



Physics Lab – Rotational Speed

with WF Smartphone Sensor Toolkit

Abstract

This physics lab demonstrates how the WF Smartphone Sensor Toolkit can be used to measure the rotational speed of a smartphone. Download the example VI to get started.



Problem/Task

Measure the rotational speed (angular velocity) of a rotating fidget spinner.

Solution

Smartphones contain gyroscopes that measure the rate of rotation around the x, y and z axes. Use the WF Smartphone Sensor Toolkit in TCP mode to wirelessly measure the rotational speed around the Z axis.

Steps

1. Place the smartphone on a fidget spinner. You might need to modify the fidget spinner so that the smartphone can rest on the rotating part of the fidget spinner. The figure above shows a solution with screws and nuts.
2. Download and install WF Smartphone Sensor Toolkit from www.wireflow.se/product/wf-smartphone-sensor-toolkit.
3. Start the WF Smartphone Sensor Toolkit app in the smartphone. The app presents the IP address of the phone.
4. Download and open the LabVIEW VI (Rotational Speed.vi), which is available as a zip file from www.wireflow.se/product/wf-smartphone-sensor-toolkit (AB0005-094 AN11 Physics Lab - Rotational Speed examples.zip).
5. Enter the IP address of the phone in the string control on the VI front panel. TCP is already selected as the communication method as a constant input to SensorAPI_Init.vi.
6. Run the VI and start rotating the fidget spinner.
7. Observe the gyroscope data. The data is presented as radians per second (rad/s).
8. The data is also scaled by a factor of 2π and presented as cycles per second (Hz). Furthermore, the data is again scaled by a factor of 60 and presented as revolutions per minute (RPM).

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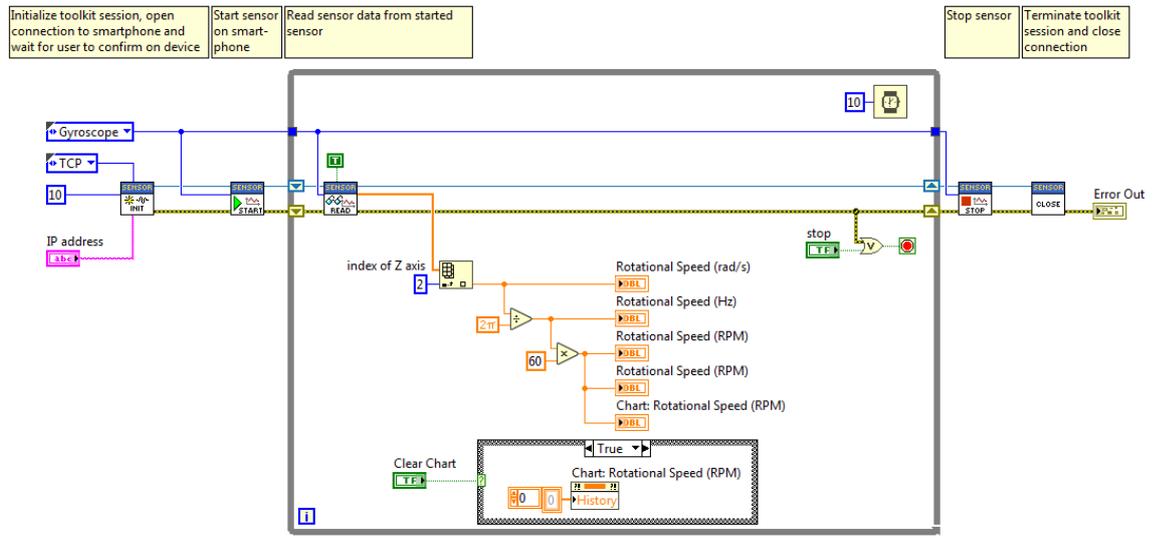
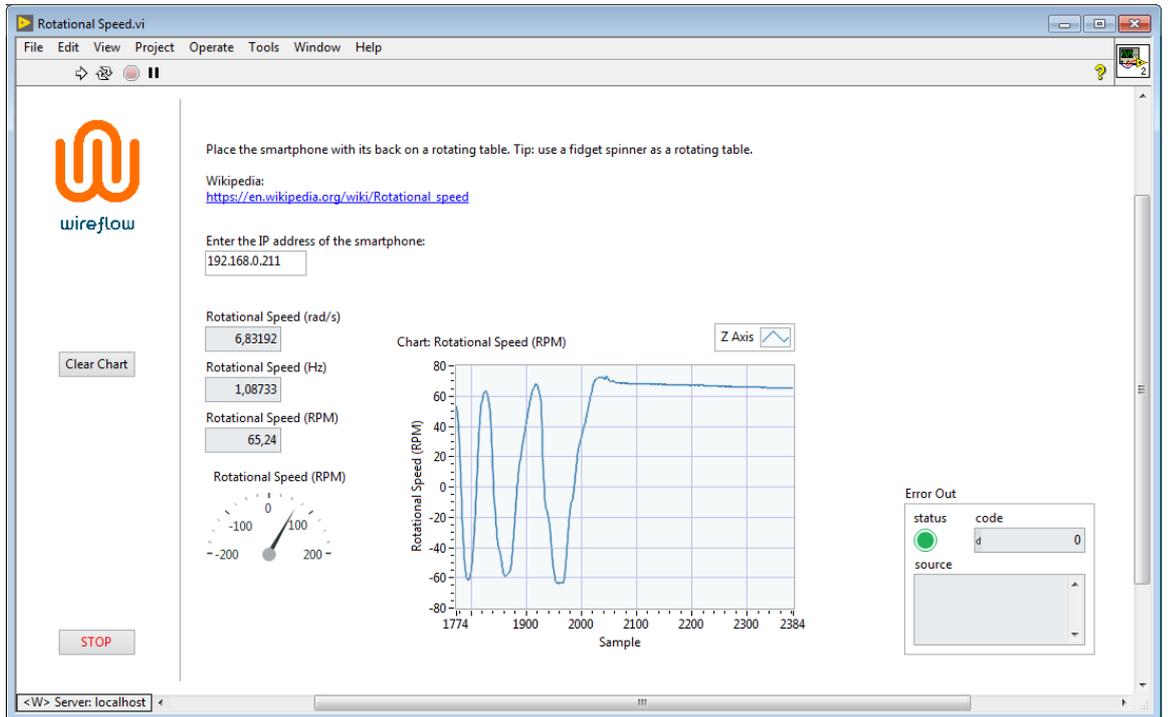
Theres Svenssons gata 10
SE-417 55 Göteborg
Sweden

www.wireflow.se

Application note no. 11
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- The chart shows the data history in RPM. To discard previous data, click Clear Chart.



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Sources

https://en.wikipedia.org/wiki/Rotational_speed