

Performance evaluation for free space optical communication link under different weather conditions

Note: points with (*) must be done, while others are optional according to time and student's activities)

ILOS: intended learning outcomes.

1-Theoretical and historical ILOS

- a- Brief history on free space optical communication systems and development.*
- b- Basics of free space optical communication: Ray theory, systems configurations, history of FSO channel modeling, historic and basic transmitter types, basic receiver design & Eye –skin safety for FSO networks. *
- c- Review on visibility calculations and theory for LOS-FSO links*
- d- Review on Scattering and Turbulence phenomena that affect FSO link*.
- e- Review specifications of various practical LOS-FSO links and choose suitable one to the mathematical model in point 2.*

2-Mathematical modeling & simulation ILOS

- a- Calculation for required Tx & RX powers based on Beers-Lambert law. *
- b- Estimating the atmospheric attenuation coefficient then the attenuation faces the link according to Kim model of attenuation.*
- c- Evaluating link budget according to Friis transmission formula.*
- d- Feeding the previous data and specifications (from point 1) to optisystem 7.0 (FSO system simulator) to evaluate the performance and judge the selected link specifications.*
- e- Repeating (a-d) for other models like Kruse and Al-Naboulsi.

3-Practical and design ILOS

- a- PC to PC laser transceiver.*
- b- Infrared security alarm system.*
- c- Optical door lock.
- d- Laser spy.
- e- Different design circuits for CD ROM motor
- f- Long range infrared remote control

4- Student's specifications

- a- Ability to read and search. (most important)***
- b- Very good practical experience.*
- c- Very good programming experience (Matlab-Mathcad-Maple)*
- d- Working in a group. ***

5-Advanced ILOS

- a- Using OptiFDTD-OptiBPM simulation tool for design and simulation of advanced passive and non-linear photonic components that helps in designing and manufacturing real life FSO all optical network components
(Integrated optics structures, Nonlinear materials, dispersive materials, Optical micro-ring filters and resonators).