Optical Microelectromechanical Systems for communications

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Microelectromechanical Systems (MEMS) are micrometre-sized sensors and actuators that are used in many devices in our everyday life. Using the same fabrication technology, one can fabricate on-chip optical circuits, which drastically improve the performance of telecommunication systems. However, both MEMS and silicon waveguides have been independently developed. In this project, we aim to bring together both fields to try out new ideas to enable new applications and to improve existing ones.

In this Master Thesis you will design and develop a MEMS tunable photonic device (in particular, a tunable polarization rotator for dispersion compensation in fiber optic communications). The project will start by gathering information on the state-of-the-art of such devices, use theoretical knowledge and simulations to design a prototype, fabrication of the designed devices, and characterization, including building a simple measurement setup.
You will be encouraged to try your own ideas with input from your supervisor.

Primary goals:
- Learn about the application requirements.
- Validation of design via optical theory and simulations.
- Follow your supervisor in cleanroom fabrication of the devices.
- Build the measurement setup and test it with existing devices.
- Optical and mechanical characterization.

Secondary goals:
- Optimize/multiplex devices in another iteration

In this project, you will need to handle optical theory and simulations, cleanroom processing, and optical characterization of devices.
Experience with optics and photonics and measurement tools and programming is appreciated. However, motivation, creativity, and independent working are the most valued skills.
Please note that this degree project has no economic compensation.
For more information about the project please contact: Carlos Errando-Herranz, carloseh@kth.se, or Assistant Professor Kristinn B. Gylfason, kristinn.gylfason@ee.kth.se

References:
C. Errando-Herranz, F. Niklaus, G. Stemme, and K. B. Gylfason, "A low-power MEMS tunable photonic ring resonator for reconfigurable optical networks," in 28th IEEE International Conference on Micro Electro Mechanical Systems (MEMS), 2015, Jan. 2015, pp. 53-56. [Online]. Available: http://dx.doi.org/10.1109/memsys.2015.7050884

C. Errando-Herranz, F. Niklaus, G. Stemme, and K. B. Gylfason, "A MEMS tunable photonic ring resonator with small footprint and large free spectral range," in 18th International Conference on Solid-State Sensors, Actuators and Microsystems (Transducers 2015), Jun. 2015.