

CITA SubWG1 Brake Testing

30.1.2018

TESTEK, a.s., Bratislava

0 0 1 0  
0 1 1 0  
0 0 0 1  
0 1 1 0



# DX meter, an application for measuring the vehicle's deceleration

Ing. Peter Ťapák, PhD. Ing. Matej Rábek,  
Ing. Michal Kocúr, PhD, Ing. Juraj Matej PhD.

- TESTEK, a.s. with the Institute of Automotive Mechatronics at Slovak University of Technology in Bratislava are developing a new concept of vehicle deceleration measuring for PTI
- Measurement of vehicle deceleration by the application in the mobile device
- Transfer of measured data to the server for the PTI supervision

Measurements are evaluated by the ECE regulation 13 formula:

Average maximal deceleration  $dm$

$$dm = \frac{v_b^2 - v_e^2}{25,92(s_e - s_b)} \text{ (m/s}^2\text{)}$$

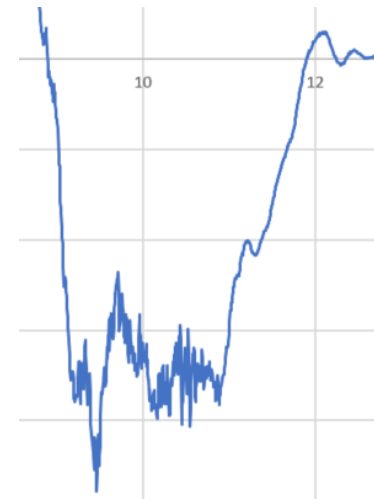
$V_0$  – initial vehicle speed in km/h

$V_b$  – vehicle speed at 0.8  $v_0$  in km/h

$V_e$  – vehicle speed at 0.1  $v_0$  in km/h

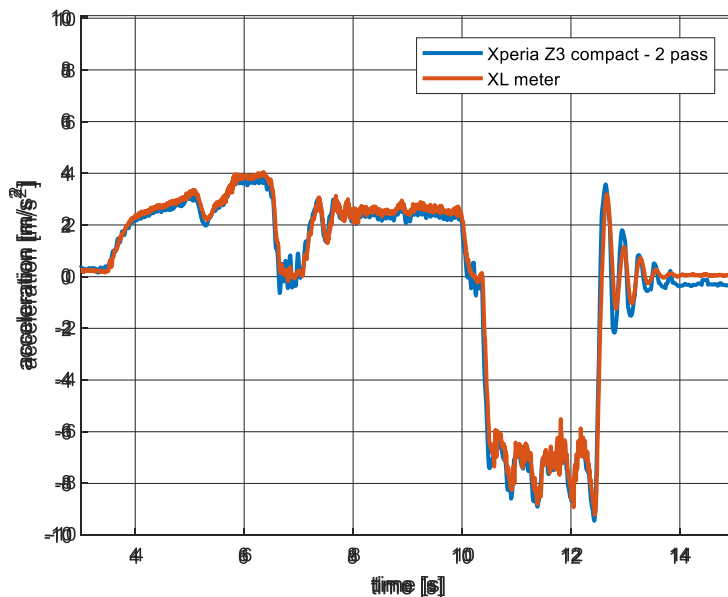
$S_b$  – distance travelled between  $v_0$  and  $v_b$  in meters

$S_e$  – distance travelled between  $v_0$  and  $v_e$  in meters



	XL meter	Phone Filter 0	Phone Filter 1	Phone Filter 2
Speed [km/h]	54.26	61.37	54.27	54.84
Decel. [m/s <sup>2</sup> ]	7.30	7.9	7.54	7.51

- Filter – Necessary
- FIR – easy to implement
- Higher order - almost no effect on result



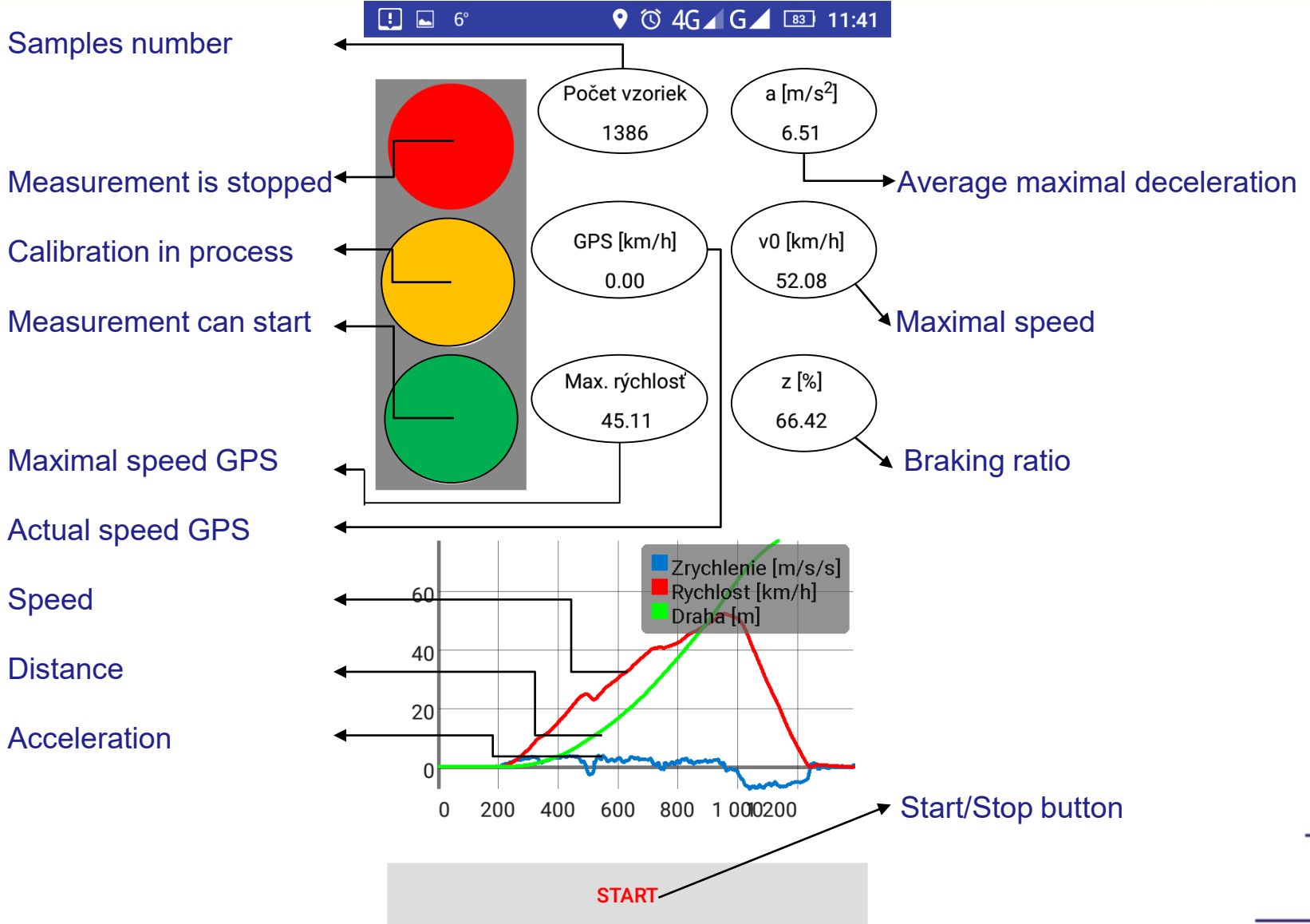
- no need to level the smartphone
- calibration starts when the „start“ button is pressed (first 100 samples)
- measuring can start when lit up green
- measuring is stopped by the press „stop“ button
- app DX meter computes the maximal average deceleration and braking ratio

$$\text{braking ratio} = \frac{dm}{g} \cdot 100(\%)$$

- app DX meter also shows the graphical results of measurement

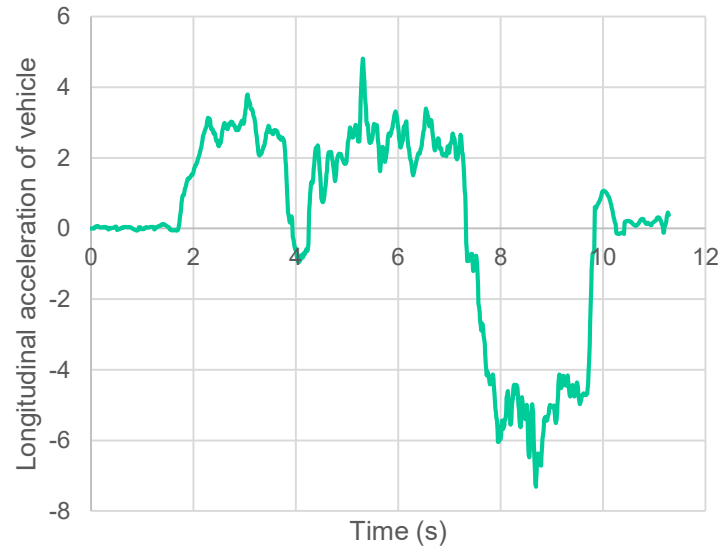
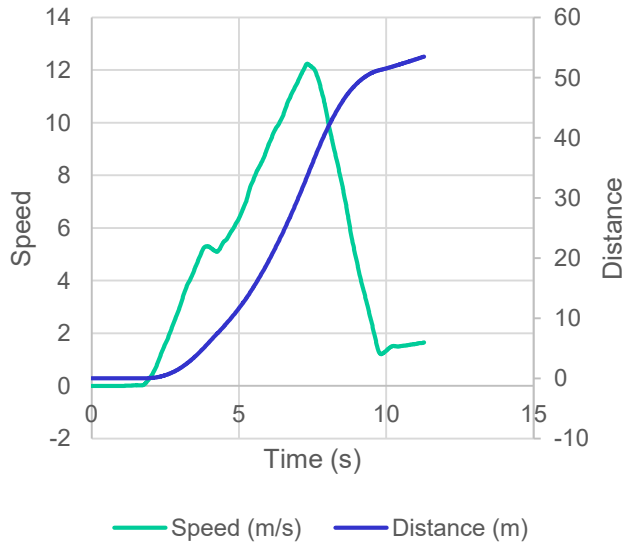
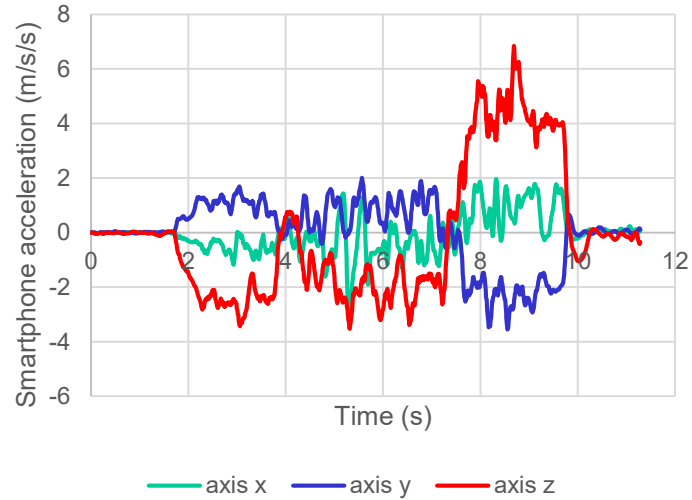
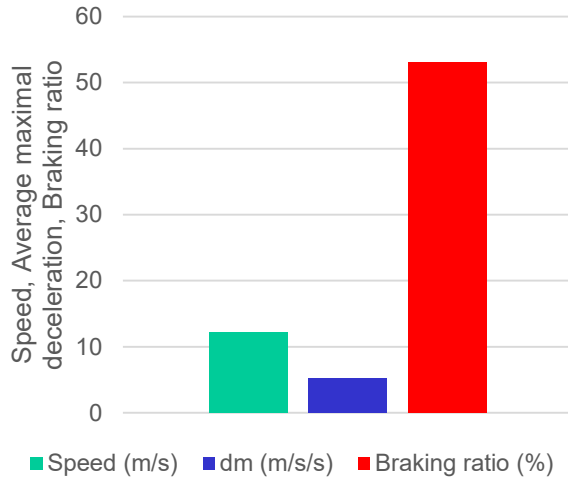
# DX Meter Application

0 0 1 0  
0 1 1 0  
0 0 0 1  
0 1 1 0



- value of braking ratio
- value of maximal average deceleration
- smartphone acceleration vs time (x,y,z)
- vehicle acceleration vs time (longitudinally)
- vehicle speed and distance vs time
- GPS coordinates vs time
- vehicle speed by the GPS vs time

# Transferred Data for the Supervision



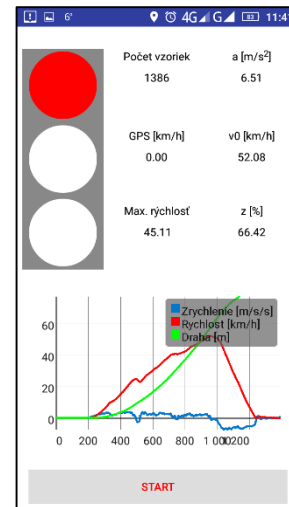


# Measurement Comparison

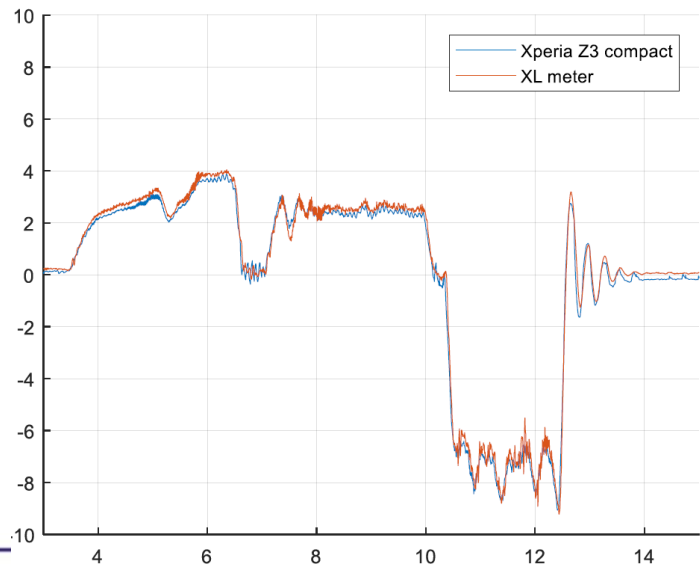
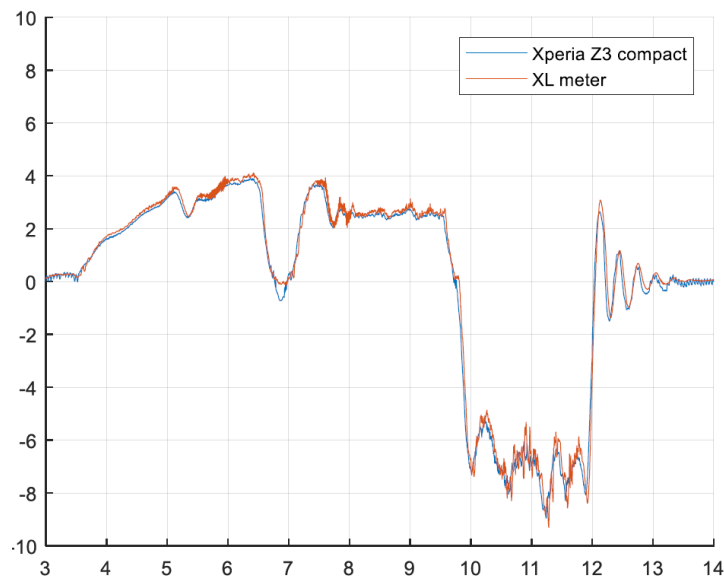
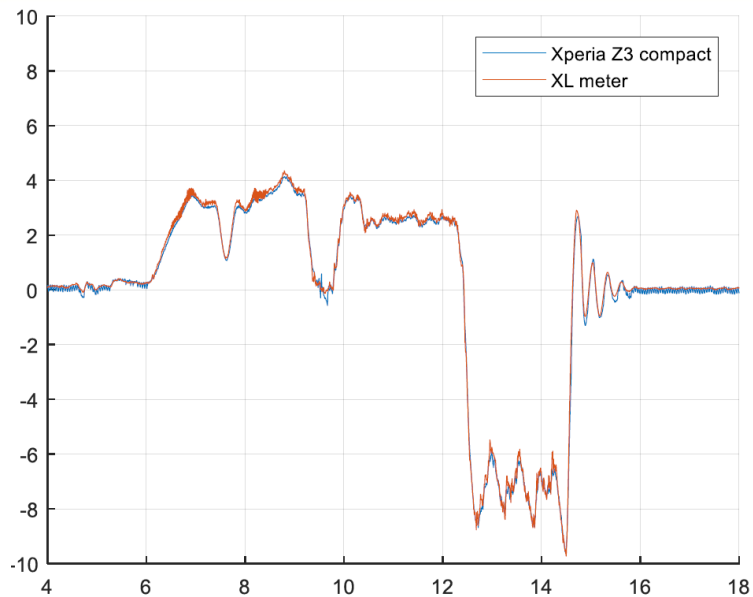
- Measurements by the DX meter app were compared with type approved decelerometer in the Slovak Republic, Inventure XL meter
- Measurements were done with multiple smartphones
- Measurements were done with various positions of smartphones
- Compared measurements seem to be very promising



VS



# Measurement Comparison



0 0 1 0  
0 1 1 0  
0 0 0 1  
0 1 1 0



Thank you for your attention