

Project Title	High-precision LEGO photonics
Supervisor	Dr Christopher Rowlands
Theme(s)	Biomedical Sensing Diagnostics and Imaging Medical Devices
Project Type	Lab based
Project Description	<p>Optical instruments require the most precise modern precision machining techniques - even a basic biomedical microscope contains components aligned to sub-micron accuracy. This precision alignment comes at a cost, and commercial microscopes can easily cost hundreds of thousands of pounds. To try to reduce this cost, we can turn to one of the planet's foremost experts in low-cost high-precision engineering - the LEGO Group. LEGO is a miracle of modern engineering - each brick is moulded to a tolerance of 20 microns, smaller than the diameter of a white blood cell. By designing optical systems that can accommodate slightly degraded tolerances we can dramatically broaden the ability of researchers worldwide to construct custom optical systems without the need for expensive machined parts and precision alignment methods.</p> <p>The student on this project will be constructing high-precision optical systems for biological applications based on low-cost LEGO parts. These might include beam expanders, automated stages, power controllers, adjustable mirrors, and even full microscopes (complete with automated stages, cameras, autofocus and a variety of illumination sources).</p> <p>The ideal student for this project will be innovative and creative, quick to learn and willing to work hard. Some programming skill may be helpful, but a problem-solving mindset and curiosity are more important. All necessary practical skills (especially traditional optical alignment) can be taught.</p>