Contribution ID: **5** Type: **not specified**

Low-cost multiperspective imaging of zebrafish

Wednesday 25 June 2025 09:57 (13 minutes)

Automated multi-perspective imaging of zebrafish larvae allows researchers to accelerate analysis without the arduous task of repositioning specimens under a microscope. Systems, such as the VAST BioImager facilitate this, but they are expensive and lack adaptability for specific laboratory needs. Additionally, the glass capillary size used (600-700 µm) restricts the size of the larvae, which can be imaged. Here, we introduce a low-cost, open-source solution for automated multi-perspective imaging of zebrafish larvae.

Our 360° scanner captures images of zebrafish in a quartz glass capillary with an inner diameter of 3 mm while moving the camera around the stationary capillary. The capillary is housed in an imaging chamber filled with glycerin and sealed with a glass plate perpendicular to the camera. This setup minimizes image distortion. Moreover, because the refractive index of glycerin (n=1.475) and quartz glass (n=1.46) are nearly identical, the glass capillary becomes virtually invisible, reducing imaging interference. The imaging chamber is connected to the system via two pneumatic connectors, allowing easy interchangeability, for instance, to accommodate capillaries of different sizes to image zebrafish larvae at various developmental stages.

We use a Raspberry Pi HQ camera with a resolution of 4056 x 3040 pixels, equipped with a telecentric lens, which can be exchanged for lenses of various magnifications. The camera is mounted on a motorized rail, allowing it to move to the desired focal plane and enabling extended-depth-of-field imaging for sharp, high-depth images.

Our system predominantly uses 3D-printed components and readily available standard parts to maintain affordability. A graphical user interface enhances usability, offering options to image the zebrafish larvae at preset angle intervals for a full rotation or from a specific angle. Our next step is to automate the positioning of the specimens within the imaging chamber.

Presenter: KLUG, Nathalie (Institute for Automation and Applied Informatics - Biomedical Engineering & Robotics)

Session Classification: Talks 1-5