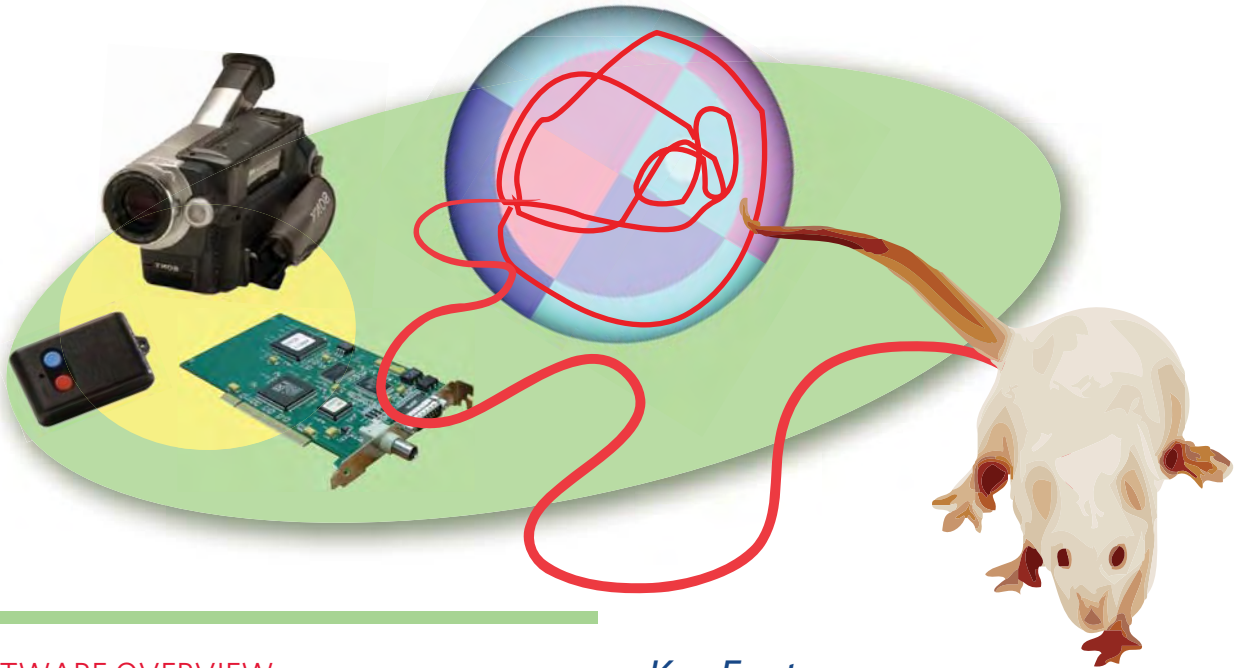


# Smart *Video-tracking system*

Powerful and user-friendly tool for automated recording of animal behavior



## SOFTWARE OVERVIEW

SMART Video Tracking System is a complete and user-friendly video-tracking system for evaluating behavior of laboratory animals.

SMART allows the recording of activity, trajectories, events, social interactions, and performs calculations on a wide range of analysis parameters.

The SMART system utilizes real-time images or video files and displays the animal's track on the computer screen. Smart then analyzes the animal's path with reference to the user-defined zones.

This video tracking system offers a flexible and easy-to-learn interface for a number of behavioral tests including: Morris Water Maze, Open Field, Plus Maze, Radial Maze, Place Preference in addition to other user-designed applications.



**Over 600 citations worldwide!**

## Key Features

- *Unsurpassed video-detection performances on the market!*
- *Extremely user-friendly!*
- *Entirely configurable data report*
- *Zone-dependent camera settings*
- *Immobility detection for forced-swimming test and freezing*
- *Day/night cycle control system*
- **New** *Unmatched 3-points detection using Triwise Technology*
- *Install SMART Analysis Module in as many computers as required!*

## APPLICATIONS

ACTIVITY & EXPLORATION - Locomotor activity, Hole-board test, Novel object test, Cycling behavior  
 ANXIETY - Open-field, Elevated-plus maze, O-Maze, Black and white test  
 DEPRESSION - Forced-swimming test, Tail-suspension test  
 LEARNING & MEMORY - Water maze, Radial maze, T and Y maze, Fear conditioning, Object recognition test  
 ADDICTION & REWARD - Conditioned place preference, Odor place preference  
 SOCIAL INTERACTIONS  
 And many other possibilities

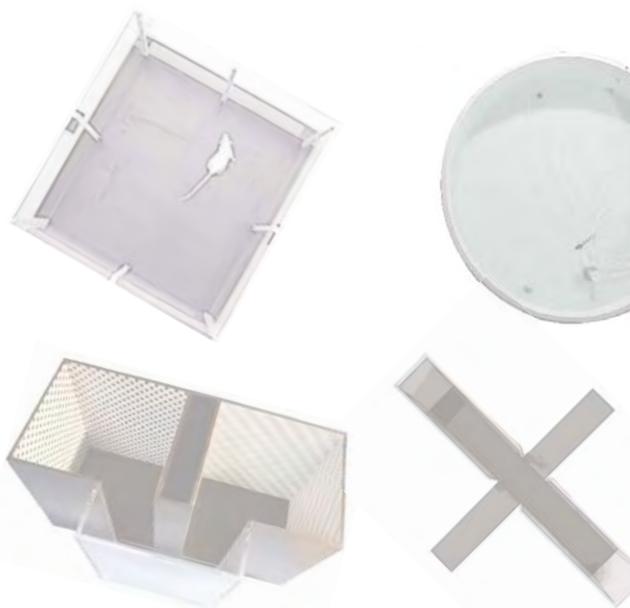
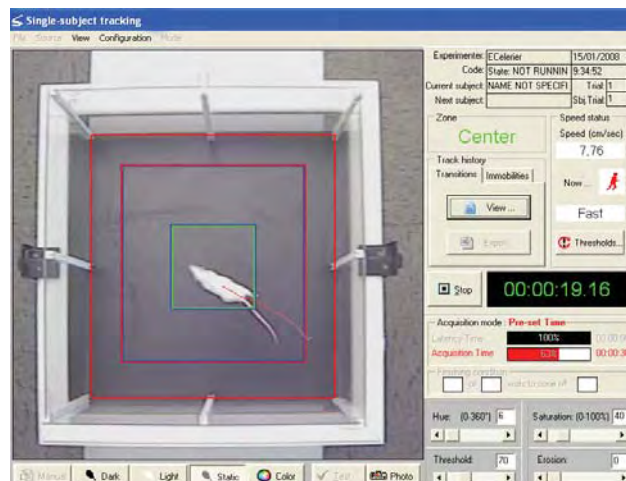


# Smart video-tracking system

## USER-FRIENDLY AND FLEXIBLE

The most user-friendly video-tracking system in the market!

- Easily navigate through the different steps of the video-tracking processes: calibration, zone edition, detection settings, acquisition and analysis.
- Associate a registered track to different zones and generate as many new sets of results as desired!!
- Directly export data to Excel® for further analysis.
- Check and analyze acquired data in real time while still in the lab, or extend Smart Analysis on as many computers as needed and analyze at your convenience!



Easily adaptable to any enclosure!!!

SMART video-tracking is perfect for any experimental area: mazes (Elevated Plus Maze, O-Maze, T Maze, Y Maze, Radial Maze, Water Maze...), home cage, open-field, experimental boxes (Place Preference, Shuttle, Operant Conditioning...). And many more!

A powerful Zone Editor provides a wide range of specific tools (polyline, square, Ellipse-Circle...) to adapt the processed zones to any experimental enclosure regardless of size and shape.

Up to 32 different zones can be easily drawn and a special tool for Water Maze is included. The user can give a name to each zone and define associations between them.

## Wide variety of image sources

SMART offers maximum versatility - researchers can opt for live image or digital video files - depending on their application requirements. Both image sources are handled with the same outstanding flexibility and analysis features.

### "Live image" source

Data acquisition can be performed online during the "live" experiment simply by connecting an external camera. Alternatively, the experiment can be recorded via video camera, DVD, or video digital recorder and processed on- or off-line. An included cable simply connects the external recording devices to the frame grabber board for image processing.

### "Video digital" source

Experimental images are recorded in digital format and are saved into the computer hard drive for SMART tracking process. In this case, no frame grabber is needed. Standard digital formats supported by SMART are MPG, AVI, DIVX and VOB.

## Cameras

- Standard or mini CCD camera with varifocal lens
- Infrared camera for near-dark applications
- Video Camcorder



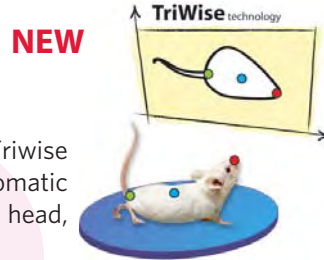
## ADVANCED TECHNOLOGY

### Unmatched detection !

- Enables for black-on-black and white-on-white video monitoring.
- Robust video-detection core based on frame grabbing technology.
- Set different brightness and contrast levels in different zones of the same experiment!

### 3-points detection using the Triwise Technology!!!

Use the innovative Triwise technology for the automatic detection of the animal head, center mass and base-tail.



An innovation of Panlab/  
Harvard Apparatus R&D team!

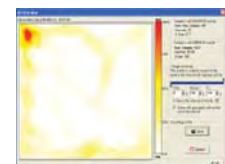
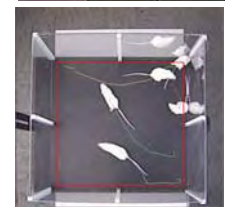
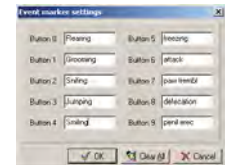
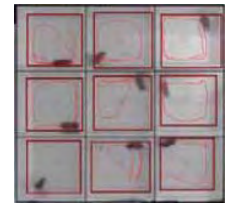
### Powerful Input-Output option for interacting with external devices



Apply this option in your experiments: sinking the Atlantis platform in the Morris Water Maze, opening/closing doors in the radial maze, provides aversive or reinforcing stimuli depending of animal choice in an Y maze, or operating different devices behavior cages...

## Others Features

- **Multiple Arena Option**  
Increase productivity and save time.
- **Ethological Event Recording**  
Use the SMART ethological keyboard to record specific behaviors that cannot be identified automatically.
- **Global Activity**  
Optimize the video monitoring of animal spontaneous activity and immobility in forced-swimming and fear conditioning tests.
- **Day&Night Cycle Control System**  
Automatic switching between day and night lighting conditions (light and camera settings) without any user intervention.
- **Social Behavior**  
Track up to 8 animals in the same arena and register contact between them.
- **Activity Map**  
Activity mapping tool included for data illustration
- **Tailored Analysis Reports**  
Outstanding analysis tools enable configuration of customized reports and calculations.
- **Track Exportation To Image**  
Exporting tracks to BMP or JPG images for illustrating data in publications and conferences.
- **Telemetric-Switch**  
Remote switch to start and stop sessions away from the computer.



## Parameters measured in SMART

General parameters characterizing the animal trajectory and movement pattern (covered distance, speed, permanence time in zones, turning angle, parallelism index, time spent immobile, time spent in slow and fast movements, XY coordinates...)

Specific parameters for water maze (latency to target, time in wall and quadrants, Wishaw's error, mean average distance to target, mean directionality...)

Specific parameters for social interaction studies (contacts number and duration, relative movements between subjects...)

Global activity for spontaneous activity, forced-swimming test and fear conditioning...

Automated behavior using the TriWise 3-points detection: rotations, rearings, object exploration, head-to-head contacts between animals...

Events visualized by the user (using the Ethological Event Recorder).

## SMART system components

- SMART software CD
- USB protection key
- User Manual
- All cables and connectors



# Smart video-tracking system

## SMART: a modular design for fulfilling your needs!

Choose between a variety of extensions each providing specific features.



	SMART BS	+ MA extension	+ SS extension	+ TW extension	+ I/O extension	+ TS extension
Tracking one animal in one arena	✓					
Center mass tracking	✓					
Color detection	✓					
Global activity	✓					
Zone-dependent camera settings	✓					
Ethological Event recording	✓					
Artifact filtering	✓					
Video-digital support	✓					
Analysis module	✓					
Track illustration tool	✓					
Tracking up to 16 arenas at once		✓				
Use with multiplexer (multi-camera)		✓				
Tracking up to 8 animals in the same arena			✓			
3 points tracking (head, center mass, base-tail)				✓		
Automated detection of rearings				✓		
Automated detection of rotations				✓		
User-criterion for zone entry				✓		
Automated detection of contact between subjects			✓	✓		
External device control			(between center masses)	(between center masses or between heads)	✓	
Day/Night cycle control					✓	
Atlantis platform control for water maze					✓	
Start/stop remote control						✓

Ask for a free  
**DEMO  
VERSION**  
under request



## Related Panlab/Harvard Apparatus products

- Open-field box
- Elevated-plus maze
- Circular pool
- Radial maze
- T and Y mazes
- Black & White box
- Atlantis platform
- Place preference box

## ORDERING INFORMATION

	SMART BS	76-0028	Basic System V 2.5 Single subject tracking
OPTION	FRBOARD2	76-0264	Frame Grabber Board (PC interface board), only when live image processing is required
OPTION	SMART MA	76-0265	Multiple Arenas Extension (one animal per arena in up to 16 arenas)
OPTION	SMART SS	76-0266	Social Behavior Extension (up to 8 animals in a single arena)
OPTION	SMART TW	76-0327	Triwise module for detection of head, center mass and base-tail
OPTION	SMART I/O 8C	76-0267	Smart System Extension. Control Box for 8 Inputs and 8 Outputs
OPTION	SMART I/O 32C	76-0268	Smart System Extension. Control Box for 32 Inputs and 32 Outputs
OPTION	SMART UPG 2.5	76-0269	Upgrade to V2.5 from previous versions of Smart
OPTION	SMART TS	76-0270	Telemetric Switch (remote start/stop switch)
OPTION	SMART (accessories)		Camera, boom stand, computer, DVD reader/writer etc... please contact our sales attendants for more detail

## Contact us for additional information

### Panlab s.l.u.

C/Energía, 112  
08940 Cornellà  
(Barcelona) SPAIN

Phone: +34 934 750 697 (Int.)  
Phone: 934 190 709 (Dom.)  
Fax: +34 934 750 699  
info@panlab.com  
www.panlab.com

## Distributed by: