

Project Title	A New Head Mounted Display Concept: Virtual Reality in a Pair of Sunglasses
Supervisor	Dr Christopher Rowlands
Theme(s)	Biomedical Sensing Diagnostics and Imaging Medical Devices
Project Type	Lab based
Project Description	<p>In order to experience immersive virtual reality, a display must have a large field of view and a high resolution, otherwise the user will feel like they are 'looking at the world through a toilet roll'.</p> <p>Commercially available head-mounted displays like the Oculus Rift, HTC Vive and Playstation VR solve this problem by placing the screen in front of the eyes, but this is clearly an inelegant solution as it involves basically strapping a brick to your face. More recent designs such as the Microsoft HoloLens and Magic Leap One use holographic gratings to project light into the eye, but these have a smaller field of view, leading to the 'toilet roll' problem described above.</p> <p>The Rowlands lab is currently developing a new type of holographic display, which can achieve a large field of view along with high resolution, by making the hologram itself active, rather than passive. Instead of projecting the whole image at once, the display scans a beam across the eye at high speeds, producing the illusion of high resolution but without the compromises needed for the HoloLens or Magic Leap One.</p> <p>The student on this project will conduct theoretical and experimental studies into the feasibility of this design. They will be using finite-difference time-domain modelling and fabricating electro-optically active waveguides in an attempt to demonstrate a proof of principle, with the goal of producing a device that can project simple patterns into a stationary eye.</p> <p>The ideal student will have a good background in computer modelling, an interest in microfabrication and photolithography, and possibly some electrical engineering expertise. Any necessary skills can be taught however.</p>