Everyone Can Be a Fish-Gazer! A DIY 3D Fish-Monitoring System

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Ethological research is very important for human. It has great contribution to the scientific community. But the development is slow as there are not enough people participating in the study. It is believed that the high threshold of the equipment is the major reason. So we propose to create an accessible, handy and inexpensive observation system which has similar functions to the existing equipment to tackle the problem. We used a fish tank, three smartphones and some stands to set up the observation device. A breakthrough of our design is to make use of three recording devices instead of the conventional two as it can eliminate data error. Free computer software was also used to generate a temporal and spatial 3D fish-monitoring system. The research procedure began with recording videos of adult zebrafish. Data were then input into the software to plot their motion data, and with those data we can compute the fish's stationary time in each part of the tank, distance and speed of motion in X-axis, Y-axis and Z-axis, total distance of motion in 3D space as well as moving path. Data were then put into the software to reconstruct individual endpoints of behaviours to 3D application, which reflects data of the swimming path. Furthermore, we did a comparison between our system and the existing system. The result showed that our system functions similarly to it. In addition, our system can track multiple fishes. It suggests it can even outperform the system in the market. To conclude, our system has broken the limitation of Ethology since it is accessible, handy, inexpensive, and can be set up almost everywhere. We hope that when more members can participate in fish observation, more phenomena can be found, allowing greater development in the field.