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Recent advances in automatic assessment of the cardiac function in zebrafish larvae**Ramesh R Galigekere**

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Studying model organisms with cardiovascular system bearing similarities to that of the human, has been a part of research in medicine and biology. Accordingly, zebrafish is considered very useful for study in developmental biology, toxicology and pharmacological testing – due to the similarity in the response to various drugs, easiness of breeding, transparency (up to a week after hatching), high throughput, lesser cost involved, in vivo testing, and reduced bioethical concerns. Heart-rate (HR), its variability and arrhythmia are three non-invasive measures of cardiovascular health. Although the heart-beats, of a larva kept under a microscope, may be counted manually, the process is tedious. Therefore, there is a significant interest in automating the process, by using a video-recorder fixed to a microscope. Although many methods to address the indicated purpose have been published, they have their own respective limitations.

This talk summarizes the findings of recent research performed

by our group – including Mr. Syam Krishna (PhD student at the Dept. of BME, MIT, Manipal, currently supported by a CSIR Senior Research Fellowship, Govt. of India), Dept. of Biomedical Engg., MIT, Manipal, and Dr. Kiranam Chatti, Dept. of Biology, Principal Research Scientist, Dr. Reddy's Institute of Life Sciences, Hyderabad – on the development of a completely automatic and robust HR-estimation algorithm to on non-transgenic larvae. The method works automatically to estimate an adaptive ROI (irrespective of location and size of the larva, camera zoom, and image resolution) based on the concept of “quantity of motion”, followed by independent component analysis. It works even in the presence of minor motion of the larvae/platform, including drift. The method has worked on all the videos we have acquired so far. The ability of the method to detect certain type of arrhythmia is also demonstrated.

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