Project Title	Towards a Raman-Activated Cell Sorting system for cancer screening
Supervisor	Dr Christopher Rowlands
Theme(s)	Biomedical Sensing Diagnostics and Imaging
Project Type	Lab based
Project Description	Nobody needs to be told how much of a threat cancer poses to the population; even worse, certain types of cancer (such as pancreatic cancer, or certain types of ovarian cancer) are so difficult to detect that once they are observable, the prognosis is very poor. A screening method that can detect the limited number of cancer cells circulating in the blood would be of interest in these cases. Fluorescence Activated Cell Sorting, or FACS, is a routinely-used method for sorting cells into different categories based on fluorescence. Unfortunately, cancer cells aren't fluorescent, and finding a good label is arduous and often ineffective. The alternative is to use some form of intrinsic contrast, such as the Raman effect. The Raman effect allows molecules to be identified by the characteristic vibrational frequencies of the bonds in the molecule itself, thus it is very specific and requires no labelling or staining. The goal of this project is to take the first steps towards a combined Raman-Activated Cell Sorting (RACS) and single-cell sequencing instrument that can identify rare circulating tumour cells early. The student on this project will first be responsible for designing, building and programming a Raman microspectrometer, and then using it to analyse different cell populations (some made up of known cancer cells, some not) to see whether the system can distinguish an individual cancer cell from the thousands of other cells also found in the blood. The ideal student will have a background in programming, some CAD skills, and experience building instrumentation, but these are by no means a requirement; the student will be taught anything necessary that they do not already know.