



Capacitive Inclination Sensor

HSG-IMAT (Stuttgart), 2E mechatronic (Wernau)
MicroMountains Applications (Villingen)



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BACKGROUND and BASICS

- An inclination sensor determines the orientation angle of an object respective to the earth's gravitation field.
- **Sample applications:**
 - Special vehicles: cranes, digger, agricultural machines
 - Medical: sick bed, operating tables
 - Metrology: digital levels, laser distance-meters
 - Consumer electronics: controller joysticks, segway
- HSG-IMAT has competences in design, prototyping and testing of capacitive electromechanical systems.



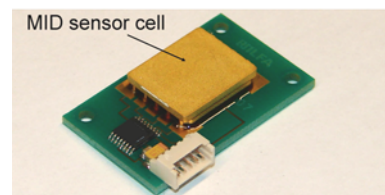
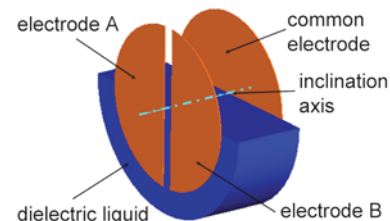
Quelle: Segway



Quelle: Amazon

CONCEPT and SOLUTION

- The inclination sensor is based on a capacitor arrangement with a dielectric liquid between the electrodes. A rotation of the electrode arrangement leads to an inclination dependent differential capacity which is detected by a special electronic circuit.
- In the AiF-project 14742N, first samples of such a fluidic inclination sensor with 180° as well as 360° measuring range were designed, fabricated and tested. The sensor cell with the sensing electrodes housing and the liquid was fabricated using a laser MID technology. The sensor showed an almost linear output signal, very less noise, high resolution and accuracy as well as controllable temperature behavior.



STATUS and OUTLOOK

- In cooperation with Micromountains Applications AG, HSG-IMAT's inclination sensor technology is transferred to our industrial partner 2E mechatronic, Wernau. Therefore the assembly technology of the sensor was reengineered to allow customized layouts and systems as well as lower manufacturing costs for smaller units.
- **Features of inclination sensors fabricated by 2E:**
 - Measuring range: 360°
 - Resolution: <math><0,01^\circ</math>
 - Accuracy range: 0,1°
 - Digital signal output: I²C
 - Customized designs, packaged or on PCB
 - Size: e.g. 79 x 26 x 15 mm³
- 2E mechatronic plans to start the production of the inclination sensor by the end of the first quarter 2009.
- You are interested in the new inclination sensors from 2E mechatronic or in R&D services on capacitive sensor systems? Please do not hesitate to contact us.



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