

Modelling Relay Assisted Free Space Optical Communication Systems for Future Optical Communication Networks

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Project summary

Project motivation

FSO communication also known as optical wireless communication refers to the terrestrial line-of-sight optical transmission through the atmosphere. FSO is an enabling technology for an all-optical network. Unfortunately, FSO signals are susceptible to degradation arising from channel loss when subject to atmospheric conditions such as fog and turbulence. This susceptibility has prevented legacy FSO systems from reaching the often desired 2 to 3 km backhaul link. By intelligently exploiting the fact that fading variance is distance-dependent in an FSO channel, relay-assisted transmission methods allow taking advantage of the resulting shorter hops to yield significant performance improvements and extending the communication link distance. Being a powerful fading mitigation method, relay-assisted FSO communications have drawn much attention.

Project aims and methods

The project will **provide a broad research framework** on the relay-assisted FSO communication which is envisioned to be a powerful countermeasure to atmospheric turbulence fading effects with its inherent diversity gains. Project will primarily focus on the **All-Optical Amplify and Forward relayed FSO systems** in the **serial configuration**. The project will involve the following key steps.

Extensive survey of state-of-the art networks

Developing novel scintillation mitigating method

Undertaking systematic computer based mathematical modelling (utilising MATLAB)

The results obtained and design rules devised from this project will serve as benchmarks for enabling practical implementation of all-optical FSO relay systems and setting a firm foundation for the next generation communication networks.

Takeaways as an Intern

- Contribute to the development of the next generation FSO networks.
- Improve mathematical modelling and technical writing skills – sought after graduate skills.
- Develop effective research methods – key skill for career in academic but also a highly transferable skill in industry.
- Opportunity to co-author a research paper based on this project.

Specific skills and experience required for this project

Please also refer to the advert on our jobs pages for the person specification for these internships

- ✓ Good knowledge of Digital Communication Systems
- ✓ Good understanding of probability and statistics
- ✓ Experience of programming using MATLAB
- ✓ Good communication skills, particularly in technical writing

Project location

City Campus

Home working may be available

Project delivery

This project can be conducted over 6 weeks full-time or an equivalent duration part-time (with minimum 3 days per week in case of part-time).