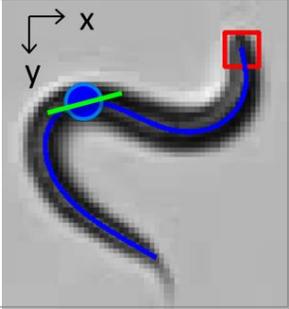
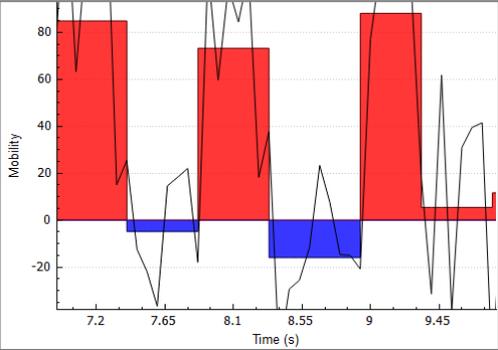
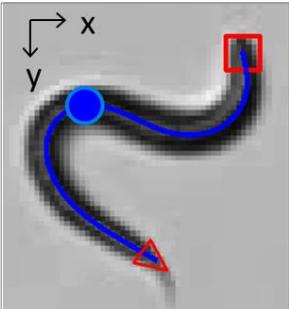
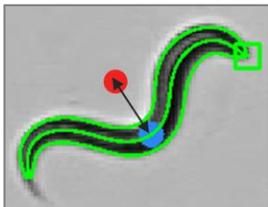
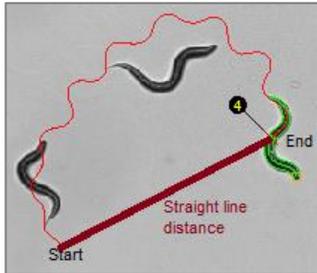
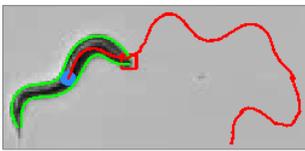
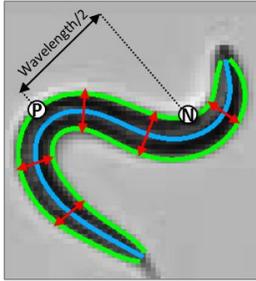


<p><b>Center Points</b></p>	<p>X,Y coordinates for multiple, evenly spaced sample points along the central axis. The table displays data for a single track.</p>
<p><b>Direction</b></p> 	<p>Angle between the line segment (green) located at the midpoint and the X axis. Angles are limited to the range <math>-\pi</math> to <math>\pi</math> radians (-180 to 180 degrees). The 0 degree direction is in the direction of the X axis (to the right).</p> $1 \text{ rad} = \frac{180}{\pi} \text{ deg}$
<p><b>Mobility</b></p> 	<p>Mobility is similar to <b>Moving Average Speed</b> but provides additional analytical tools (speed threshold and minimum duration) to track motion. A block of color indicates a series of frames meeting the Mobility criteria. The y-value of a given color block represents the moving average speed for the series of frames.</p>
<p><b>Position</b></p> 	<p>X,Y coordinates displayed for head (red square), tail (red triangle), or midpoint (blue circle).</p>
<p><b>Reversal</b></p>	<p>Worm moving in a backward direction for a minimum number of frames.</p>

<p><b>Speed</b></p>	<p>Distance per second covered by the worm along its central axis.</p> <ul style="list-style-type: none"> <li>• If the sign is positive, the worm is moving forward (head direction).</li> <li>• If the sign is negative, the worm is moving backward (tail direction).</li> </ul> <p>The speed is based on the position of the mid-point along the central axis. Image noise may affect speed measurements.</p>
<p><b>Moving average speed</b></p>	<p>Speed for a particular worm, averaged across a number of frames. The number of frames is known as the size of the moving window.</p> <p>Using a moving average reduces the effects of noise, and also results in a latency in speed measurement.</p>
<p><b>Smoothed speed</b></p>	<p>Moving average speed smoothed over a user-defined frame span using locally weighted polynomial regression.</p> <p>This method can remove outliers caused by worm model fitting error.</p>
<p><b>Validation</b> (see Validation workflow)</p>	<p>WormLab provides validation data by <b>Count</b> or <b>Percentage</b>.</p> <ul style="list-style-type: none"> <li>• <b>Detect FN:</b> Number or percentage of false negative matches. A false negative is a worm you marked that wasn't detected by the software.</li> <li>• <b>Detect FP:</b> Number or percentage of false positive matches. A false positive is a software-detected worm that you didn't mark. The most likely reason for a false positive is that the object detected is not a worm.</li> <li>• <b>Detect matched:</b> Number of worms or percentage detected by the software and that you matched.</li> <li>• <b>Detected:</b> Number of worms detected by the software.</li> <li>• <b>Frame:</b> Frame number.</li> <li>• <b>Head matched:</b> Number or percentage of heads matched by you and the software.</li> <li>• <b>Head missed:</b> Number or percentage of heads missed by the software.</li> <li>• <b>Head/Tail measurement error:</b> Distance error in <math>\mu\text{m}</math> for marking head/tail between you and the software. This is an accuracy measurement.</li> <li>• <b>Total (row):</b> Total across all validation frames.</li> <li>• <b>Total for head/tail measurement error (row):</b> Average of all <b>Head/Tail Measurement Error</b> values.</li> <li>• <b>Validated:</b> Number of worms marked.</li> </ul>

**Track summary**



Mathematical average for each worm:

**Mean worm length:** From head to tail along the central axis (blue)

**Mean width:** Cross-section (red) averaged over the entire length

**Mean area:** Region within worm's contour (green)

**Wavelength:** Measurement between the positive (P) and the negative (N) stationary points multiplied by 2

**Track length:** Length of forward motion plus length of reverse motion (red) over the total number of frames tracked.

**Peristaltic track length:** Length of forward motion minus length of reverse motion.

**Speed:** Includes averaging of negative values, when the worm is reversing.

**Peristaltic speed:** Peristaltic track length divided by time.

**Straight-line distance** (red): Shortest path between the starting and ending point of the worm track.

**Mean amplitude:** Average centroid displacement over an entire track.

**Max amplitude:** Maximum centroid displacement over an entire track.

**Centroid displacement** (black double-arrow): Distance between the mid-point (blue) and the average location (red) of the central axis points.