Fraunhofer
IIS

FRAUNHOFER INSTITUTE FOR INTEGRATED CIRCUITS IIS

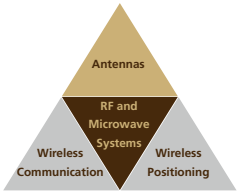
BLACKFIR®
ADAPTIVE LOCALIZATION TECHNOLOGIES

FRAUNHOFER IIS – YOUR PARTNER FOR RADIO LOCATION TECHNOLOGY

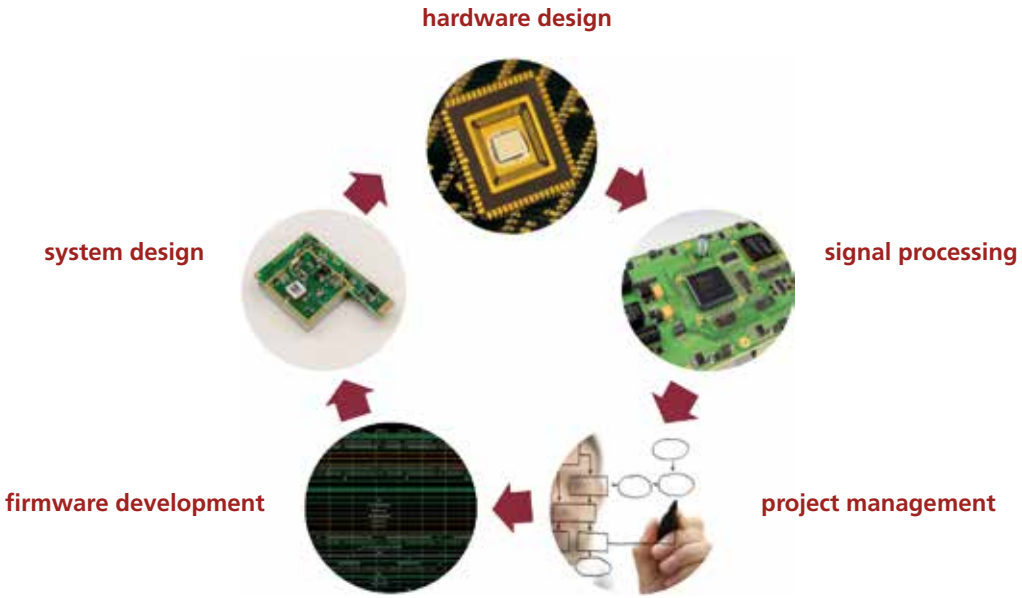
Radio location and communication has been a key area of expertise at Fraunhofer IIS for more than 20 years. Our team of 50 researchers can support all phases of your development process, from design to industrializing the product. Numerous small-to-medium enterprises, as well as large companies, are already exploiting our innovation skills in the fields of radio communication, radio location and antenna technologies.

The Locating and Communication Systems department currently has a staff of around 30 employees actively working on angle-of-arrival and time-based radio location technologies, event detection and the corresponding applications.

We boast a broad range of expertise from system design, signal processing and hardware design, to firmware development and project management.



Fraunhofer IIS offers years of extensive experience and a rich portfolio of services in the fields of radio communication and radio location!



BLACKFIR® – PROCESS

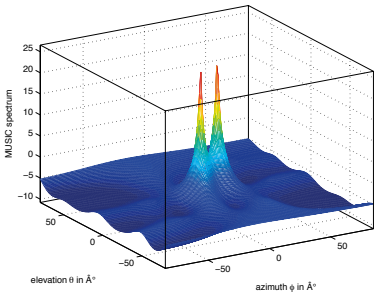
THE BLACKFIR TECHNOLOGY IS BASED ON THE FOLLOWING METHODS:

Angle of arrival:
The azimuth and elevation arrival angles of a signal are estimated by means of an antenna array.

Distance measurement:
The distance to a transponder can be determined by measuring the round-trip time.

Additional sensors:
The reliability and accuracy of location data is improved through the use of additional sensor data (acceleration sensors, barometers, gyroscopes).

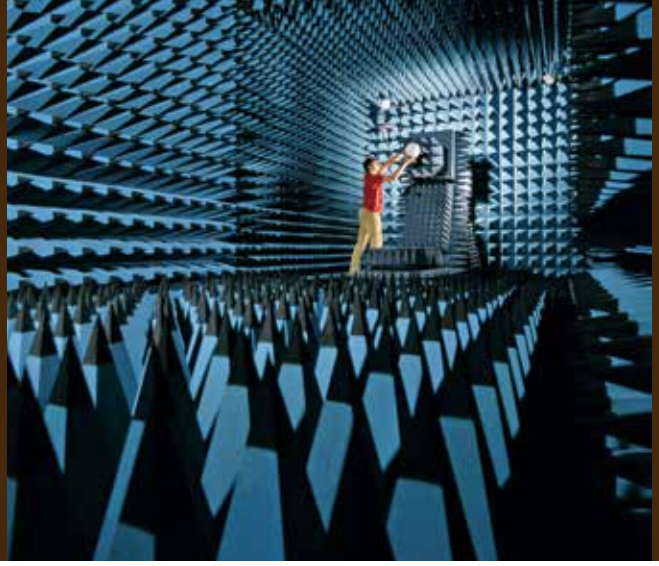
Sensor fusion:
Reliable position data can be generated by combining the information from the different measurements.



Angle-of-arrival measurement MUSIC spectrum

ADVANTAGES AT A GLANCE

- Adaptable to different frequency ranges
- Possibility to utilize various wireless transmission standards
- Deployable both indoors and outdoors
- Modular base technologies available that serve as a foundation for customer-specific modifications and developments



BLACKFIR® – SYSTEM TECHNOLOGY

ANTENNAS

- 2D array antennas for determining the azimuth and elevation angles of objects
- Adaptable to different frequency ranges
- Anechoic chamber provides professional measurement infrastructure
- Customized antenna design

5.8 GHz array antenn

SIGNAL PROCESSING PLATFORM

- Modular systen architecture enables fast integration for integration of customer-specific communication modules or interfaces
- Based on state-of-the-art FPGA, DSP and microprocessor technologies
- Extensive flexibility and capability enables support for a variety of algorithms

Dgital signal processing platform

HF-FRONTEND

- Phase-coherent multichannel receiver
- Adaptable to prevalent ISM frequency bands
- Option to implement customer-specific modifications and developments

RF front end

BLACKFIR® – SYSTEM DESIGN

Our research activities produce a broad range of results, from custom-made technology solutions to flexible and adaptable system and platform developments.

BLACKFIR® SINGLE POINT LOCATOR

- Locating objects within a radius of 100 meters with a single receiver
- Minimal instrumentation and configuration effort

Single point locator

BLACKFIR® TRANSPONDER

- Modular structure
- Option to equip the system with sensors for light, temperature, acceleration, air pressure and magnetic field
- Sensors based on state-of-the-art MEMS technology
- Suitable for indoor and outdoor applications
- Lightweight and robust design
- 2.4 GHz ISM frequency range
- Wirelessly rechargeable battery

Transponder development: The WiSmIt µ

BLACKFIR® – APPLICATIONS

THE BLACKFIR® LOCALIZATION SYSTEM IS SUITABLE FOR A WIDE RANGE OF INDOOR AND OUTDOOR APPLICATIONS:

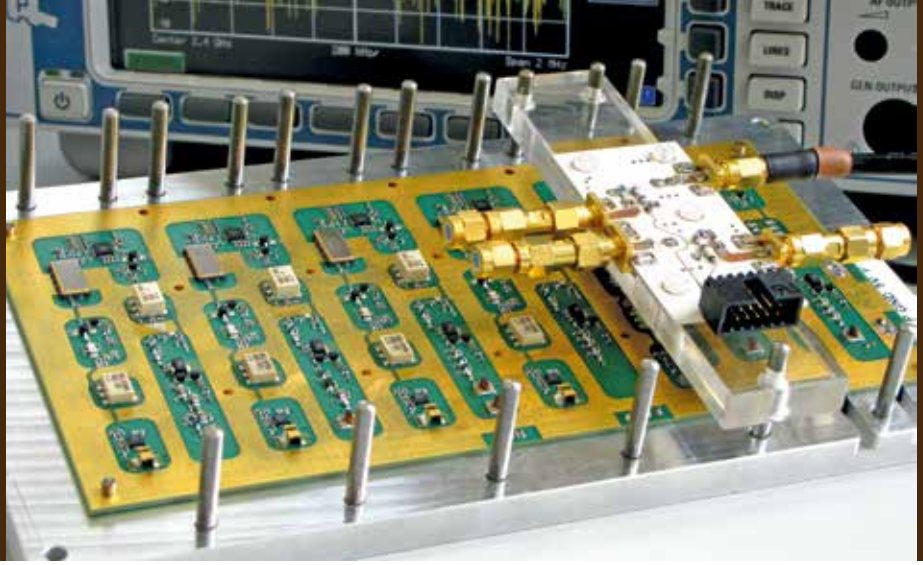
- Logistics and security systems
- Emergency services
- Recreation and leisure
- Manufacturing
- Telemetry and sensor networks
- Robotics
- Driver assistance systems

We currently offer 868 MHz, 2.45 GHz and 5.9 GHz base systems that can be adapted to a variety of applications.

Fraunhofer IIS has developed extensive experience in localization systems through its involvement in various projects in the logistics and security industries.

Application in logistics processes

Application at the airport



BLACKFIR® – SERVICES

Strong technology partners with solid expertise ensure extensive market success. We serve as your outsourced R&D department. By relying on our experience and know-how in the field of localization systems, you can enjoy a variety of benefits including:

- Solutions tailored to the specific needs of the customer with respect to accuracy, response time behavior, field of application and cost
- Variety of scalable localization systems that can be customized to the individual target environment
- Up-to-date information regarding potential applications and the current market situation

The BlackFIR® 2.4 development kit for real-time localization from Fraunhofer IIS provides a state-of-the-art platform for testing directly localization technologies in your applications and environments, allowing you to develop custom solutions.

BlackFIR 2.4 Development-Kit

FOR MORE INFORMATION VISIT US AT

WWW.IIS.FRAUNHOFER.DE

FRAUNHOFER INSTITUTE FOR INTEGRATED CIRCUITS IIS

Director
Prof. Dr.-Ing. Albert Heuberger
Am Wolfsmantel 33
91058 Erlangen, Germany

Locating and Communication Systems Department
Nordostpark 93
90411 Nürnberg, Germany

Contact
Dipl.-Wirtsch.-Ing. René Dünkler
Phone +49 911 58061-3203
Fax +49 911 58061-3299
rene.duenkler@iis.fraunhofer.de

Dipl.-Ing. Marc Fassbinder
Phone +49 911 58061-3243
Fax +49 911 58061-3299
marc.fassbinder@iis.fraunhofer.de

www.iis.fraunhofer.de