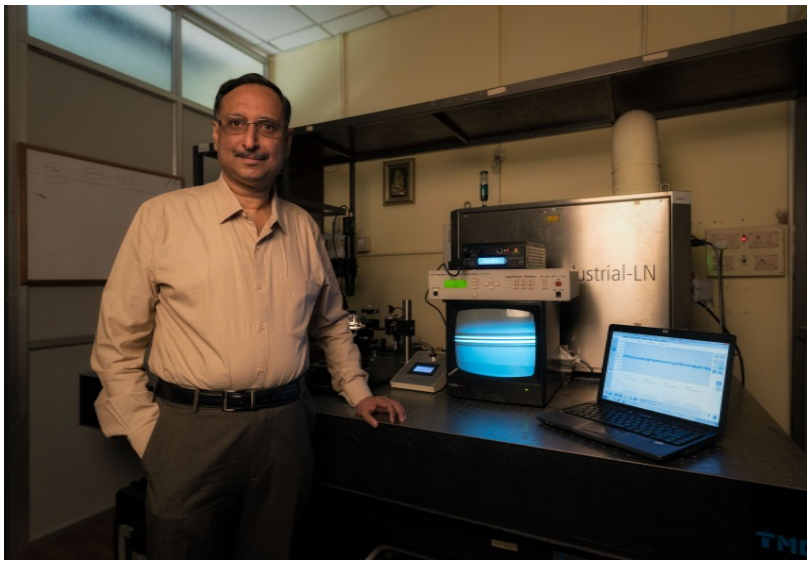
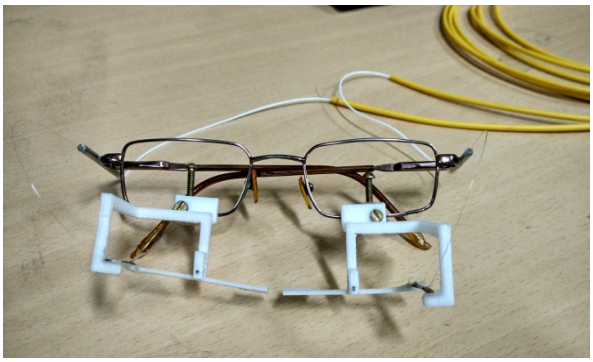
SUNDARRAJAN ASOKAN (Professor, Department of Instrumentation and Applied Physics)

FBG DEVICES: SOLVING REAL-WORLD PROBLEMS



SundarrajanAsokan's team works on a sensor technology known as Fiber Bragg Grating (FBG) which has found a wide range of applications in optical sensing. An FBG consists of an optical fibre core surrounded by a glass cladding. This core is fabricated such that its refractive index varies in a sinusoidal pattern across its length, with a periodicity called the *pitch*. For a particular pitch, the FBG reflects a specific wavelength of light, while transmitting all the other wavelengths. When the pitch changes—say, in response to an external stimulus like a physical strain or when there is a change in the environment due to a biological or chemical reaction—light of a different wavelength is reflected, which in turn can be accurately measured and calibrated to detect and quantify the external stimulus. This property of the FBG is exploited to make optical sensors which are finding applications in many different fields.

Asokan and his collaborators have developed several innovations based on FBG, aimed at providing solutions to real-world problems such as structural health monitoring of aircrafts, measuring blood pressure and heart rate variability, detecting important bio-markersetc. Recently, in collaboration with the Department of Electrical Communication Engineering, they have developed an FBG-based device that can help paralyzed patients communicate even if they are unable to speak.* This wearable



This wearable device (in white) senses air pressure from patients' exhalation and instantaneously converts it into an audible signal to aid paramedics

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Another focus of Asokan's research is in the area of chalcogenide glasses, primarily made up sulphides, tellurides and selenides. These glasses are transparent to infrared radiation and are used in memory devices and optical amplification applications.

Though Asokan works on areas of physics that have direct applications, he believes in combining applied and basic research. "In fact, while solving a specific problem, a lot of theoretical challenges need to be addressed as well," he explains.

* Srivani Padma, SharathUmesh, Shweta Pant, TalabattulaSrinivas and SundarrajanAsokan. 2016. Fiber Bragg grating sensor-based communication assistance device. *J. Biomed. Opt.* 21(8): 086012