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ModMicro – A low-cost, modular
microscope system

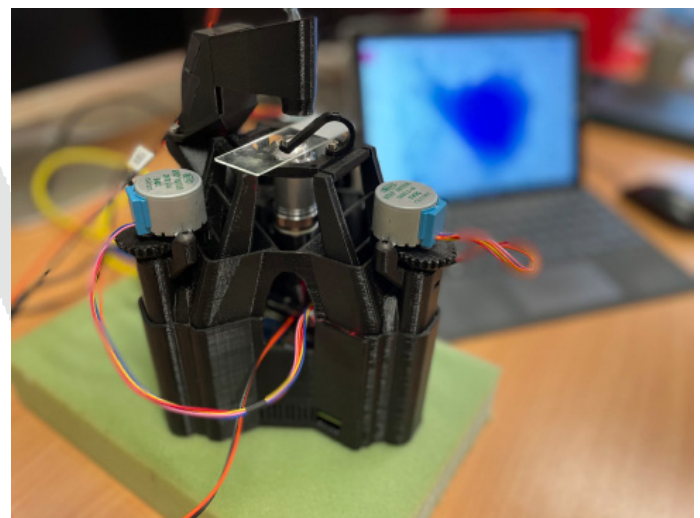
ModMicro – A low-cost, modular microscope system

What if microscope systems capable of advanced, high-resolution approaches were accessible the world over? ModMicro is a project investigating the possibility of achieving exactly this by leveraging additive manufacturing and off-the-shelf equipment to make microscopes accessible and available to all.

Microscopy has been one of the greatest tools of the modern times, imaging the world that is (almost) invisible to the naked eye. With more and more advances in this domain, there are constant advancements being made in resolution, depth of field of view, and imaging through turbid medium. However, there has also been a similar trend in the rise of the costs involved as well. State-of-the-art microscopes such as light field microscopes cost well over £100,000, with structured illumination microscopy (SIM) systems costing well over £400,000. While these systems are incredibly specialised and are supported by a team of professional engineers, the price tag puts the systems out of reach for most laboratories.

Motivated by this, our team of researchers have adopted and modified a version of the OpenFlexure microscope. This microscope is made by 3D printing the various parts and assembling them together to have a high-resolution, bright-field microscope. With a complete cost of under £200, these systems achieve scientific quality, visible light imaging.

The initial dataset collected using this microscope is available on University of Glasgow's repository, Enlighten, titled OPEN-BIOset. The data was used in machine learning applications and the findings shared at SPIE Photonex and Vacuum Technologies 2021. Our team, supported with funds from the Glasgow Knowledge Exchange fund, EPSRC Impact Acceleration Account fund and the IEEE Photonics Society is improving this inexpensive microscope for epifluorescence and confocal microscopy to challenge the status quo of microscopy techniques.



Key facts	Low cost Microscopy accessible and available to all.
Total cost	< £200
Assembly time	< 1 day
Imaging components	Raspberry Pi Camera x40 dry or x100 oil immersion objective White light illumination

For more info please contact:

Christopher.Payne-Dwyer@glasgow.ac.uk
Business Development Manager

Akhil.Kallepalli@glasgow.ac.uk
Project Research Lead

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