

Mr Mohammad Hossein Zoualfaghari MEng, PhD

Final Year Doctoral Researcher
Post Graduate Assistant Lecturer

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About

Mohammad Hossein Zoualfaghari (M'09) received MEng degree (Class I) in Electrical, Electronic and Communications Engineering from University of Birmingham, UK, in 2009, where he is currently working toward the Ph.D. degree in Electronic and Communications Engineering at the Electronic, Electrical and Computer Department.

Mohammad Hossein Zoualfaghari was awarded the full scholarship for his Ph.D. research from the University of Birmingham.

Qualifications

- PhD candidate in Optical Communications
- MEng in Electronic, Electrical and Communications Engineering in 2009

Postgraduate supervision

Lectured postgraduates and undergraduates and delivered technical labs and tutorials on Optical Communications, Optics Lab, MATLAB, VHDL, Computer Hardware and Digital Design, Digital Systems and Embedded Computing, C Programming and Algorithm Problem Solving and Electromagnetic.

Research

"Optical Code Division Multiple Access (OCDMA), Co-channel Interference Reduction, Prime Code Families, Multi User Interference (MUI) Reduction"

Code-division multiple-access (CDMA) techniques have been investigated for applications in optical network since mid-80s. CDMA communication system allows multiple users to access the network simultaneously using unique codes.

In this research, the challenge is to produce some novel families of OCDMA orthogonal codes which can be implemented in the optical communications systems, along with performance analysis of these codes and co-channel interference reduction. Some of outcomes are listed below:

- A novel family of ideal in-phase cross-correlation codes hereby referred to as Uniform Cross-Correlation Modified Prime Code 'UC-MPC' is introduced for OCDMA systems and its correlation properties are analyzed and compared with the other available prime code signatures. The results show that UC-MPC has better correlation properties as compared to the other prime code families. In short, the proposed code has (i) excellent correlation properties, (ii) reduces the co-channel interference, (iii) improves the system security and (iv) very low receiver BER.
- Employing different networks and modulations in the laboratory, real file transmission over fiber optic has been developed, which accommodate multi access scheme up to whole capacity of network
- Employing optical professional packages such as "Optisystem" from "Opiwave" package, different systems and modulations are simulated and compared with the analytical results
- A new technique is proposed to cancel MUI in optical communication systems by 100%.

Publications

1. Zoualfaghari, M.H.; Ghafouri-Shiraz, H.; , "Uniform Cross-Correlation Modified Prime Code for Applications in Synchronous Optical CDMA Communication Systems," *Lightwave Technology, Journal of* , vol.30, no.18, pp.2955-2963, Sept.15, 2012
doi: 10.1109/JLT.2012.2207091
2. Zoualfaghari, M. H. and Ghafouri-Shiraz, H. (2012), Analysis of a novel prime code in IP transmission and routing over FSK-OCDMA in an optical network unit. *Microw. Opt. Technol. Lett.*, 54: 2852–2856. doi: 10.1002/mop.27213