

## VeloAngle Enthusiast - Phone Calibration and Attachment

Video containing more complete instruction can be found at <https://www.veloangle.com/blog/category/usage-tips/>

1. Load Multi-Clinometer app from Google App store

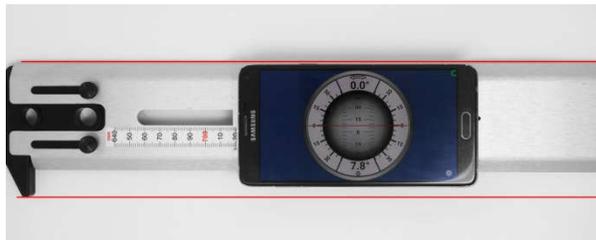
<https://play.google.com/store/apps/details?id=info.physicssolutions.multiclinometer&pcampaignid>

2. Before calibrating, secure the smartphone to VeloAngle with 3M Command tape supplied, or other semi-firm removable double-sided tape.

If the phone has protruding features such as the camera shown below, make sure the tape is thick enough to clear it and ensure the phone body is parallel to VeloAngle's surface.

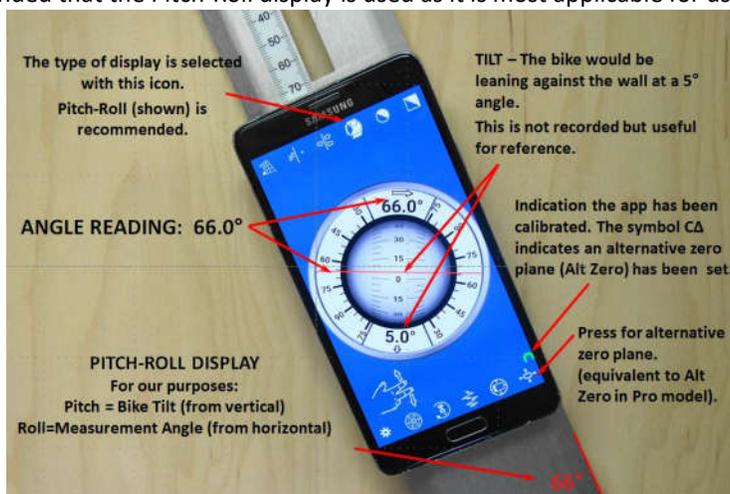


Ensure that the phone doesn't extend past the edges shown in red below. These two lines will be the reference surfaces used for the first four calibration steps.

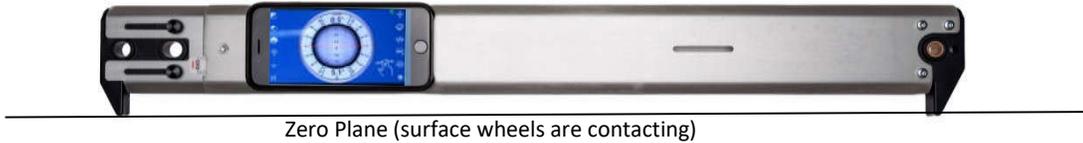


3. Perform calibration according to "Multi Clinometer Calibration Procedure" attached to the end of these instructions.

4. It is recommended that the Pitch-Roll display is used as it is most applicable for use with VeloAngle.



5. Immediately after the phone is calibrated when attached to VeloAngle it can be used as is. Once the phone is removed, the zero plane must be re-established. The phone does not need to be re-calibrated.
  - a. Re-attach the phone. Touch the nibs to the surface the wheels are resting on. If the surface is uneven, the nibs should be extended so they touch immediately adjacent to the wheel's contact points.



- b. Adjust VeloAngle until it is within  $0.5^\circ$  of vertical ( $0.0^\circ$ )



- c. Touch the “Zero” icon to set the angle to zero based on the surface the wheels are contacting. The “Δ” symbol indicates an Alternative Zero is in use for both tilt and angle. Touching the “Zero” again will revert to the calibrated zero. Calibrated zero should be the starting point for each attachment and re-zero

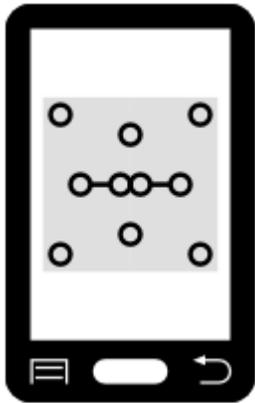


6. The bike does not have to perfectly vertical for accurate measurements but should be within 5 degrees of vertical for best results.

*For best results the device should be calibrated secured to VeloAngle or other rectangular backing that eliminates interference of buttons, cameras or other edge geometry that would interfere with maintaining parallelism required in steps 1 -4 and make it easier to keep the device steady throughout.*

## Multi Clinometer Calibration Procedure

---



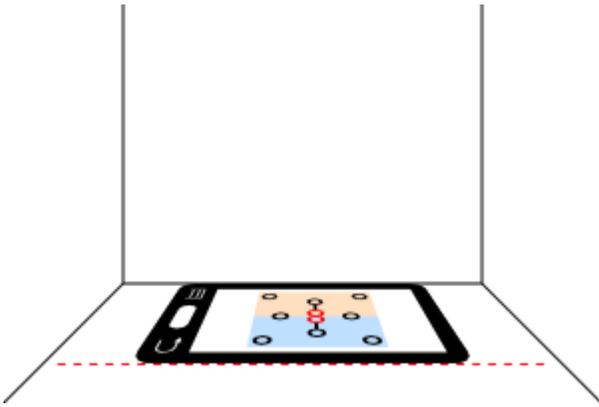
All that is needed is a planar, not necessarily horizontal, surface meeting a not necessarily vertical surface such as a desk standing tight against a wall. The ten rings represent different calibration positions of the phone, and they turn red according to these positions. When clicking within the gray, orange or blue areas, the calibration is done for that position. Make sure the device reading has settled and that the device is kept still when clicking. A green interior of a circle indicates that the calibration is done for the corresponding position. The calibrations can be done in any order, and be redone, fully or partially, at any time by just clicking the calibration button again. At recalibration, i.e. clicking the calibration button again, the already calibrated points are shown yellow instead of green which is only for your memory so that you can keep track of which points are re-calibrated. The calibrations are stored such that it is remembered next time you start the phone. By touching the red button with a zero all calibration points so far are erased or the whole calibration. The calibrations are confirmed with appropriate sound effects. There is a short movie within the app showing the calibration procedure, started by touching the red button with an i.



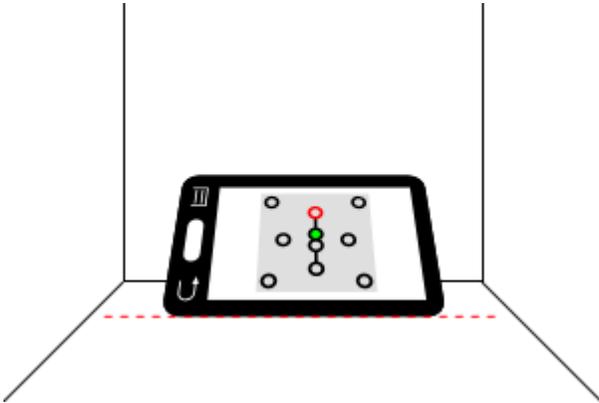
First click the settings button to show all other buttons.



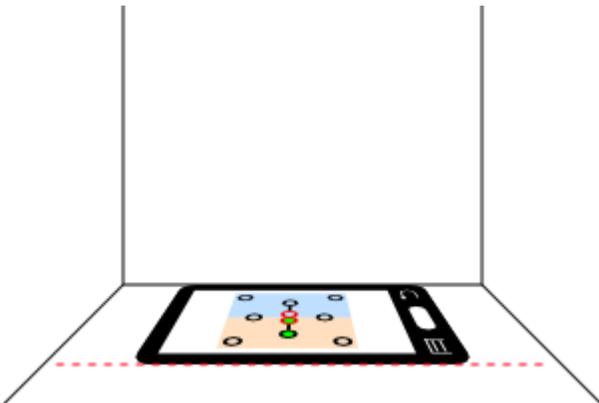
Then click the calibration button.



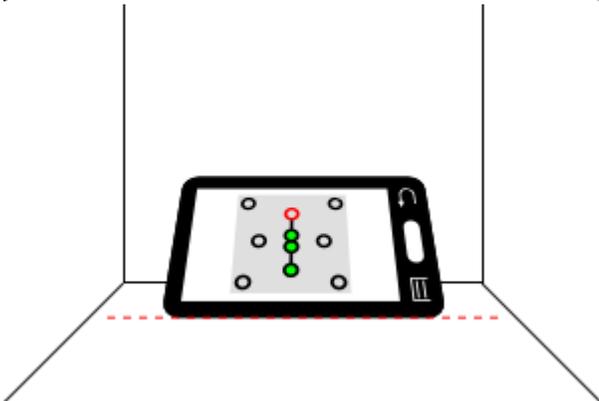
1. Put the phone on the planar approximately horizontal surface (the desk) tight against the approximately vertical surface (the wall). The two middle circles should turn red. Let the angle reading settle. Click within the area, orange or blue, nearest to the wall (in this case orange). The middle of the red circle closest to the wall turns green to indicate that the corresponding calibration is done.



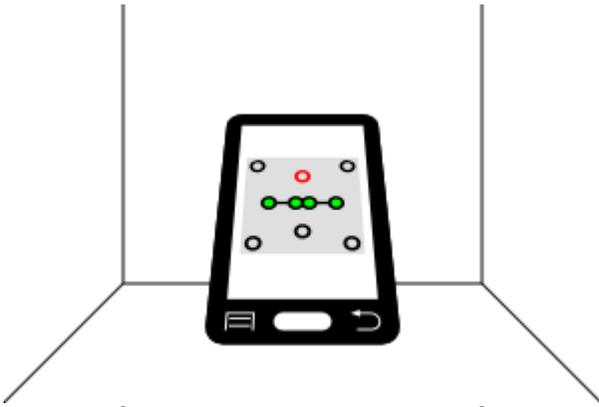
2. Put the phone about halfway up and against the wall as in the figure, i.e. about 45 degrees, such that one side lays tight on the desk and the opposite tight to the wall and the circle connected with a black line to the previous ring turns red. It is important that the edges are parallel to the edges in the previous position, indicated in the figure by red dashed lines. Beware of buttons etc on the sides of the phone for the alignment. When the reading has settled, click within the gray area, and the inner of the circle turns green to indicate that the corresponding calibration is done.



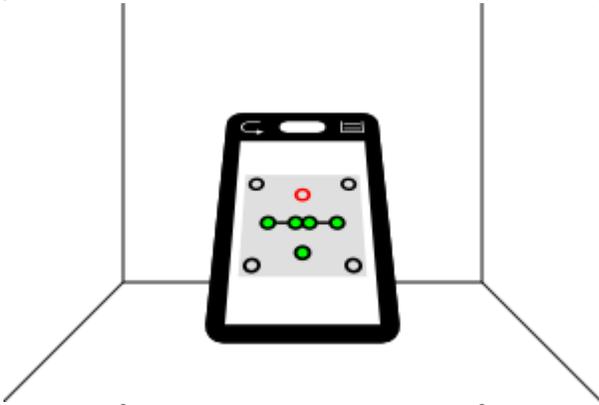
3. Put the phone flat on the desk again, tight to the wall, but turned 180 degrees this time as in the figure and click the area closest to the wall (blue in this case).



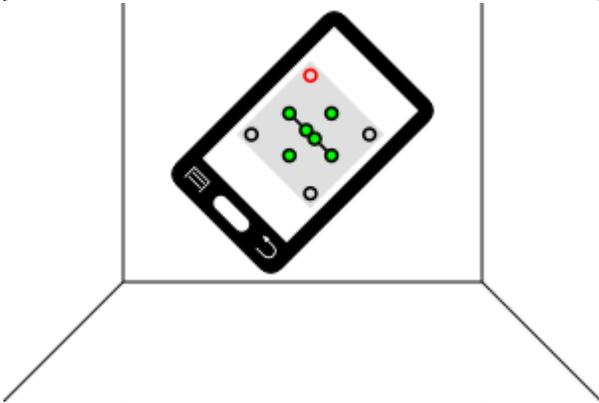
4. Put the phone about halfway up against the wall again and push within the gray area. Keep the red dotted lines parallel to the ones in the previous figures.



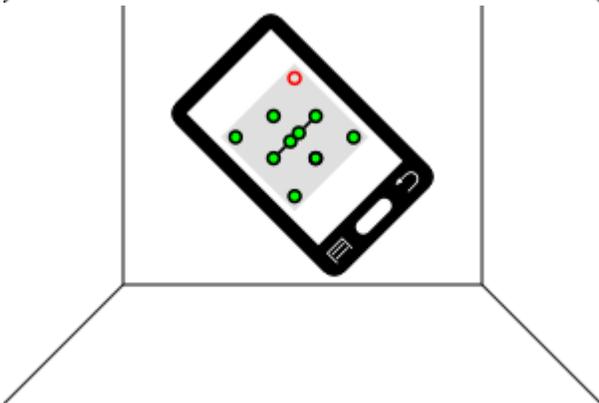
5. Turn the phone about  $90^\circ$  and put it about halfway up the wall, i.e. about  $45^\circ$ . The exact position is not important, but the corresponding circle must turn red, the reading settle and the phone held steady before the gray area is clicked.



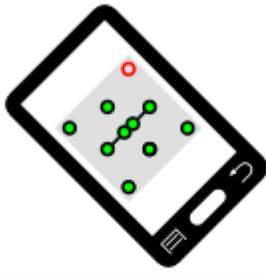
6. Do the same thing the other way around as in the figure.



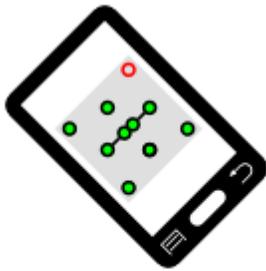
7-10. Hold the phone close to the wall such that one of the outer rings turns red. The exact position is not important but the phone must be kept steady. Click within the gray area to get the corresponding calibration done.



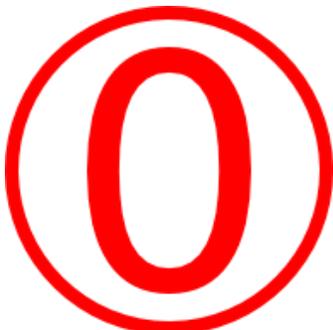
8. Turn the phone on the wall until another ring gets red and repeat the procedure.



9. Repeat the procedure for all outer circles.



10. When all circles are green inside, the calibrations are done and you may push the calibration button again to hide the circles. You may put the phone flat on the table with the bubble-view to check the inclination of the table. Let the reading settle. If the inclination is the same, irrespective of your turning, within a couple of tenths of a degree, that indicates that the calibration has been successful.



Clicking the button with the zero erases the calibration points so far, or the whole calibration. A sound effect confirms that it is erased.



Clicking the button with the i starts the movie showing the calibration procedure.



A small green c shows up when the calibration is done. It is visible also when the buttons are hidden.