OMNI-DIRECTIONAL FREE SPACE OPTICAL (FSO)LASER COMMUNICATION

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Overview

• FSO is a telecommunication technology that uses light propagating through free space to transmit data between two points

• Fiber and copper network infrastructures simply cannot keep up with demand for broadband services

• FSO is a viable approach for addressing the increasing needs of the emerging broadband networking market

• Available FSO systems cost thousands of dollars.

Our goal – realize a cost effective prototype indoor FSO communication system

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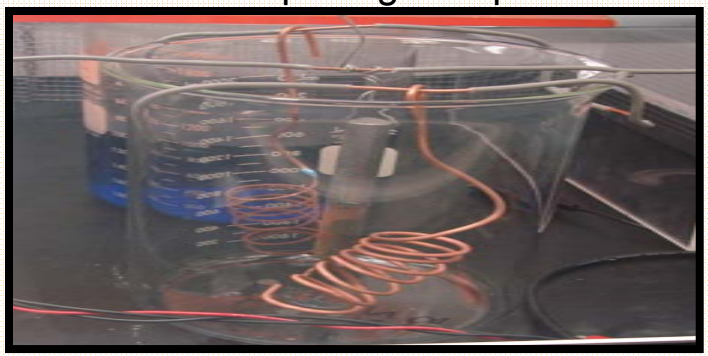
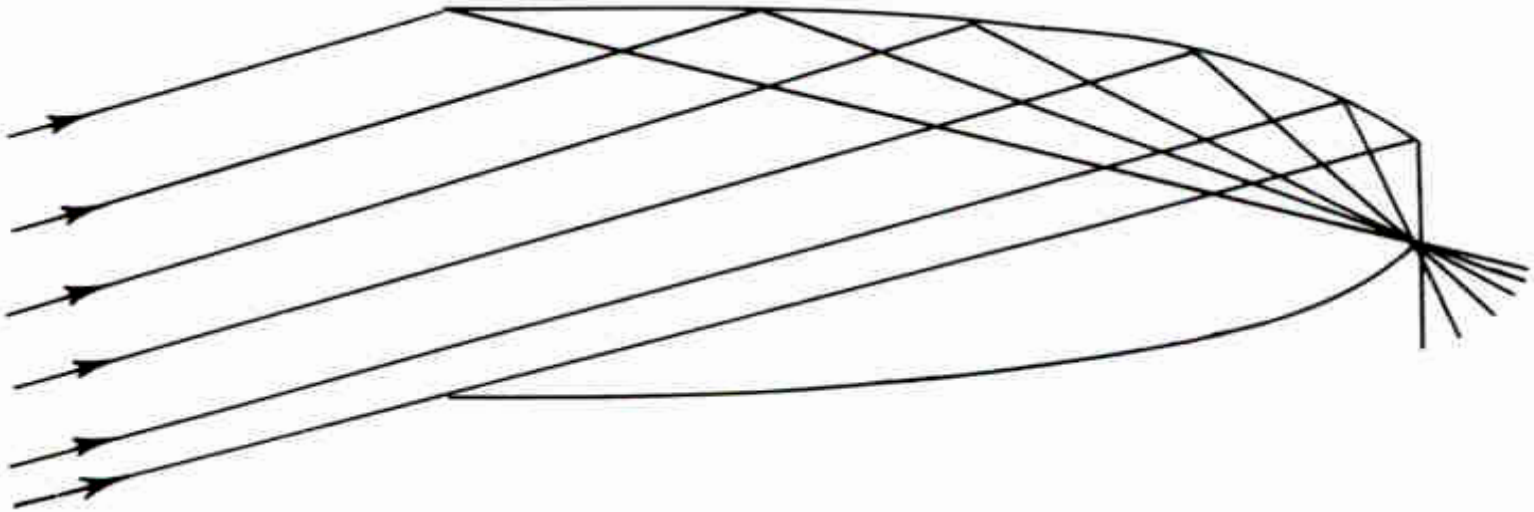
CPC design and manufacture

- Electroplating Setup



- Prototype CPC

- Rays entering at extreme angle



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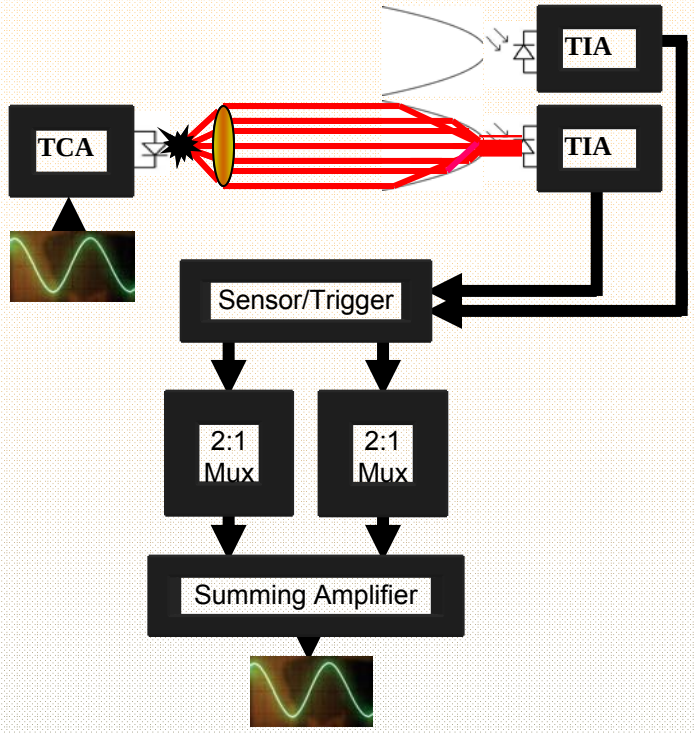
Setup for experiment

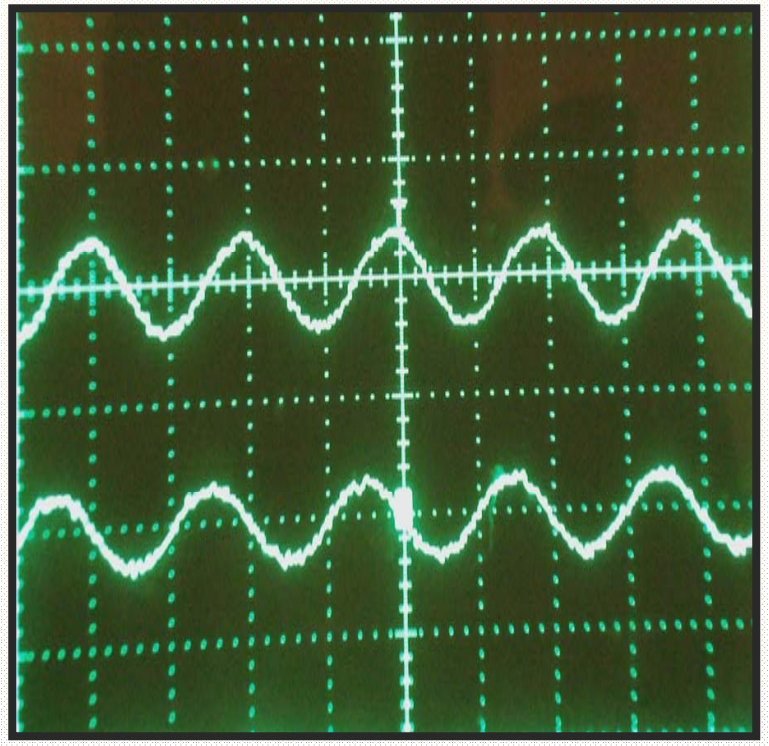
Dual-CPC Transceiver Setup

- Transconductance amplifier (TCA)
- Transimpedance amplifier (TIA)



Transmission at 5MHz

- Output – top / Input – bottom



Omni-directional Free Space Optical (FSO) Laser Communication

Pros

• Freedom from licensing and regulation translates into ease, speed and low cost of deployment

• Provides security unparalleled by RF or other wireless-based transmission technologies

• Large amounts of bandwidth

Cons

• Physical barriers: walls, buildings, trees, birds

• The unpredictable atmosphere: rain, snow, smog, fog, and wind.

However can be solved by designing dynamically adjusting laser power schemes in response to

weather conditions and employing multi-beam transceivers, e.g. Multi-CPC transceiver

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Future Work

- Multi-CPC receiver array