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**Project Title:** Investigation of a macrobending singlemode fiber based refractometer  

**Project Area:** This project lies in the area of optical fiber sensing. The main objective of the proposed project is to explore feasibility of fibre-optic technologies for the development of a macrobending fiber based refractive index sensing application.  

**Preferred Background of students:** Good understanding of fibre optics, with a preference for a student with interests in the uses of experimental operation on tunable laser & optical spectrum analyzer, and mathematical design and simulation.  

**Project Synopsis:** To date, a series of optical refractometers, such as Abbe and Rayleigh refractometers have been developed and utilized for measuring the refractive indices and concentrations of liquids in biotechnology applications, such as the sugar content, blood protein concentration and salinity of urine in the area of experimental medicine. Optical refractometers are also widely employed in chemical applications for measuring fluid concentrations for commercial liquids such as petrochemicals, antifreeze, cutting fluid and industrial fluids.  

In this project, a thorough investigation of the proposed bare fiber macrobending refractometer will be undertaken, which includes: 1) theoretical modeling for the macrobending fiber refractometer; 2) an approach to improving the sensitivity of the refractometer, using a reduced cladding radius; and 3) a possible measurement system implementation based on ratiometric power measurement. The proposed fiber refractometer offers a much simpler configuration by comparison with existing waveguide/fiber-based optical refractometer sensors with the advantage of ease of fabrication.  

This project will involve modeling, design and experimental investigation of a macrobending fiber based refractometer to be incorporated into a ratiometric power measurement system.  

The project will be carried out in conjunction with the Photonics research group undertaking the research in the area of optical fibre sensing. The Group has a wide range of optical test equipments.  

For further information please contact the supervisor.