **Interferometry** – Measuring tiny positional or material changes using light.
- **Microscopy & Spectroscopy** – Analyzing materials at microscopic scales.
- **Quantum Optics & Sensing** – Studying light behavior for high-precision measurements.

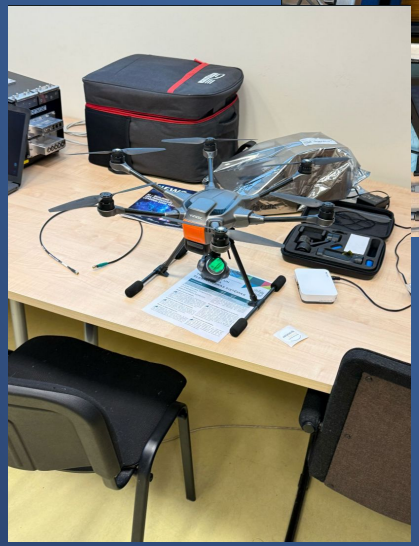
# Fiber Optic Test & Measurement Setup

**Key Components & Functions:**

- **Optical Fibers** (yellow and blue) – Used to guide light signals with minimal loss.
- **Erbium-Doped Fiber Amplifier (EDFA) or Laser Module** (labeled "Eblorttrans") – Likely amplifies or generates laser light.
- **Optical Components & Connectors** – Splitters, couplers, or filters for signal manipulation.
- **Electronic Measurement Equipment** (Keysight device) – Monitors and analyzes optical/electrical signals.

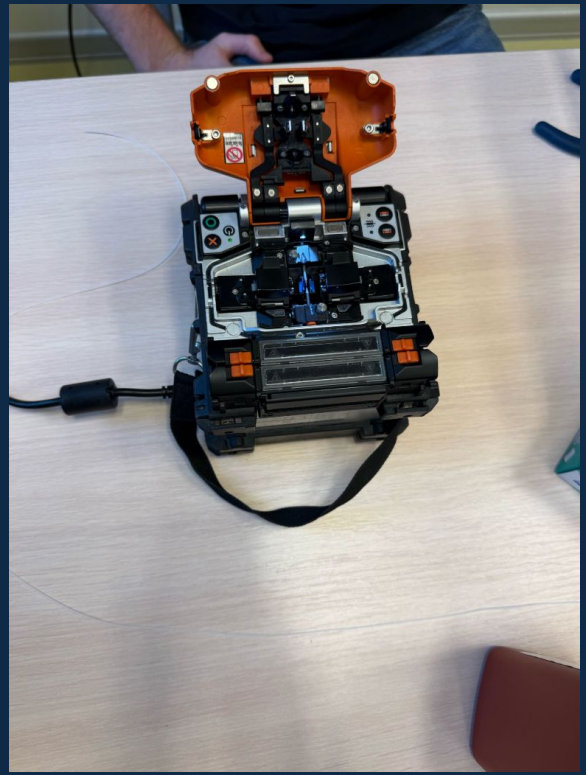
# Creating a Sufficient 5G Network For Drones

The next researcher we spoke with is focused on developing a strong and independent network for drones, similar to how companies like LMT provide their services. In the testing phase, the system was evaluated for bandwidth and speed in the blue box. The researcher shared that the ultimate goal is to refine the system into a product ready for the market and to work together with LMT in the future. This project aims to improve drone communication networks, making them more reliable and scalable for the growing drone industry.



# Optic Fiber Splicing

Fiber optic splicing is the process of seamlessly joining two optical fibers to optimize signal transmission. It involves preparing, cleaving, aligning, and fusing fiber ends using an electric arc. This technique reduces signal loss, boosts durability, and is critical for high-performance telecommunications networks.



# How Fiber Optic Splicing Works?

1. Preparation

Remove fiber protection and clean thoroughly. Cut Kevlar threads to prevent interference.

2. Cleaving & Alignment

Cleave fiber ends for a smooth connection.Align fibers precisely using an LCD screen.

3. Fusion Splicing

Fuse fibers using an electric arc.Test for signal quality and strength.

4. Importance & Benefits

Ensures minimal signal loss and strong connections.Supports high-speed, long-distance data transmission.Replaces traditional copper wiring for better efficiency.

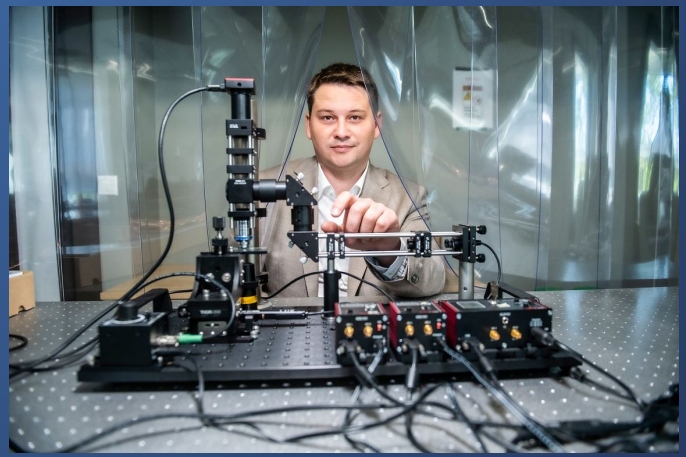
5. Evolution of Fiber Optics

Originated from early telegraph systems.Now essential in modern telecommunications.

# Future Plans

**Research & Development**: Focus on improving fiber optic communication systems, advancing high-speed data transmission, and minimizing signal loss.

**Education**: Provides hands-on learning experiences, helping students explore fiber optics' role in telecommunications and data transfer.



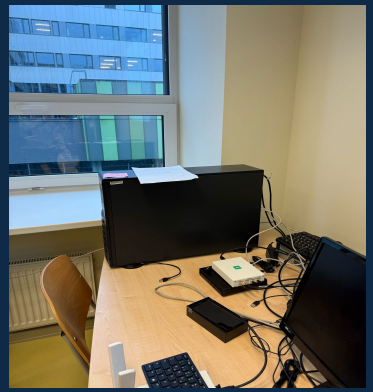
# Thanks to Toms Salgals

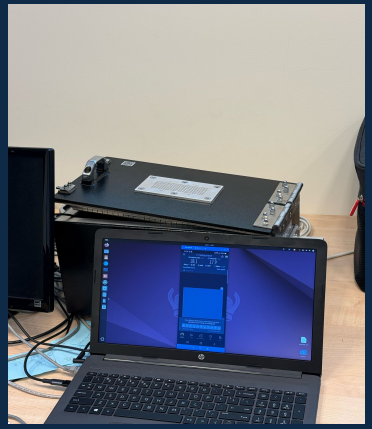
We sincerely appreciate his time and effort in introducing us to the fascinating world of **high-speed fiber optics**. Your insights and expertise have greatly expanded our understanding of this cutting-edge technology. Introducing us to new concepts we have never heard of before. And also introducing us to the fact that RTU has a world level researchers that have great results.

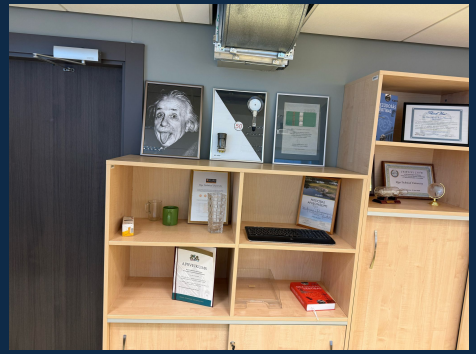
A special thanks for the **exciting lab excursion**—seeing real-world applications firsthand was an incredible experience!

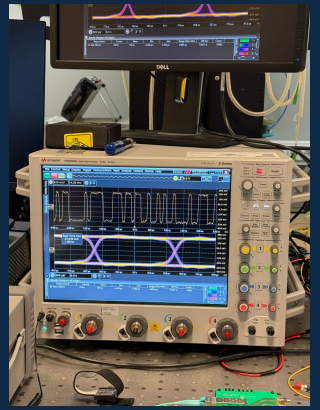
# 5 Specific Jargon that we learned

- Telecommunication -Communication over long distances using electronic systems.
- Fiber Optics - Data transmission using light through thin glass/plastic fibers.
- Electronics - Devices and systems using electrical circuits to process data.
- Smart-electronics system - Advanced electronics that use machine learning or sensors to perform tasks.
- Fiber optic splicing - Joining fiber optic cables to ensure smooth data flow. Or i other words connecting them.









# THANK YOU FOR YOUR ATTENTION