Abstract: The ability to fabricate chip-based optical structures that manipulate the propagation and confinement of light at the wavelength-scale has opened up exciting new technologies for quantum optics and metrology. In the first part of this talk, I will describe our efforts to generate and manipulate the properties of single photons using nanophotonic devices. High-confinement waveguides, gratings, and microcavities are used to control the radiative properties of a single epitaxially-grown quantum dot in order to create high brightness single photon sources, which are post-processed through nonlinear wave mixing and amplitude modulation to control the wavelength and shape of the single photon wavepackets. Quantum optical sources based on nonlinear wave mixing in silicon devices are also developed for room-temperature, telecommunications-band operation.

In the second part of the talk, I will describe new force and displacement sensors we are developing based on cavity optomechanics. Here, we take advantage of the long photon lifetimes and large field gradients produced in nanophotonic resonators to develop a near-field sensor for atomic force microscopy, demonstrating sub-femtometer/sqrt(Hz) sensitivity with GHz bandwidth and high dynamic range. I will describe progress towards implementation of sensors that are integrated with electrostatic actuators for controlling cantilever motion and on-chip waveguides for optical readout.

Friday, March 30, 2012
2:00 p.m.
Green Hall, Room 0120 Host: Dr. Jung-Tsung Shen

Short Bio: Kartik Srinivasan has been a Project Leader in the Nanofabrication Research Group at the NIST Center for Nanoscale Science and Technology since September 2007. He received B.S., M.S., and Ph.D. degrees in Applied Physics from the California Institute of Technology, where his graduate research was supported by a Fannie and John Hertz Foundation Fellowship. After completing his Ph.D., he continued at Caltech as a Postdoctoral Fellow at the Center for the Physics of Information. His work in nanophotonics has been recognized with the Sigma Xi Young Scientist Award for 2011 and a Presidential Early Career Award in Science and Engineering (PECASE).