Conduct Vision Software Manual

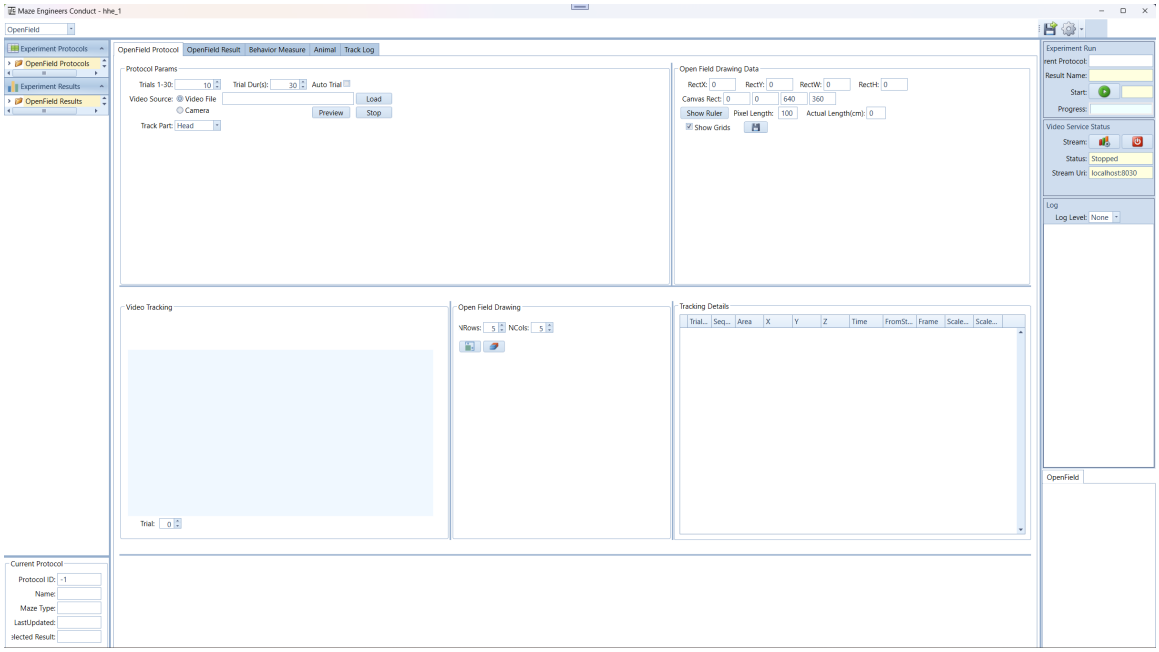
Contents

1. Install and Run Application

The application can be installed in folder C:\ConductScience. There are subfolders

ConductVisionF\ConductVisionPy
ConductVisionF\ConductVisionUI

The executable is ConductVisionUI\bin\ConductVisionUI.exe. Double click on the executable. The application appears as below:

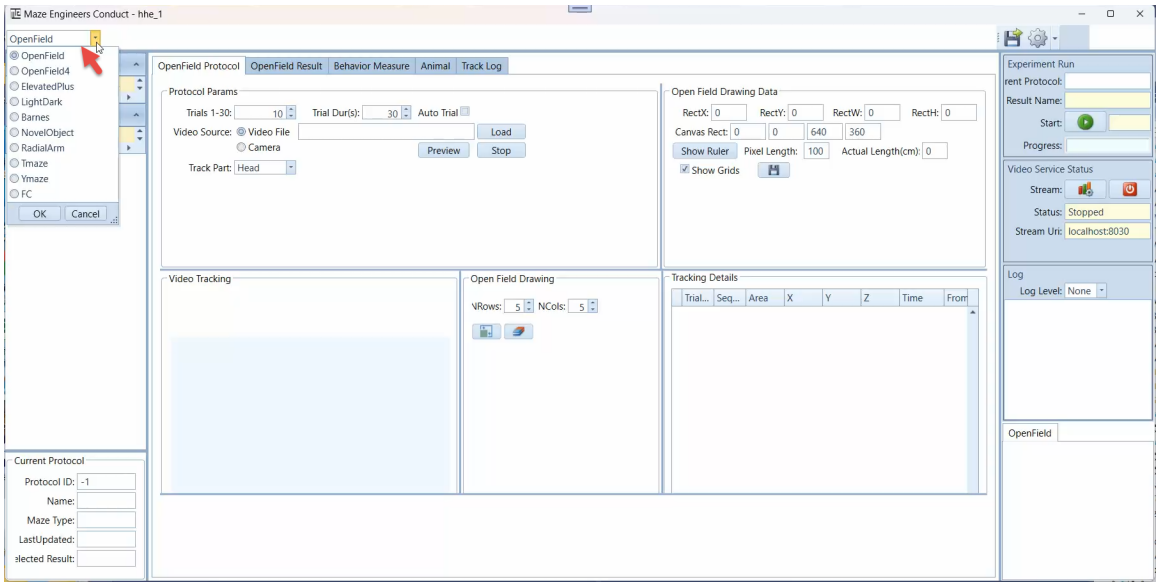


2. Maze Types

Click on the maze type field to view or select a maze type. You can switch to another maze without having to restart the application.

The maze types are defined in the package the user purchased. Pack1 is currently available.

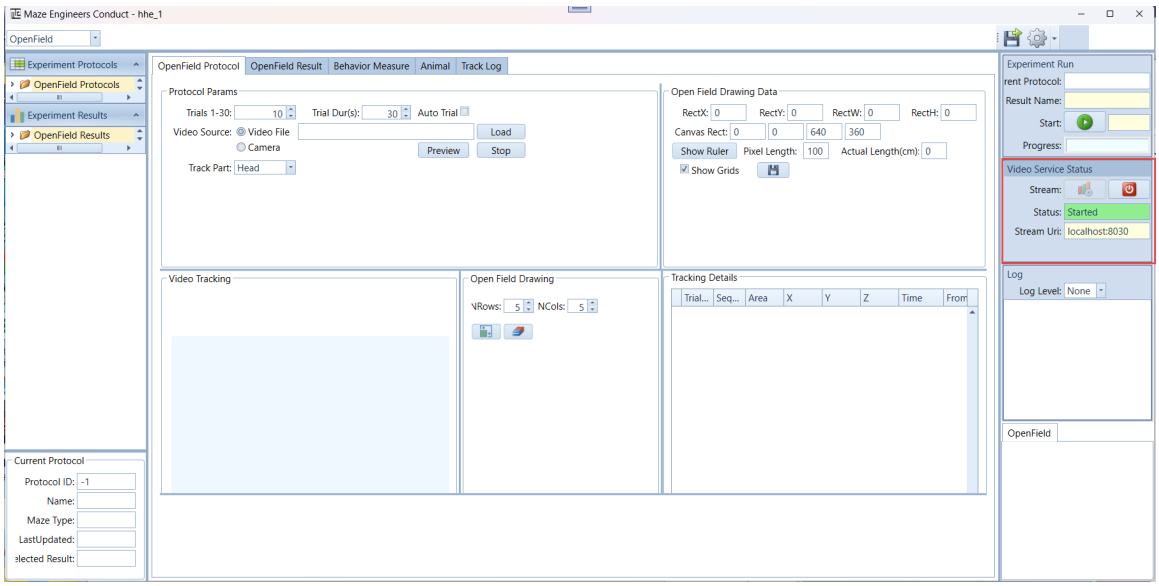
- Pack1: Barnes, Light-Dark, Novel Object, OpenField, OpenField4 (Open Field Set of 4), Elevated Plus, Radial Arm, T-maze, Y-maze, U-maze (User defined maze)
- Pack2: Sociability, Phenotyping, Water Maze
- PackFish: Zebrafish
- PackFC: Fear Conditioning System
- PackAuto: Automated mazes



3. Video Service Connection

To use AI based video tracking service, the user needs to start the service stream. When the service stream is established, the status field shows text Started and color becomes green. If there is a need to stop the stream because of the exception, click on the stop button and then start again.

When the application starts, it is in the stop state.
The stream uses local machine port 8030. It is usually available for users. If the port is blocked, please contact your system administrator to open the port.

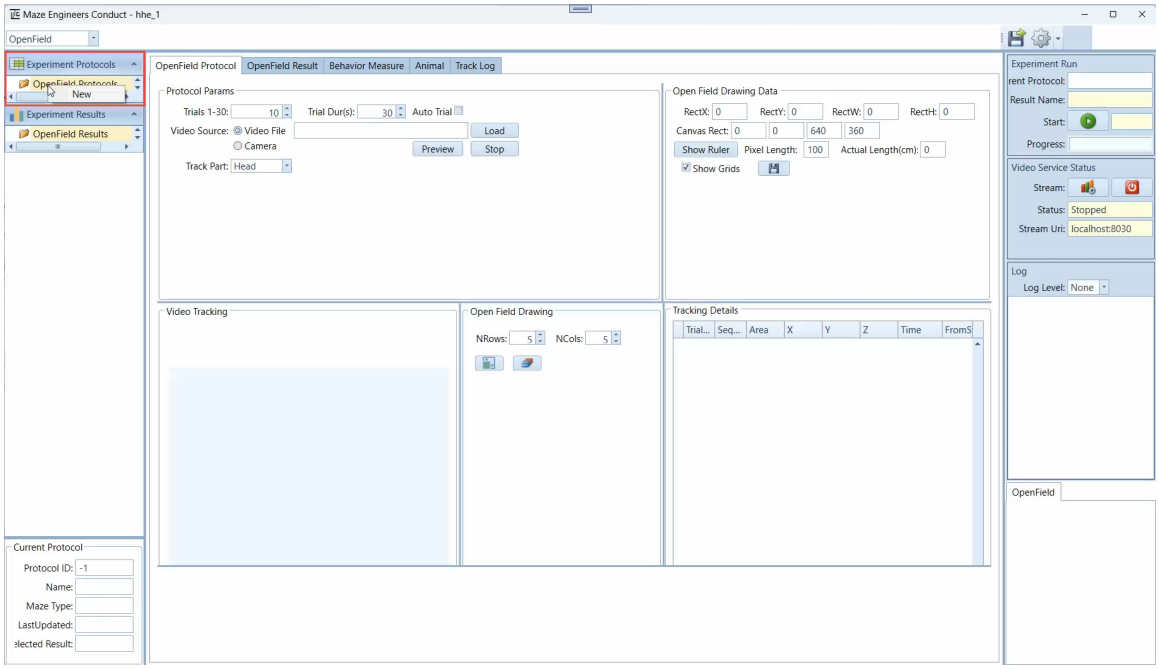


3. Experiment Configuration

The application provides a user interface to configure and execute experiments (protocols) and view execution results.

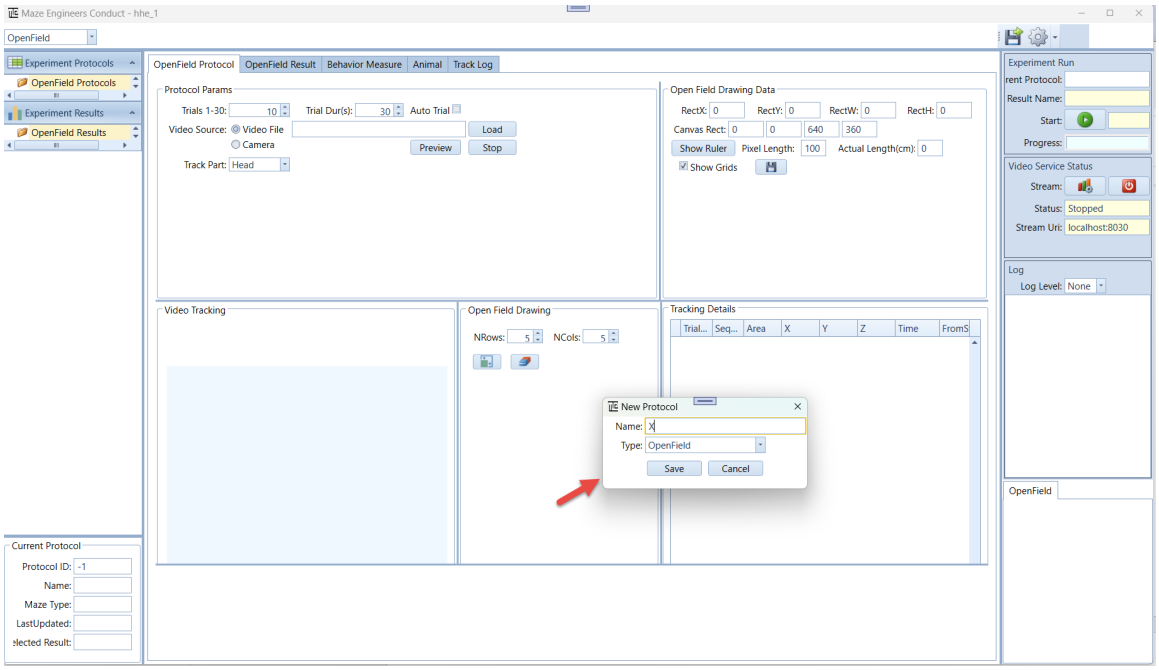
3.1 New Experiment

To create an experiment protocol, right click on "OpenField Protocols" on the left panel. A menu item New appears as shown below:

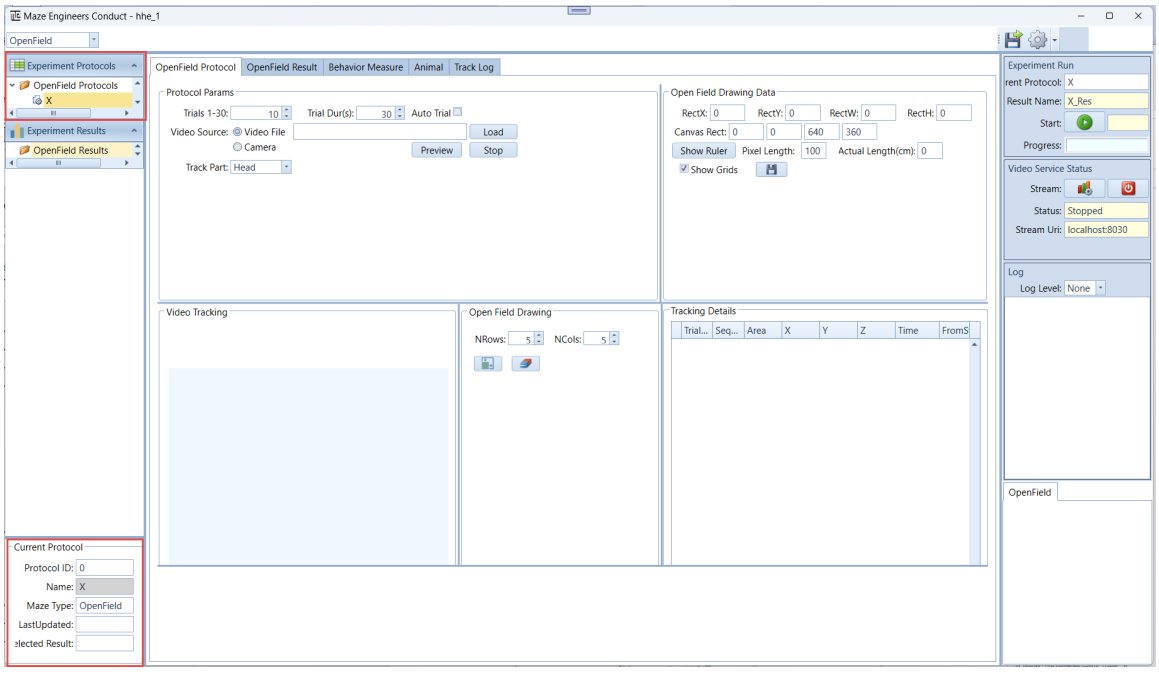


If a different maze like LightDark is selected, the protocols will be “LightDark Protocols”.

Click on New menu item, a "New Experiment" window appears as shown below. Fill in an experiment name and click on Save button.



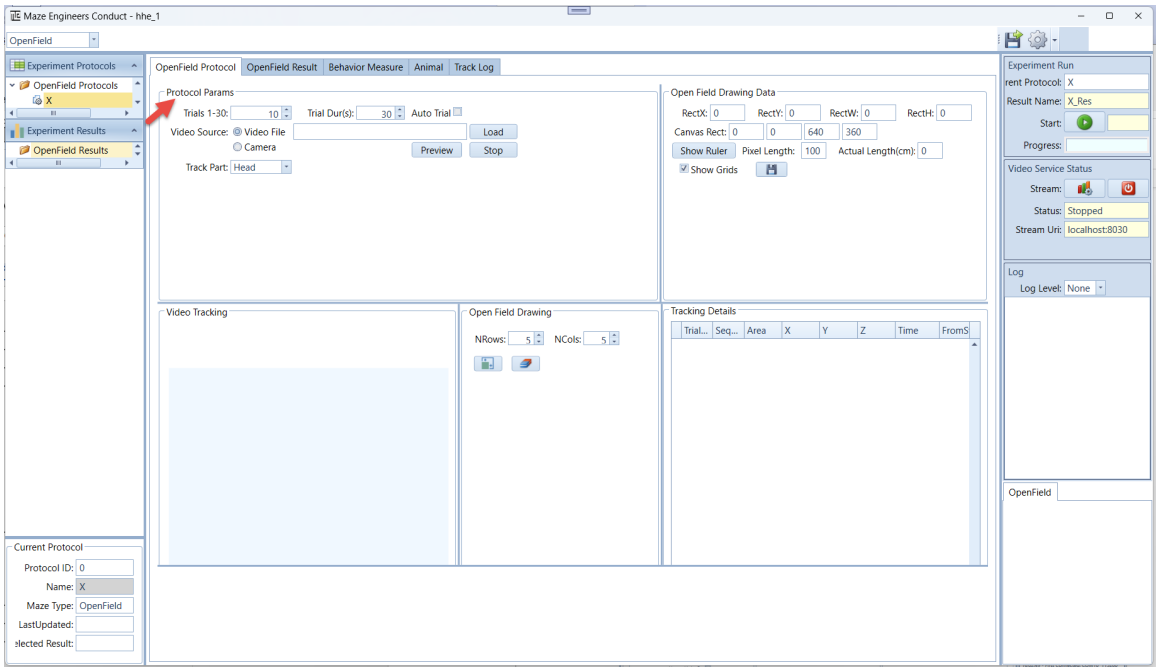
Once the experiment is created, it appears in the folder "OpenField Protocols" as shown below:



An experiment can be deleted by right click on the experiment. The current active protocol is indicated in the left bottom of the screen.

3.2 Configure Parameters

To configure an experiment, double click on the experiment under the folder "OpenField Protocols".



3.2.1 Protocol Parameters

- **Trials** (1-30) - represents number of the trials to continuously run in the session
- **Trial Durs(s)** - represents the trial duration in seconds
- **Auto Trial** – If selected, the next trial will automatically start after the completion of a trial. If not selected, a dialog will appear asking the user to place the animal in the starting position before starting.
- **Video Source Video file** - to track a video file, the user needs to load a video file.
- **Video Source camera** – this is to track rodent in real-time
- **Preview** – in living tracking mode, the user can preview the maze; stop preview will produce a thumbnail that can be used for drawing the tracking areas.
- **Track Part** – the user can choose the track part, either head or body. Some mazes only allow for head tracking.

3.3 Area drawing

There are two styles of drawing: rectangular area and polygon.

Rectangular area drawings include

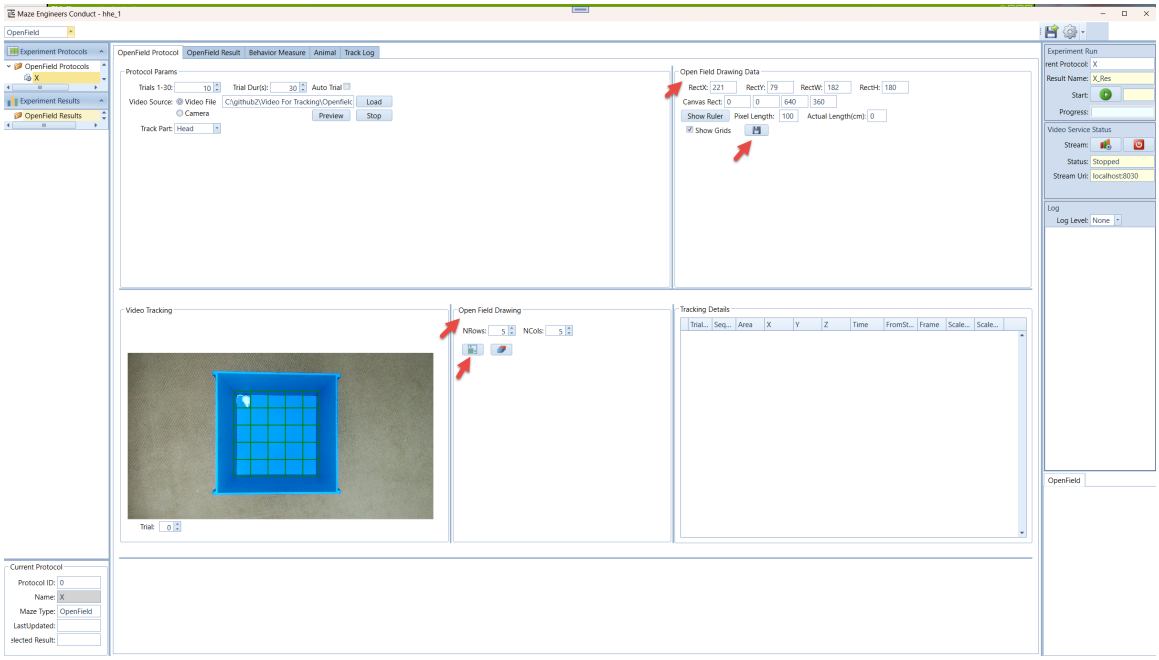
- Barnes
- Light-Dark
- Novel Object
- OpenField
- OpenField4 (Open Field Set of 4)

Polygon area drawings include

- Elevated Plus
- Radial Arm
- T-maze
- Y-maze
- User defined maze

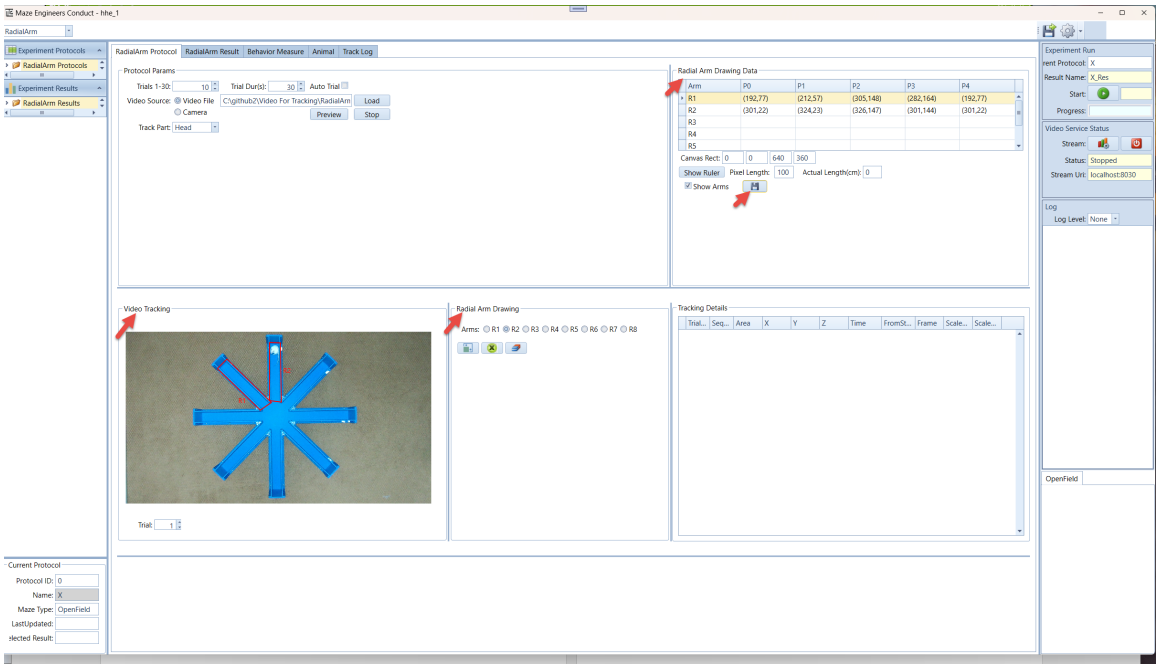
3.3.1Drawing a Rectangle

- Click Button in the Open Field Drawing group to enable the drawing mode.
- Select NRow and NCol
- On the maze, select the point on the left up corner and drag to the right bottom inside the maze
- After the drawing, click Save button on Drawing Data group.



3.3.2 Drawing a Polygon

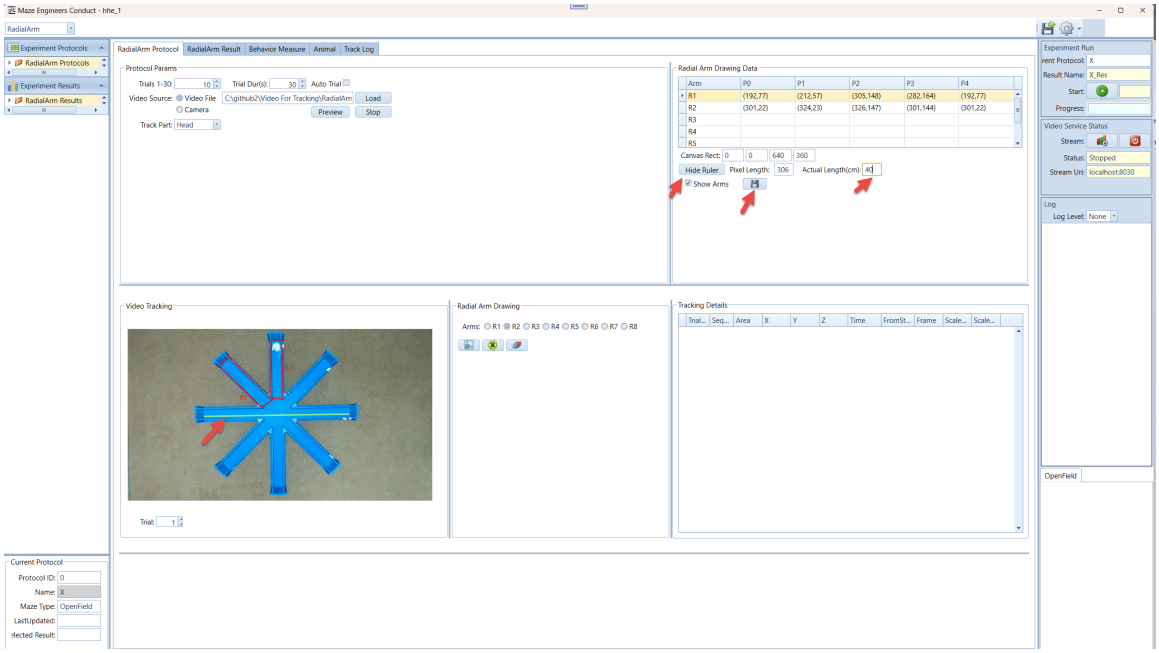
- Enable Button in Radial Arm Drawing group to enable drawing mode
- Select a radial arm
- Click four points of an arm to form a polygon
- After the drawing, click Save button on Drawing Data group.



3.4 Ruler

In software, the camera image distance is defined as pixels. We are interested in reporting the distance meters like cm. So, we need to know the pixels distance on screen maps to meter distance cm.

- Click on the Show Ruler button, and a line appears on the maze
- Draw the ends of the line to two end points of the maze
- Enter the real distance in the field.
- Click Save button the save the data

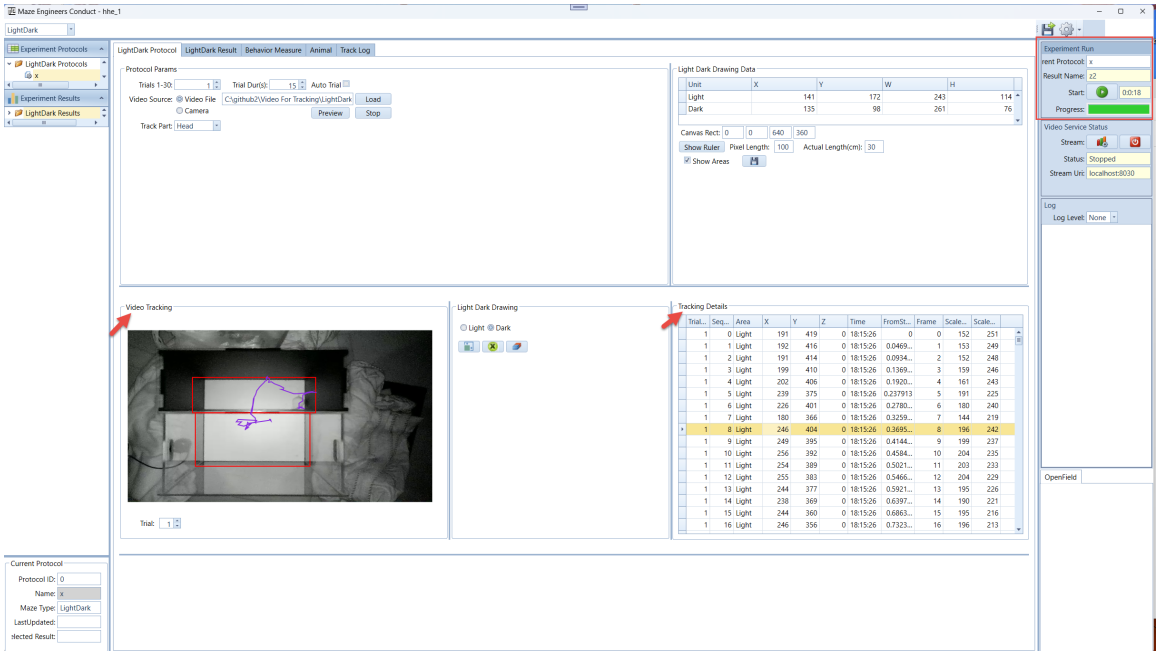


4. Experiment Run

To execute an experiment, select the protocol under "Protocols" on the left navigation panel and double click on it. Make sure the service stream is connected.

4.1 Run Experiment

Enter a name for the experiment run and click Start button. This will set system in the running state.



When the start button is clicked, the button state becomes stop. User can click on a stop button to stop the session run.

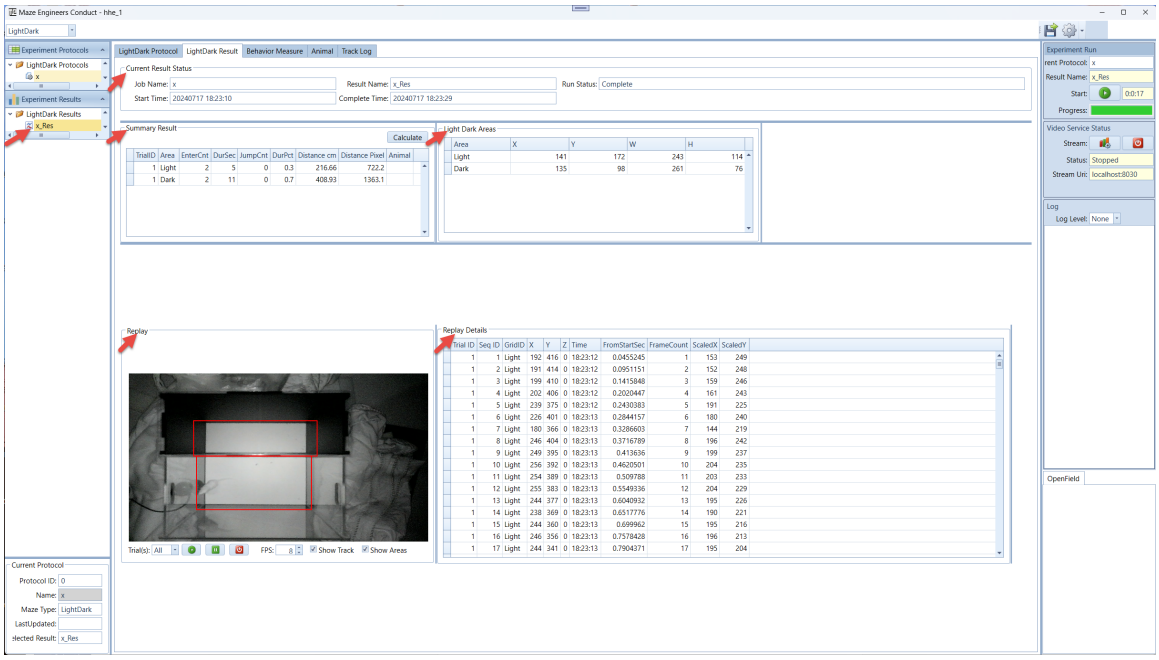
The experiment will stop when total time reaches, or all trials are completed, or the user stops it.

In the Video Tracking group, the animal moves are tracked.

In the Tracking Details group, the track details are recorded. The data grid only should the latest trial. When a trial completes, the tracking data is saved.

4.2 Result Tables

Select the result from the left Experiment Result. The results are shown on the Result tab. There are five grids.



Current Result Status: show the protocol name, result name, protocol run start time, complete time and run status

Replay Group: it allows user to replay the video at a user defined speed (frame per second)

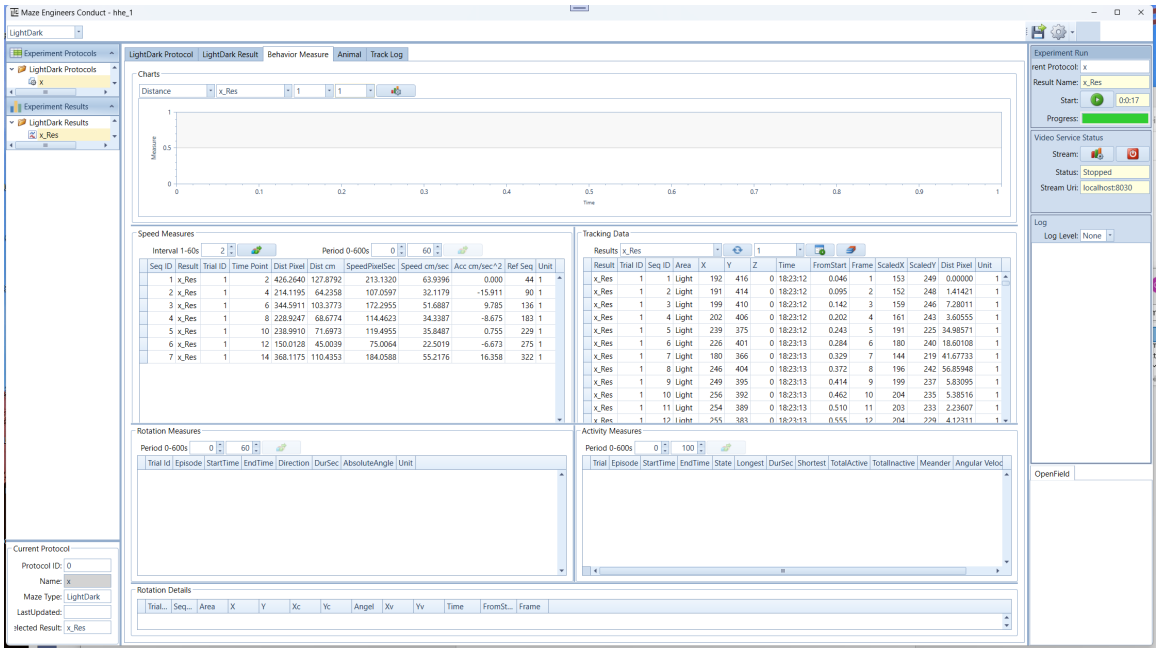
Replay Details: it contains all tracking data of the session (multiple trials)

Summary Result: shows the statistics of each area including the enter count, duration and distances.

Area Group: shows area drawing information. The data are not important for the user at this point.

5. Behavior Measure

5.1 Temporal Move Measurement



The Behavior Measure tab provides calculations of the animal motor measurements.

It allows calculation of any number of results (multiple results), trials (multiple trials) or units (open field set of 4 has 4 units).

Charting provides drawing of the measurements (single trial or cross trial comparison).

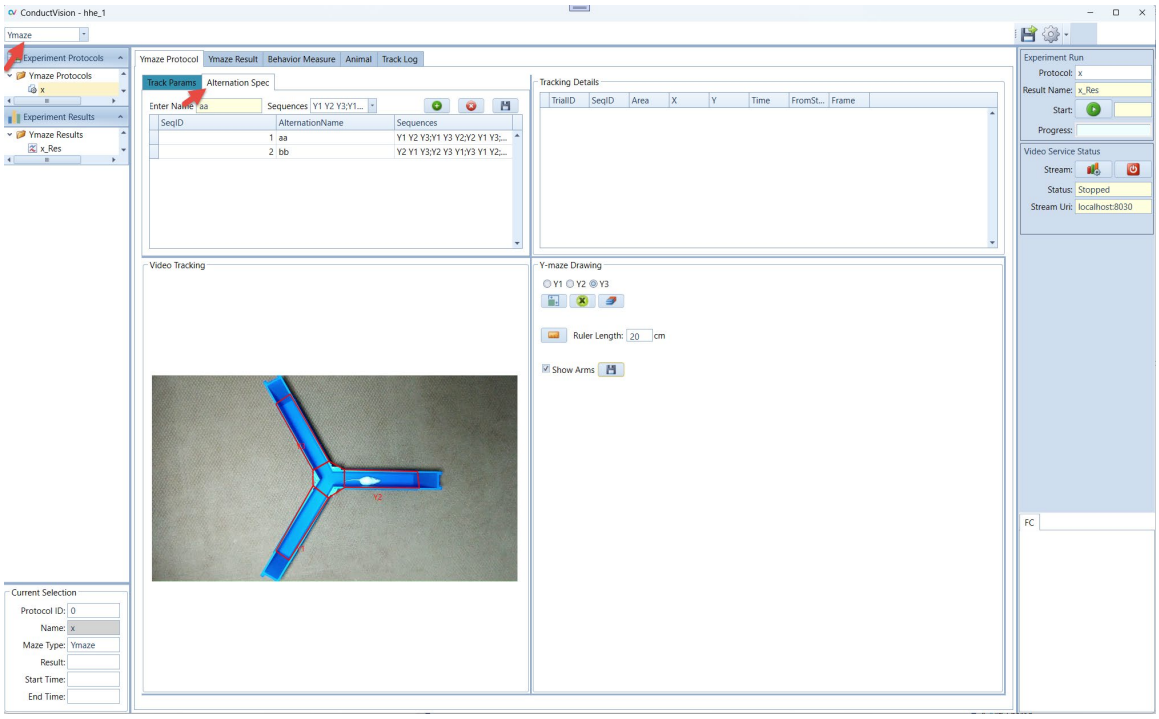
5.2 Rotation Measurement

5.3 Activity Measurement

5.4 Heatmap

6. Maze Protocols

6.1 Y-Maze Spontaneous Alternation



The Y-maze spontaneous alternation test is a behavioral test often used in research, particularly in neuroscience and psychology, to assess spatial memory and exploratory behavior in rodents.

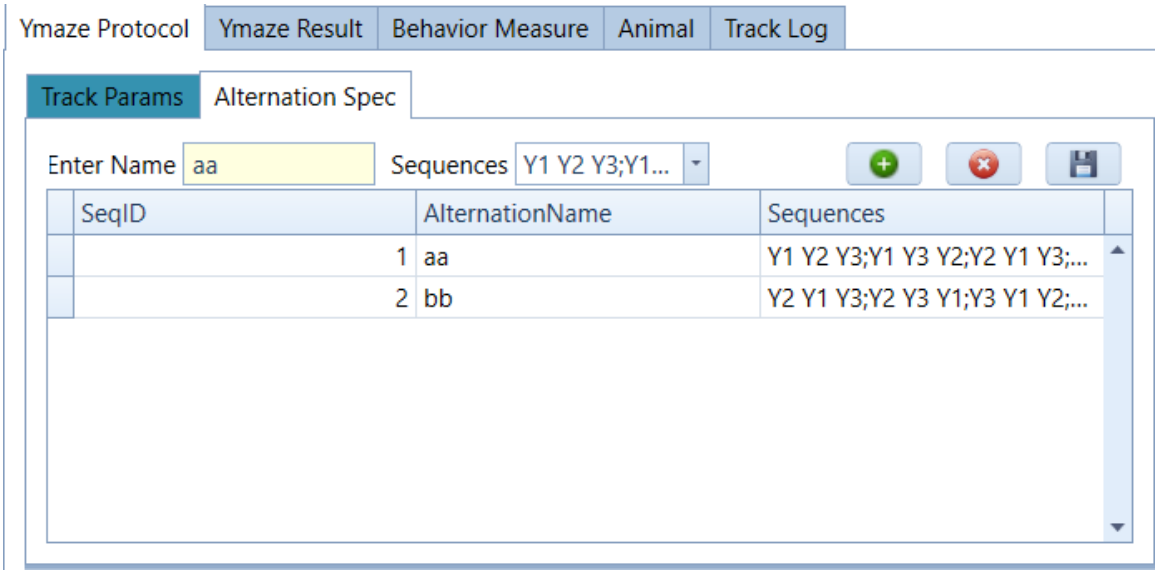
The Conduct Vision software provides spontaneous alternation analysis using tracking data.

6.1.1 Y-Maze Alternation Specification

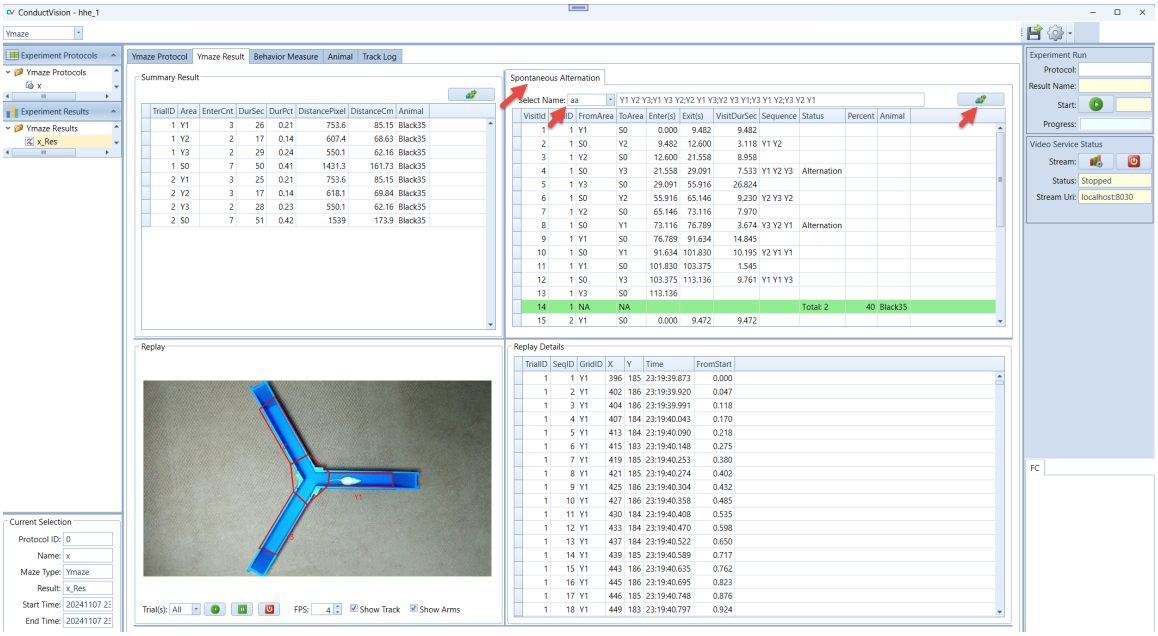
- There are six possible sequences for Y-maze:

  Y1 Y2 Y3
  Y1 Y3 Y2
  Y2 Y1 Y3
  Y2 Y3 Y1
  Y3 Y1 Y2
  Y3 Y2 Y1
- For a specification definition, the use can specify all sequences or a subset of the sequences and give a name. The screenshot below shows two definitions of alternation sequences aa and bb. Each protocol can have its specification of the sequences.
- To add a definition, give a name and choose a set of sequences and then click on Add button
- To remove a definition, select the data row in the grid and click the Remove button
- To save the specification, click the Save button.

- Once the specification is saved, it will appear on the result tab when a trial run is completed.



6.1.2 Y-Maze Alternation Result



- On the result tab, the Spontaneous Alternation panel displays the result of alternation analysis.
- Choose the alternation specification name and the specification definition is displayed in the next field.
- Press button the calculation button  , the alternation result is calculated and saved automatically.

- The calucation is done for each trial. At the end of the result of the trial, a summary line is displayed with number of alternations and the alternation percentage.

- Examples
    - Example 1: the first four rows shows arm entry sequence Y1Y2Y3. Since Y1Y2Y3 is in the definition, the sequence makes an alternation.

	VisitId	TrialID	FromArea	ToArea	Enter(s)	Exit(s)	VisitDurSec	Sequence	Status	Percent	Animal
	1	1	Y1	S0	0.000	9.482	9.482				
	2	1	S0	Y2	9.482	12.600	3.118	Y1 Y2			
	3	1	Y2	S0	12.600	21.558	8.958				
	4	1	S0	Y3	21.558	29.091	7.533	Y1 Y2 Y3	Alternation		

    - Example 2: the following four rows shows arm entry sequence Y3Y2Y1. Since Y3Y2Y1 is in the definition, the sequence makes an alternation.

	VisitId	TrialID	FromArea	ToArea	Enter(s)	Exit(s)	VisitDurSec	Sequence	Status	Percent	Animal
	5	1	Y3	S0	29.091	55.916	26.824				
	6	1	S0	Y2	55.916	65.146	9.230	Y2 Y3 Y2			
	7	1	Y2	S0	65.146	73.116	7.970				
	8	1	S0	Y1	73.116	76.789	3.674	Y3 Y2 Y1	Alternation		

    - Example 2: the following four rows shows arm entry sequence Y2Y3Y2. Since Y2Y3Y2 goes back to Y2 after Y2Y3, it is not a spontaneous alternation.

	VisitId	TrialID	FromArea	ToArea	Enter(s)	Exit(s)	VisitDurSec	Sequence	Status	Percent	Animal
	3	1	Y2	S0	12.600	21.558	8.958				
	4	1	S0	Y3	21.558	29.091	7.533	Y1 Y2 Y3	Alternation		
	5	1	Y3	S0	29.091	55.916	26.824				
	6	1	S0	Y2	55.916	65.146	9.230	Y2 Y3 Y2			

- Total alternations
  The last row of the entries for a trial shows the total alternations and alternation percentage

6.1.3 Y-Maze Alternation Calculation and Interpretation

- Alternation Percentage

$$\text{Spontaneous Alternation Percentage} = \left(\frac{\text{Number of Alternations Made}}{\text{Possible Alternations}}\right) \times 100$$

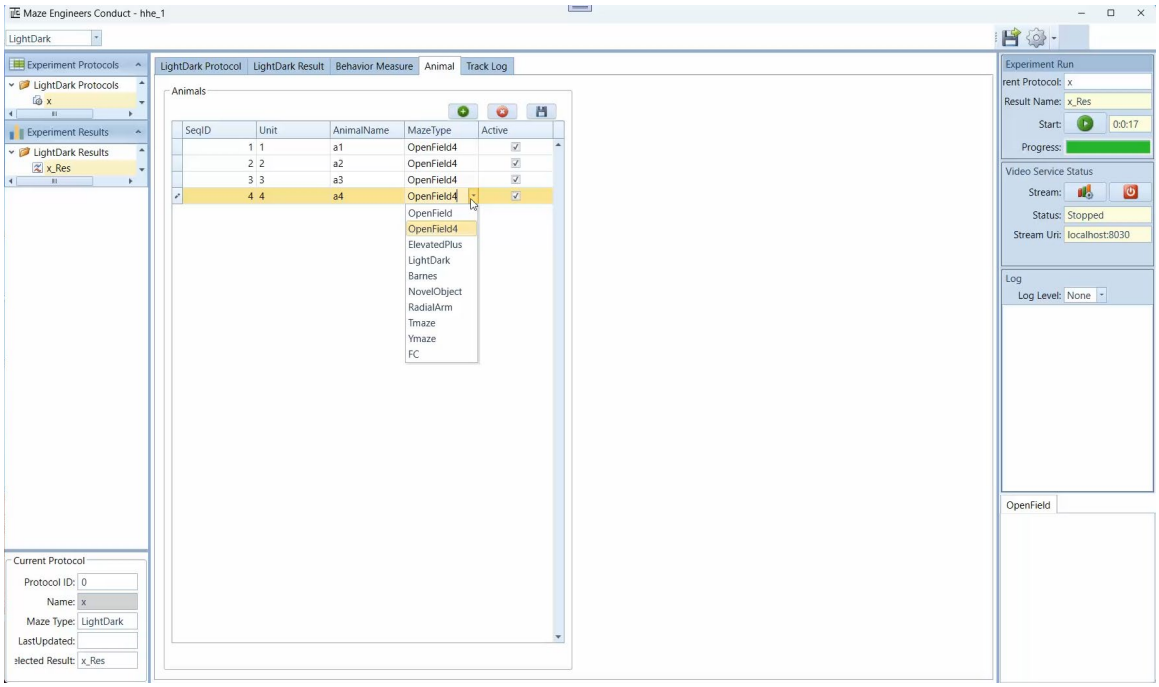
$$= \frac{Number\ of\ alternations\ Made}{(Y1\ entries + Y2\ entries + Y3\ entries - 2)} \text{ x } 100$$

- A high spontaneous alternation percentage indicates good working memory and spatial awareness, whereas a lower percentage may suggest memory impairment or cognitive deficits. This measure is especially useful in studies on neurodegenerative disease, pharmacological interventions, and genetic modifications affecting memory and cognition.

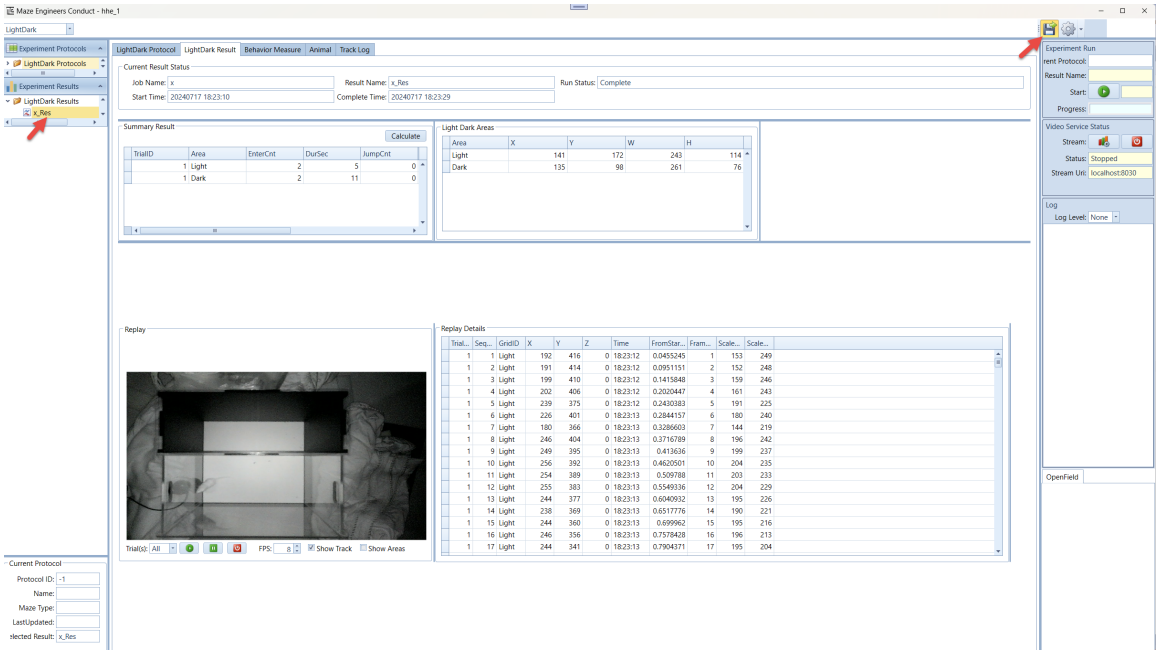
  For further detail, search chatgpt message “Y-maze spontaneous alternation percentage”

7. Animal

The tab provides a place for user to enter the animal information. The animal information then is applied to the results.



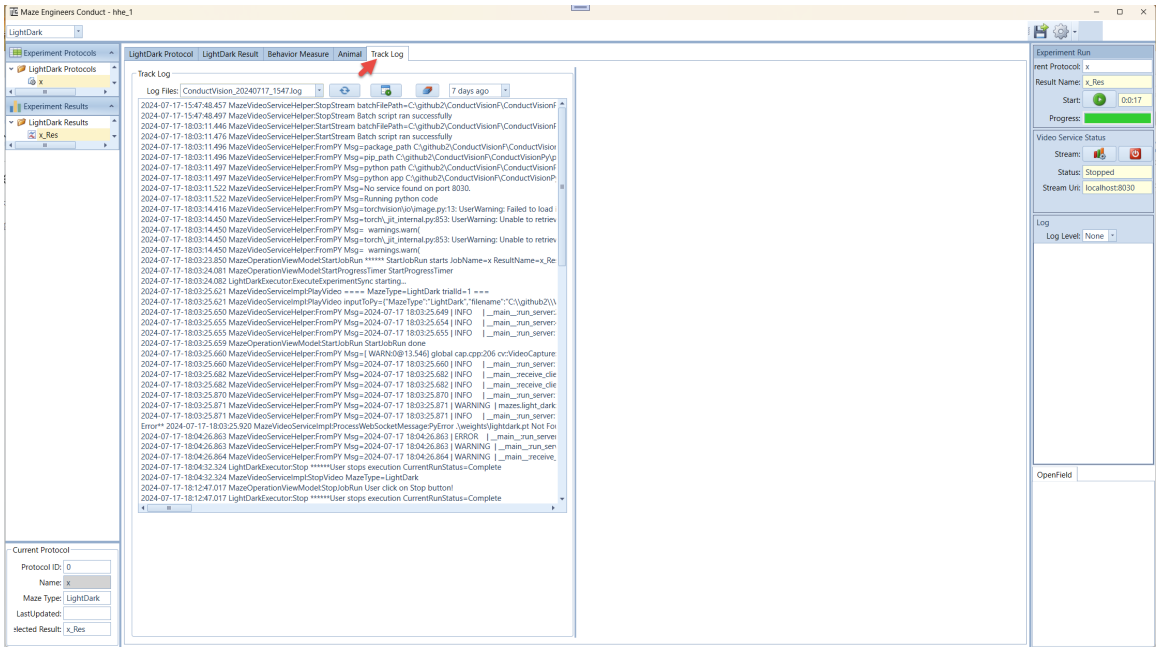
8. Export Data



- Select a result
- Click the Export button
- The out is .csv file

9. Troubleshooting

9.1 Log display



- The log content can be displayed on the screen.
- The log file is in the Log folder under your deployment folder C:\ConductScience\bin\Log

9.2 Database files and user data

The database file contains the protocols and results. There is a separate folder containing database files and video data for each maze under bin.