Fraunhofer
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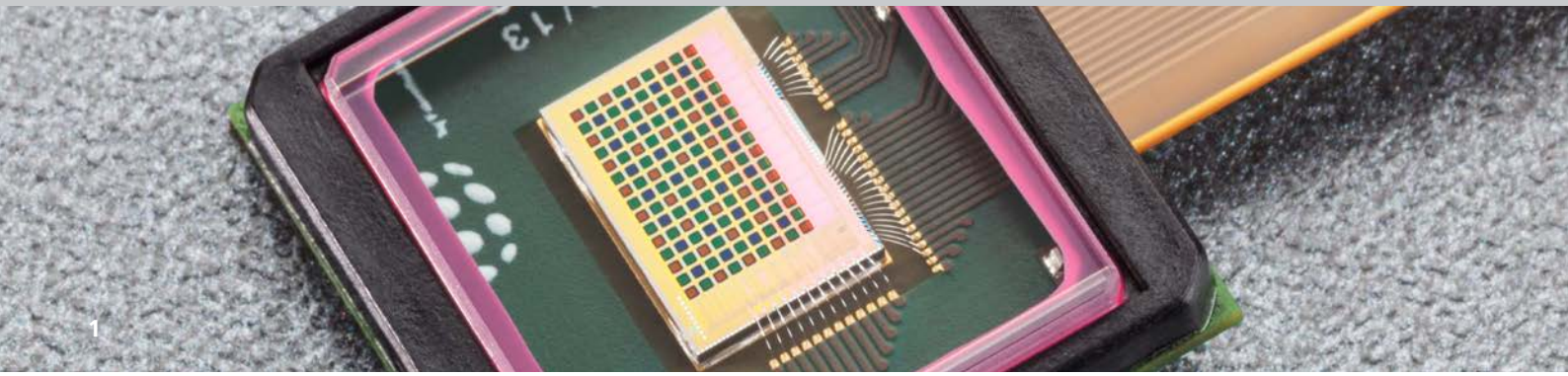
FRAUNHOFER INSTITUTE FOR INTEGRATED CIRCUITS IIS



1 *Image sensor for a microlens multi-aperture camera system*
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APPLICATION-SPECIFIC IMAGE SENSORS AND DETECTORS

We develop detectors, optical sensors, and sensor systems as application-specific integrated circuits (ASICs). Our expertise covers all system levels, from photodiodes and pixels to complete optical sensor systems. Our services comprise the whole development process, from feasibility studies to transfer into series production. For our ASICs we use commercial CMOS technology, so they can be manufactured cost-effectively at high volumes.

Fraunhofer Institute for Integrated Circuits IIS

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Services:

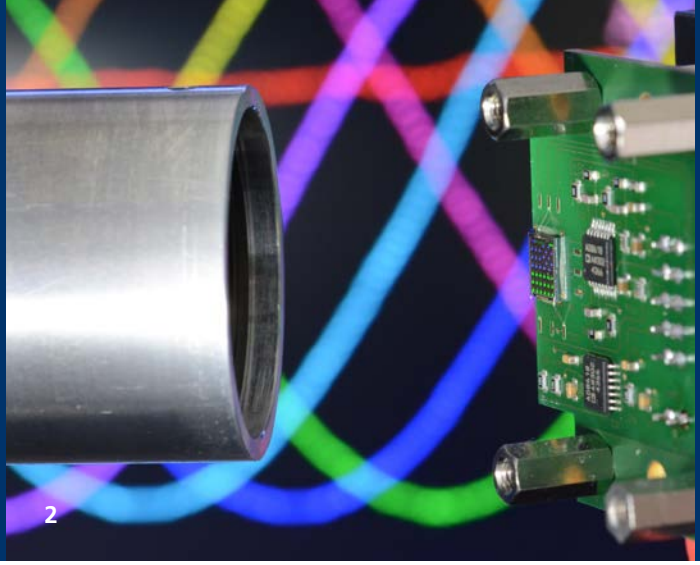
Research
- Feasibility studies
- System definition
- Prototyping

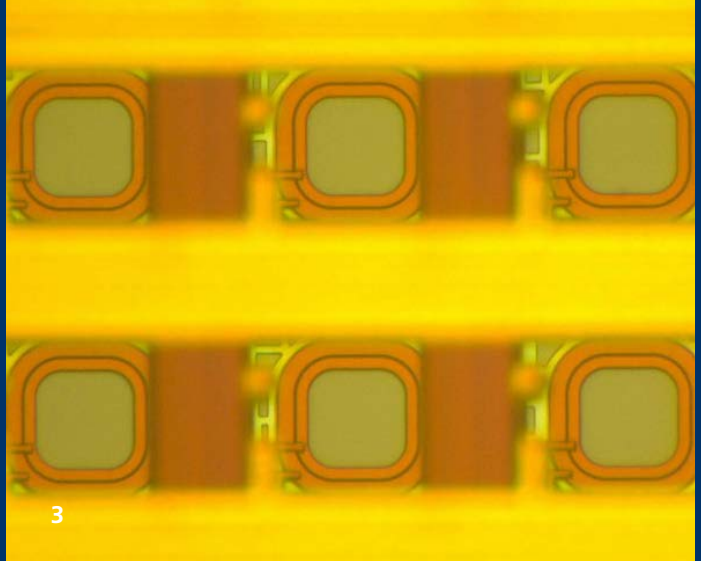
Sensor component design
- Simulation of optical systems
- Design of nanostructured spectral and polarization filters
- Photodiode arrays and image sensors
- Radiation and electron detector pixels and arrays
- Analog frontend and A/D converters
- Digital signal processing
- Interfaces

ASIC development
- Time-of-flight sensors
- Application-specific solutions
- Color and multispectral sensors
- Polarization sensors
- Optical angle encoders
- Radiation-tolerant circuits

System design
- Electrical system design
- Optics design from nano- to macroscale
- Design of spectral and polarization sensing systems

Support services
- Electrical and optical characterization
- Transfer to series production
- Supply chain management





Application-specific image sensors

Together with our commercial manufacturing partners and their established opto-CMOS processes, we are able to develop and deliver non-standard image sensors with state-of-the-art performance. This allows us to address requirements which cannot be met by standard products.

Applications

- Special pixel arrangements
- Unique geometry features, e.g., endoscopes, wearables
- Multi-aperture or microlens devices
- Ultra-low to high production volumes
- Replacements for discontinued products

Benefits

- High-quality, low-risk design
- Design flexibility

LiDAR sensors

For different applications, we develop time-of-flight (ToF) image sensors and ultra-fast line and image sensors for optical triangulation. The aim of both principles is to measure of distances to objects, walls, and boundaries.

Applications

- Vehicle-environment monitoring
- Indoor localization
- Gesture recognition

Benefits

- Fast prototyping
- Large IP portfolio

Multispectral or polarization sensors

By applying our nanoSPECTRAL plasmonic filters to photodiodes in optical sensors, either spot measurements or imaging can be achieved. The number of photodiodes and pixels can be adjusted in order to meet customer requirements.

Applications

- LED monitoring and control for human-centric lighting, smart greenhouses or automotive lighting
- Chip-size spectrometers for analyzing gases and liquids, or solid material
- Machine vision for quality control, sorting, and smart farming
- Color sensors for industrial automation

Benefits

- High number of spectral channels
- Minimum costs

Detectors

We develop both scintillator-based and direct-converting CMOS detectors for X-rays and gamma rays, as well as for electron beam detection with customer-specific specifications and form factors. By using dedicated design methods, we achieve high levels of radiation tolerance.

Applications

- Medical and industrial X-ray and gamma-ray systems
- Electron beam scanners

Benefits

- Fast prototyping
- Large IP portfolio
- Applicable in radiation-exposed environments

Working with us

We are an application-oriented research organization with long-term experience in the field of integrated sensors and circuits. We work fabless with independent foundries, so it is always just a small step from experimental prototypes to series production. Our partners and colleagues inside and outside the Fraunhofer-Gesellschaft provide optimum interdisciplinary solutions for all questions.

General R&D benefits

- Independent design service and supply chains
- Realization of established or experimental solutions
- Fast transfer to production
- Access to public funding

2 *Optical rotary encoder using integrated polarization filters*
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3 *Single photon avalanche diode (SPAD) array for direct time-of-flight measurements*
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