

Bachelor's Thesis

Machine Learning for Fiber-Optical Communications

Intensity-Modulation and Direct-Detection (IMDD) transceivers can be built with low hardware complexity, low power consumption and small form factors, which makes them a promising approach for fiber-optical transmission over short distances. However, by their reduced hardware complexity, nonlinear distortions are introduced, which need to be compensated.

The student's task is to understand and implement aspects of [1], [2] in order to communicate via an IMDD connection. In particular, the signal processing of received signals using neural networks will be compared to traditional signal processing approaches like [3].

- [1] Karanov, Boris, et al. "End-to-end deep learning of optical fiber communications." *Journal of Lightwave Technology* 36.20 (2018): 4843-4855.
- [2] Karanov, Boris, et al. "End-to-end optimized transmission over dispersive intensity-modulated channels using bidirectional recurrent neural networks." *Optics express* 27.14 (2019): 19650-19663.
- [3] Plabst, Daniel, et al. "Wiener Filter for Short-Reach Fiber-Optic Links." *arXiv preprint arXiv:2004.12148* (2020).

Advisors

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