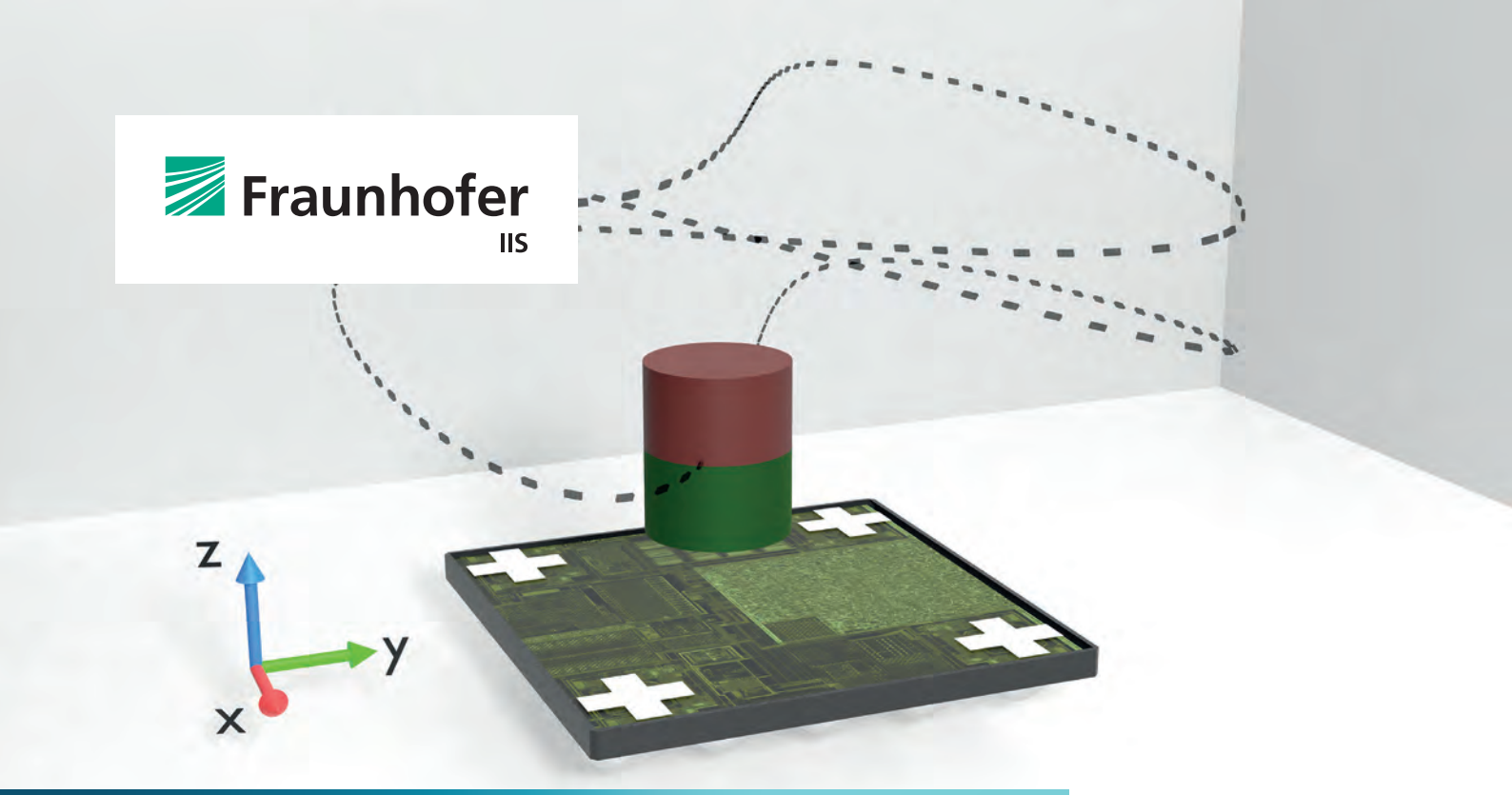
Fraunhofer IIS



Multi-dimensional position measurement © Fraunhofer IIS

HallinMotion®

Compact and universal position sensing with multiple degrees of freedom

Reliable, robust, accurate – with HallinOne® technology for 3D magnetic field sensing and HallinMotion® technology for intelligent application-specific algorithms, up to six mechanical degrees of freedom can be precisely measured using just a single IC and a standard permanent magnet.

Key Facts

Typical measurement data of a specific application:

- Scan rate: f: 100 Hz
- Range of movement: X, Y: - 5 to 5 mm
  Z: 3 to 5 mm
  α, ß: - 20° to 20°
  ø: - 90° to 90°
- Accuracy: X, Y, Z: ca. 0,05 mm
  α, ß, ø: ca. 1°

The achievable requirements are significantly influenced by the size of the magnet and the number of sensor ICs, among other factors.

Characteristics

- Non-contact, absolute position measurement – even through non-magnetic materials
- Higher position accuracy through detection of rotary and transverse motion
- Accuracy down to the micrometer range
- Robust to external magnetic fields
- Independent of temperature
- Cost-effective due to integration of the sensor in CMOS technology
- Extremely compact assembly space, offering greater design flexibility for the customer.
- Self-monitoring through integrated coils on the sensor chip

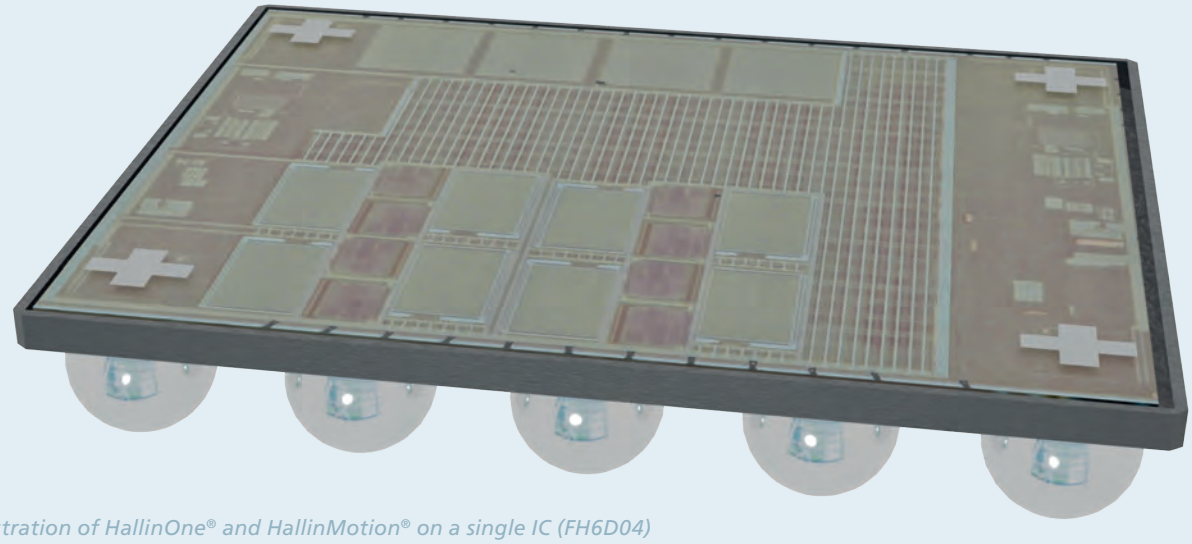


Illustration of HallinOne® and HallinMotion® on a single IC (FH6D04)
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The new multidimensional position measurement algorithm, HallinMotion®, developed by Fraunhofer IIS, is the first to allow for all six mechanical degrees of freedom with a single measuring system. The measuring system, comprising a magnet and Hall sensor IC, enables high-speed, highly accurate data acquisition. The system is highly robust against temperature fluctuations and external fields, making it suitable for a range of applications.

The new algorithm can also be used in situations where previous 1D or 2D systems were unable to achieve the desired level of accuracy due to interference from lateral movements. This results in more robust and simpler existing applications. Integrated self-monitoring also allows for use in safety-critical applications, thanks to its built-in monitoring capabilities.

Our Offer

- Investigation and development of system concepts
- Analysis and reduction of the influence of rotary and transverse motion in positioning systems
- Feasibility study
- Safety analyses: FMEA, FMEDA, safe failure fraction
- Development of customized Hall sensor ICs (ASICs)
- Development of application-specific algorithms
- Development of prototypes
- Transfer to series production and qualification

6D Application Areas

- Control elements in the areas of automotive, household appliances as well as in construction and agricultural machinery (use in safety-relevant applications and harsh environments with dust dirt and vibration)
- Chassis monitoring systems
- Robotics
- Control of CAD applications
- Monitoring of high-precision motion sequences down to the micrometer range
- Replacement of multi-sensor application with a single sensor IC

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