Hardware for 24, 60, and 79 GHz Radar Applications

A MIMO Radar Kit for Fast Prototyping

Locating and Motion Tracking

Developing radar sensors requires a considerable investment of time and financial resources. This creates an entry barrier especially for developers new to the field or interested in moving to other radar technologies. Fraunhofer IZM has prepared a development platform to lower that threshold and empower users to design and trial radar applications before the product-specific hardware is finished.

Specialists at Fraunhofer IZM have teamed up with colleagues at the Technical University of Berlin to design a universal radar platform that combines an antenna-equipped radar frontend with signal processing capabilities for applications in the 24, 60, and 79 GHz frequency range. The signal processing unit is fitted with a plug & play interface that allows it to connect to a Raspberry Pi or Jetson Nano, and the platform's individual modules can be mixed and matched to fit the specific client's needs. The fully validated platform also accommodates other adjustments and refinements.

The platform delivers data in the form of a processed point cloud with information about an object's location in space (on the x, y, and z axis) and speed (4D radar). Alternatively, the raw radar data can be shared via an FPGA platform. Its software allows the constant false alarm rate (CFAR) and chirp as well as bandwidth parameters to be put in, and signal amplification and resolution can be adjusted on the frontend.

The platform comes with a customized development firmware, with a set of features already included in its basic version: data management, radar signal pre-processing (Fast Fourier Transformation (FFT) and windowing), CA-CFAR and FFT angle estimation, and data clustering in the point cloud.

With the cost efficient design of the radar kit, Fraunhofer IZM supports fast prototyping for 24, 60, and 79 GHz radar sensor applications as well as the kit's use for education purpose

MIMO-Radar-Kit:

- Combining a 24, 60, or 79 GHz radar sensor with a Raspberry Pi or Jetson Nano (other platforms possible with compatible pin layouts)
- Delivering point cloud data via USB for standalone use
- Delivering raw data via Ethernet
- Modular and space-saving design for greater versatility
- Variable interfaces for retrieving (USB) or preprocessing (SBI) data
- Freely configurable firmware

Technical Specifications of the 24 GHz Radar Module

- Silicon Radar Radar IC / Infineon IC
- Tx/Rx signal channel
- Field of view: 30° (depending on the choice of antenna)
- Range: 100 m
- Selection of standardized interfaces (LVDS / SPI)
- Easily customized stamp footprint
- Power intake: 5 V, 0.5 A

Technical Specifications of the 60 GHz Radar Module

- Texas Instruments IWR series with integrated DSP
- 3 TX x 4 RX MIMO design
- Field of view: 30°
- Angular resolution: < 15°
- Range: 20 m
- Data processed in mmIC
- Selection of standardized interfaces (LVDS / SPI / UART / I2C)
- Easily customized stamp footprint
- Power intake: 5 V, 0.5 A

Technical Specifications of the 79 GHz Radar Module

- Texas Instruments AWR series with integrated DSP
- 3 TX x 4 RX MIMO design
- Field of view: 30°
- Angular resolution: < 15°
- Range: 200 m
- Selection of standardized interfaces (LVDS / SPI / UART / I2C)
- Easily customized stamp footprint
- Power intake: 5 V, 0.5 A

Radar Sensing Applications:

- Object recognition
- Distance, fill level
- Motion, movement patterns

Features of the Evaluation Platform:

- Standardized interface
- Mode selector
- Reset switch
- Monitoring LEDs
- USB interface and
- EEPROM for firmware

Facilitates easier data processing

Advantages:

- Efficient development of new radar system designs
- Fast and cost effective prototyping of radar designs
- Testing and evaluation of diverse locating and motion tracking applications

Areas of Application:

- Industrial sensors
- Robotics
- Autonomous vehicles

The radar system is part of a universal radar platform developed by Fraunhofer IZM to facilitate efficient radar projects. The Ready-to-Plug & Play radar kit can handle 24, 60, and 79 GHz applications for ranges from 0.1 to 260 m and angular resolutions of less than 5°. The different frequency options can be combined with single, phase array, and MIMO antenna designs.

Discover our packaging and frontend solutions for radar modules!

Please, contact us!

More information

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