AquaScan
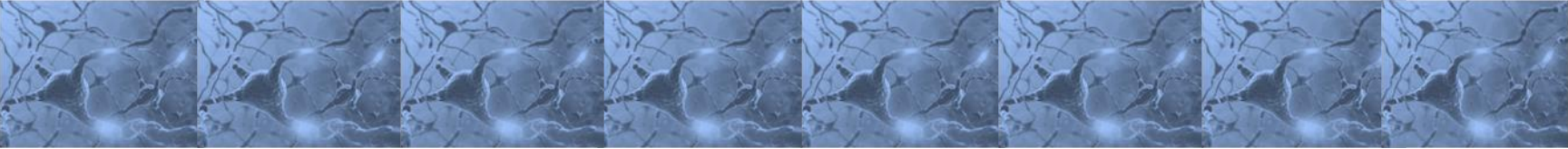## Zebrafish Automated Systems
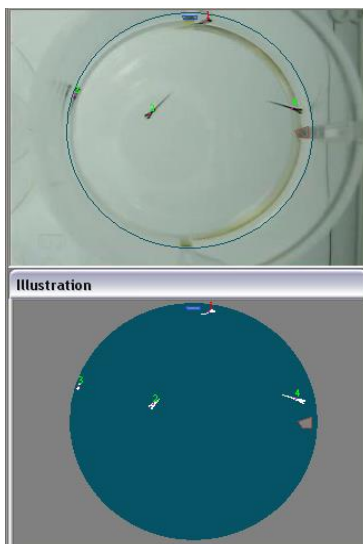
Behavior Recognition Technology

Clever Sys offers a highly versatile and customizable range of software options for the analysis of Zebrafish (*Danio rerio)* behavior in both adults and larvae.

AquaScan provides single/Multiple organisms tracking along with TTL control for stimulus delivery. Behavior can be analyzed for single organism, multiple fish, or for groups, like fish activities, animal traces, shoaling statistics, group behavior statistics, zone-revelant behaviors, etc .
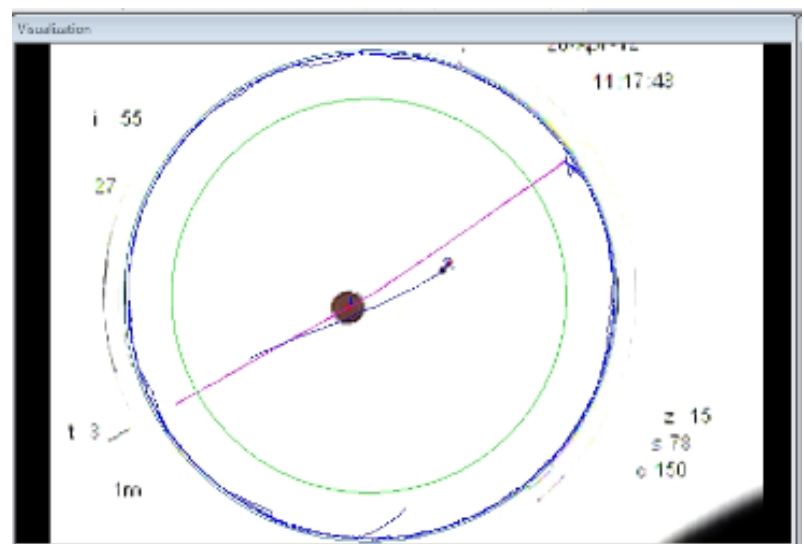
It can be used for traditional and specialized paradigms such as: *Open field, CPP, T-maze, Y-Maze, Fear Conditioning, Fear Response (predatory), Seizure, Locomotion, Photoaxis tests, Optokinetic tests, Shoaling and Social Behavior Test.*

AquaScan Function Features:

- Video Acquisition, Fish Tracking and Behavior Recognition.
- Experiment starting/stopping time control
- Light/Shock Stimulus Control
- Contextual Stimuli Control
- Real-time and offline data acquisition
- Single/multiple fish, multiple group acquisition simultaneously.
- Support multiple channel acquisitions
- Data analysis with different protocols.
- Original data, behavior data export and visualization (Excel or Open Office)
- Extensive experiment database management
- Batch analysis
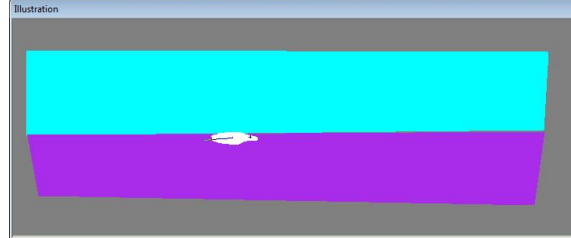- White, IR, or Red light capability

Multiple Larvae
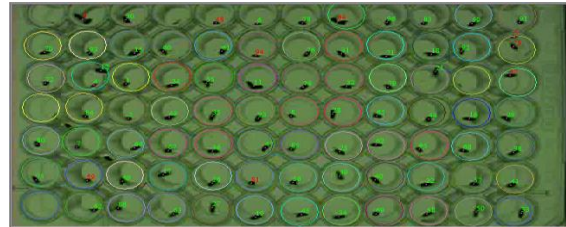

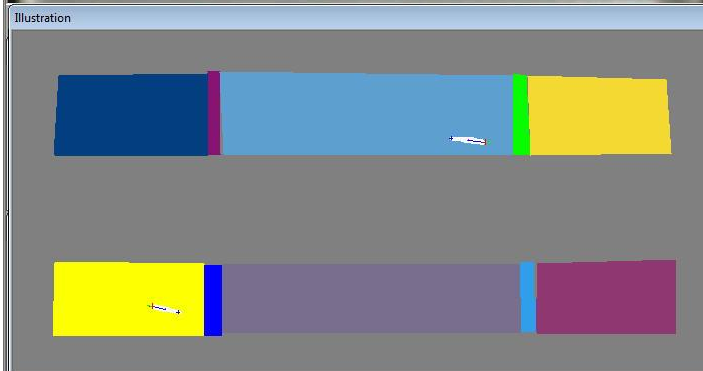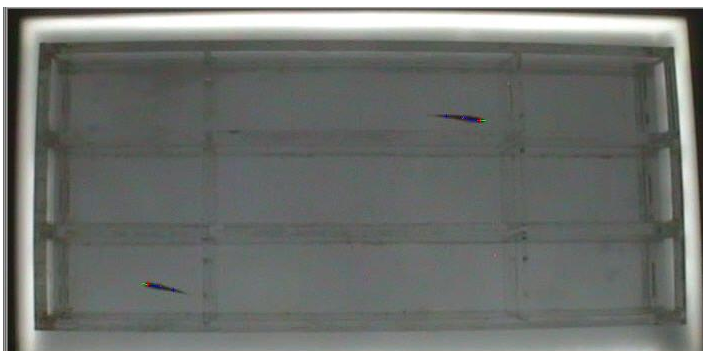**Zebrafish Larvae Optokinetic Test**

AquaScan

AquaScan Behaviors:

- (x,y) coordinats and trace for each fish
- Times, duration, moving distance and average speed for each fish in each zone
- Immobile, low activity, normal activity and intensive activity
- Sharp turning
- Sniffing specific zones, like cage bottom
- Shoaling: pair-wise fish inter-distance
- Social contact, following, chasing, etc.
- Sociability: bouts of several fish swimming closely in a similar direction.
- Drop test: statistics of distance and speed for all fish
- Statistics of group behaviors: number of active animals, average moving distance, etc.
- cardiovascular data recording, analysis and export
- Up to 92 arenas for each camera, multiple camera multiplexing

Zebrafish Open Field

96 well plate observation
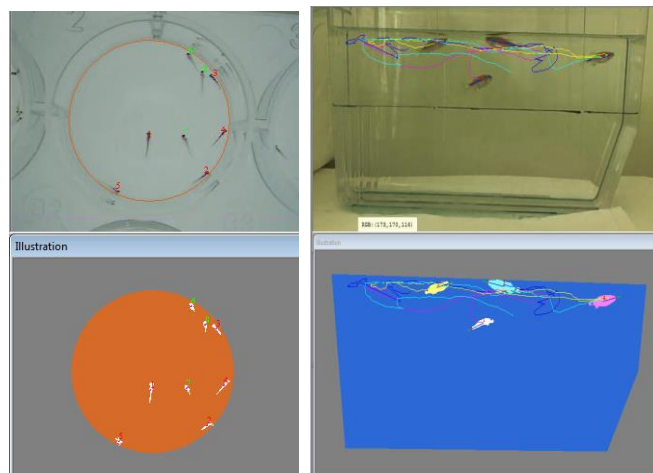

Zebrafish CPP

Shoaling

AquaScan

CSI-CPP-ZF

The CSI-CPP-ZF Apparatus has been specially designed for Zebrafish tests of conditioned place preference or self administration studies.

The device has 3 lanes with removable doors some of which have holes designed to close off or allow free passage of animals in between sections of the chamber.

The CPP chamber is made of clear acrylic to optimize video observation and to allow ambient backlighting for superior tracking.

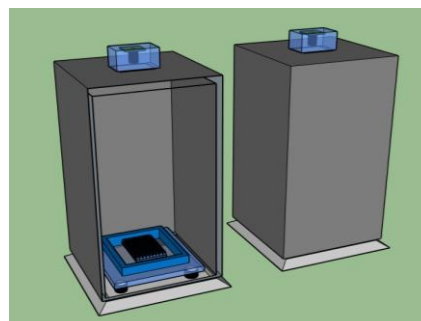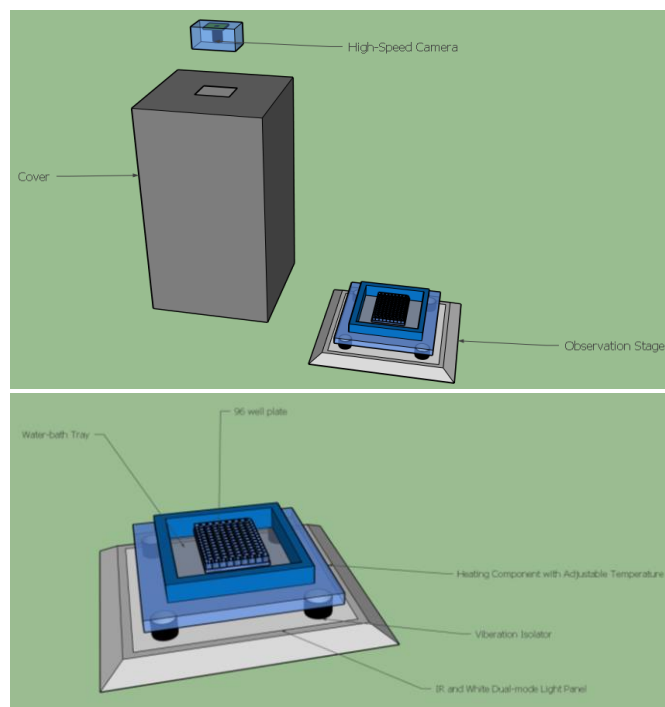Group Larvae   Multiple Fish Trace

ZebraEnv

Our ZebraEnv is a newly designed Zebrafish Larvae analysis chamber system that includes state-of-the-art features for providing a finely controlled environment for larvae behavior analysis.

It contains a high-speed digital camera placed at the top viewing downward at a stage that is back-lit by a dimmable LED light panel whose intensity is capable of being adjusted by the software. The stage comprises a water bath with the ability to insert well-plates of standard size. Up to 96-count well plates can be accommodated.

The salient feature of the stage is a unique vibration-free temperature control system. It uses a vibration free heating element instead of commonly used water-pump based water flow bath that can cause vibration effects on the wells. Our design does not have a water flow that cause vibrations in the wells. This is very critical for zebrafish larvae.
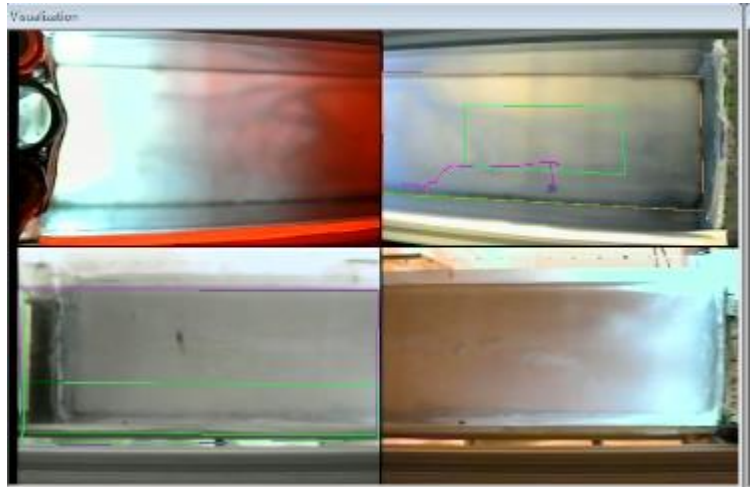
The camera is placed strategically such that it produces distortion free imaging of the outermost wells in a dense well plate

StereoScan

Unique Capabilities

- **Comprehensive Top** *and* **Side view analysis!**

- **Detailed information on Zebrafish behavior**

- **Events detected include: zone visits, crossovers, speed, motion, dist to points, dist to zones, orient to points, circling, motion, in-place motion, shape, stretch attend, head dip, turn, disappear, % body in zone, rear up, come down, hang, walk, jump, groom, eat, drink, sleep, etc.**

- **Continuous recording available for long term analysis**

- **High-Throughput Option for up to 2 cages simultaneously.**

Zebrafish in an Open Field: Top & Side View

Common Capabilities of all Clever Sys Software:

- **High-throughput for up to 96 individual arenas.**
- **Batch Mode functionality to automatically analyze multiple videos in succession without user intervention**
- **Automated Export, Binning of Results and Graphing**
- **Extensive Experiment Database to organize results and do Group Export**
- **Review of acquired results in Visualization mode**
- **Double-click playback of detected events and behaviors.**

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