1

1 *ASIC for intra ocular lense control*
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**Fraunhofer Institute for
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INTEGRATED CIRCUITS FOR TINY SENSOR SYSTEMS

Sophisticated applications require highly integrated sensor solutions, combining several functions on a single chip. Application specific integrated sensor systems provide significant benefits enabling tiny, light and ultra-low power solutions, which cannot be realized using discrete components. We plan, dimension and develop integrated circuits according to our customers' demands. We support the entire development process – from the first idea to volume production.

Benefits of integrated sensor solutions

– Reduced system size
– Low-power consumption
– Optimized performance due to perfect application adaption
– Extended temperature range up to 175 °C
– Knowledge protection by integration and certification functions
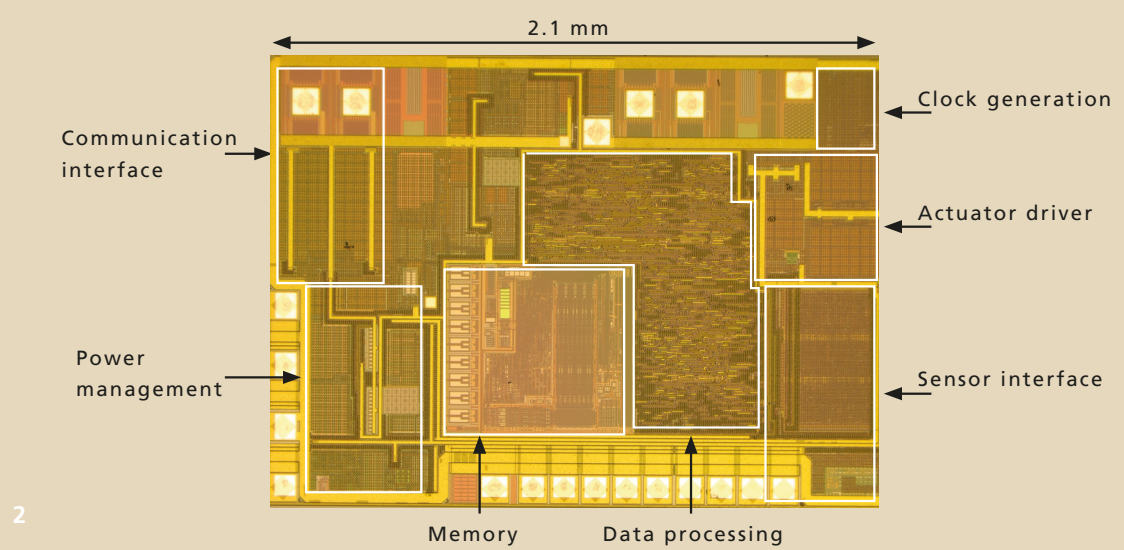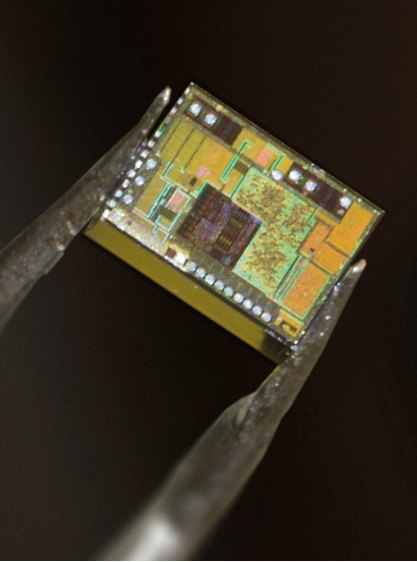– Developed in CMOS technology: reduced cost at large volume

The CMOS integration combines application optimized high performance analog circuits with extensive digital signal processing and high voltage electronics on chip.

Application specific, independent IC strategy

The combination of sensor system know-how and IC development experience allows us to explore your application specific benefits of an integrated circuit solution. **System and requirement analysis** in close cooperation with our customers enables us to present the best partitioning and integration strategy for your sensor system ideas and solutions.
Clear time, cost and risk estimation prior design start. This clear overview of the whole development until volume production allows our customers to decide about the next steps.

Clock generation

Communication interface

Actuator driver

Power management

Sensor interface

Memory   Data processing

2.1 mm

2

Our services along the development process

Specification engineering

We support the development of the optimal ASIC requirements specification. System and feasibility studies can be used to provide insight into critical parameters and necessary functionality right at the project start. This includes development of the implementation specification and risk analysis, which is required to provide accurate NRE- and chip cost estimations as well as the time plan.

With Fraunhofer IIS operating fab-less and fab-independent, our studies include a requirement dependent CMOS process selection.

ASIC and system design

Our established design flow avoids re-designs and reduces the development cost and time. Detailed evaluation of the first silicon chips proves the conformity to the specification before the transfer to volume production. Production test planning and FMEA are part of the design flow to ensure easy transition to the next phase.

Transfer to production

The production test and qualification are essential parts of an ASIC project. The series production test is implemented and qualified based on a test specification. If re-quired by the target application, Fraunhofer can assist with the ASIC qualification.

Supply chain management

Fraunhofer IIS does not own any produc-tion facilities and operates, therefore, fab-less. The supply chain is established in close cooperation with different commercial CMOS foundries and test and packaging partners. We can also provide small volume production and prototype services.

Access to public funding

As a non-commercial research institute we offer independent and unbiased solutions and easy access to public funding for scientific pre-competitive research projects.

IP re-use

The re-use of silicon proven circuit blocks reduces the project risks and is applied as often as possible. In case of special requirements, re-use might not be possible. Nevertheless, existing circuit blocks are used as a starting point for the design to reduce the development costs and design risks.

SoC technologies

We provide full sensor systems on chip (SoC) by combination and design of a wide range of functional building blocks:
– References and ADCs
– Amplifiers and buffers
– Capacitive and charge measurement interfaces
– Photodiode and SPAD readout
– Power management and high voltage circuits
– Integrated digital signal processing
– Integrated microcontrollers
– Radio-frequency transceivers
– RF-ID based inductive power supplies and communication
– Nanostructured optical filters
– 6D position measurement with HallinOne®
– Environmental sensing

2   *Layout of a highly integrated sensor ASIC for eye-implantable application*
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