

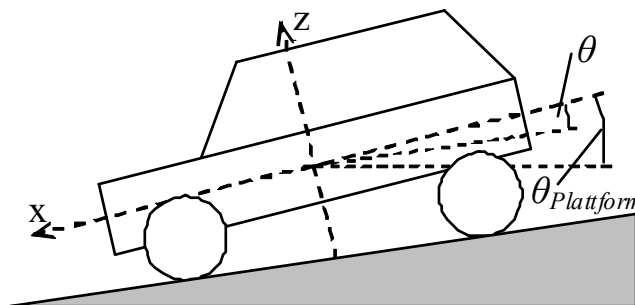
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Report title: Comparison Pitch & Roll with UC-Box and Gyro-stabilized Platform			
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There are different ways to define pitch and roll angle of a vehicle.

1. Via minimum 3 height sensors at the vehicle (for example UC-Box with non Contact Laser Ride Height Sensor)
2. With a gyro-stabilized platform.

Both principles have a basic difference. The height sensors are measuring the distance to the surface, which means the calculated signals of the pitch and roll describe the angles between the vehicle and surface.

Contrary to the height sensors the platforms are measuring relative to the horizon. Therefore the pitch angle plus the down-grade of the surface will be measured on a incline. Within a banked corner it will measure the down-grade of the curve, plus the eventually roll angle.

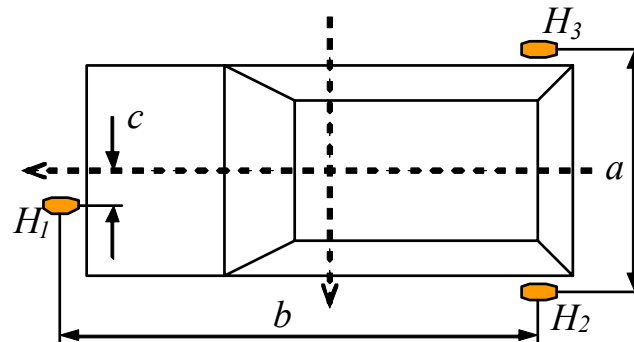


The measuring accuracy mainly contains two parameters - the measuring accuracy of the height sensors and the geometrical placement of the sensors at the vehicle. The bigger the distance between the sensors, the smaller the influence of the error of measurement of the sensors. The measuring uncertainty of HF 500C sensors averages for example +/- 1mm.

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With distances more than 1m between the sensors you can expect a measuring uncertainty in the angles from  $\pm 0,1^\circ$ .

Failures will also accrue while measuring the parameters a, b and c. A error of 1% with defining the parameter will cause an approximate 1% error (regarding the absolute value) with the angles, whereas parameter A has effects to the roll angle, parameters B and C to the pitch angle.



With inertial navigation platform the error of measurement mainly depends on the quality of the gyros and the reference-signal (mostly GPS). The support of the signals is necessary, as otherwise the angles would clear out through the drift. With standard platforms a measuring uncertainty for pitch- and roll angles of  $\pm 0,1^\circ$  will be indicated. By using DGPS or other correcting signals the accuracy could be increased.

However a warm up of about 15 minutes (the car must continuously be driven) will be necessary to achieve the given measuring accuracy. During this warm up the parameters for the internal filtering will be automatically optimised. Furthermore it is essential that the GPS aerial has "good" satellite reception. If you lose satellite reception the system will need about five minutes to achieve the specifications..

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