

## DESIGNING OPTICAL SENSORS FOR THE INTERNET OF THINGS ERA

Roxana-Mariana Beiu

Food Engineering, Tourism, and Environmental Protection Department

“Aurel Vlaicu” University of Arad, Romania

[roxana.beiu@uav.ro](mailto:roxana.beiu@uav.ro)

**Abstract** Sensors and sensor technologies are crucial for our day-to-day lives. Among them, optical sensors are also following the increasing trend of the Internet of Things (IoT), due to their special capabilities, e.g., immunity to electromagnetic interference, bio-chemical passivity, etc. This talk will start by presenting optical/photonic sensors, and continue with explaining how IoT is embracing every corner of our lives. The presentation will continue by focusing on the design of optical sensors based on several CAD tools. These CAD suites solve electromagnetics (EM) equations, e.g., by the finite-difference time-domain method. Out of a plethora of CAD tools, this presentation will detail only a handful. MEEP and MBP are two free and open source CAD tools developed at MIT, which are used for a broad range of applications. They can compute the band structures, dispersion relations, and EM modes of periodic dielectric structures. Other programs which will be discussed are EMExplorer, Optiwave Photonic Software, and COMSOL Multiphysics®. These tools will be presented alongside a few sensors, arguing why optical sensors should be designed as single (stand-alone) devices, or when they should be designed as components of a system.



**Roxana-Mariana Beiu** is a Senior Lecturer with “Aurel Vlaicu” University of Arad, and a researcher with the 3OM Optomechatronics Group. She got her MSc in Fine Mechanics from the Politechnica University of Bucharest (1994). She worked as a research engineer on fine mechanics and optics with the Institute of Advanced Technologies, Bucharest (1995-2001), designing various optical devices. In 2001, she transferred as a PhD candidate with the School of Mechanical and Materials Engineering, Washington State University, USA (2002-2005), where she did research on neuroscience as a Research Assistant, developing new non-invasive brain measurement techniques, while also teaching on Mechanical and Materials Science Engineering. Roxana-Mariana Beiu defended her PhD thesis, entitled “On Theoretical and Experimental Developments of a Novel Class of Sensors for Assessing Mechanical Deformations,” with *magna cum laude* to her alma mater (UPB) in 2007. Her main research interests are on optical systems, sensors, photonic crystals, and neuroscience.