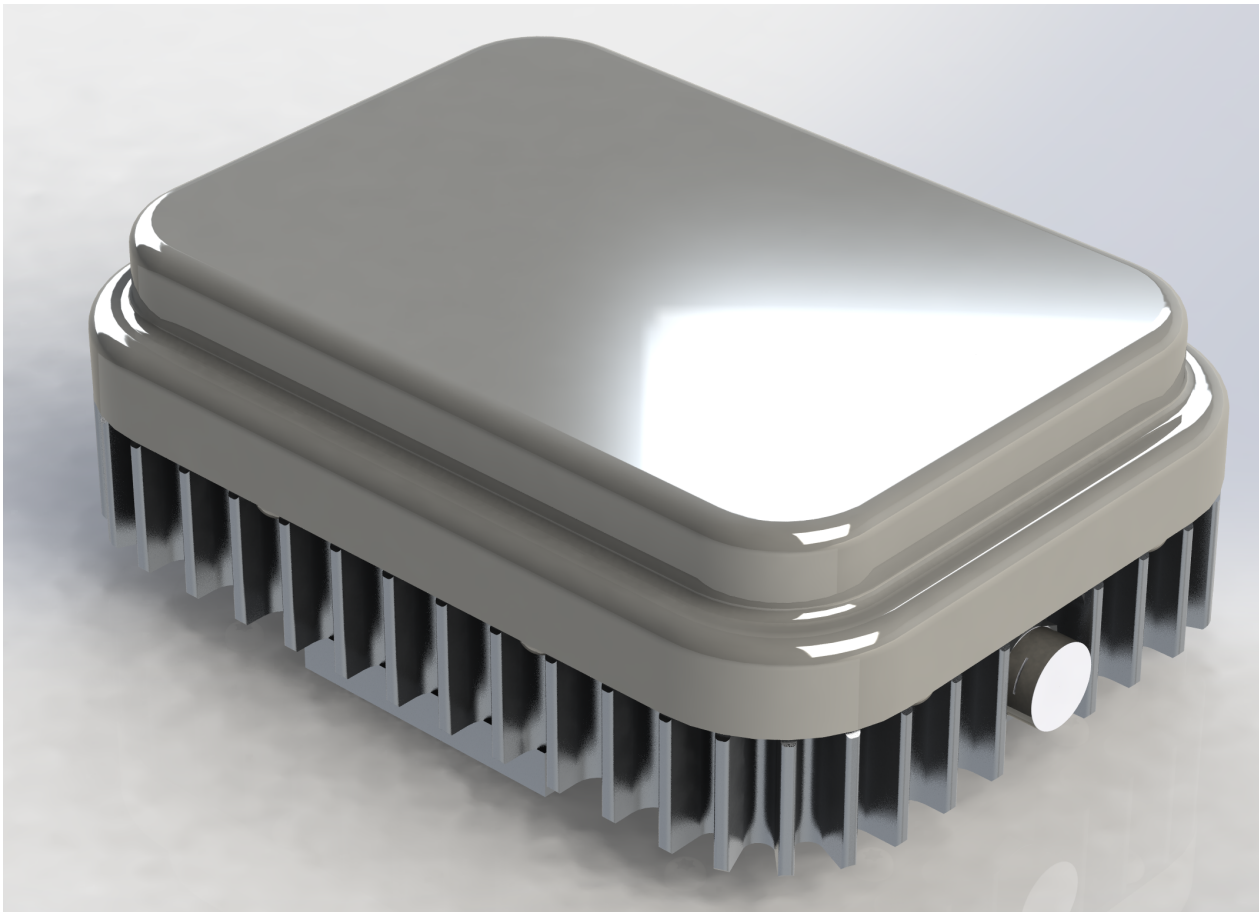# QR77mDev

Product Specification

Background

QR77mDev is a development system for radar based vehicle safety, driver assistance and autonomous vehicle systems.

Radar Functionality

The radar performs measurements with an update rate of 25Hz. Hence; every 40ms the radar transmits information about the 100 most significant objects (largest amplitude). Each object is described by:

- Range [m]: distance in meter between the radar and the object.
- Range rate [m/s]: change rate in meter per second.
- Azimuth [deg]: angle (in the horizontal plane) between the radar longitudinal orientation axle and the object.
- Elevation [deg]: angle (in the vertical plane) between the radar vertical orientation axle and the object.
- Amplitude: a measure reflecting the magnitude of the radar detection.
- Signal-to-noise ratio: a dimensionless measure reflecting the magnitude of the radar detection in relation to the magnitude of the surrounding range/Doppler bins.
- isValid: Boolean reflecting the validity of the detection.

The radar detections are not tracked/filtered; only the raw detections are listed.

The maximum useful range for the radar is at least 100m. The minimum unambiguous Doppler-velocity range is 2* [-40, 40] m/s.
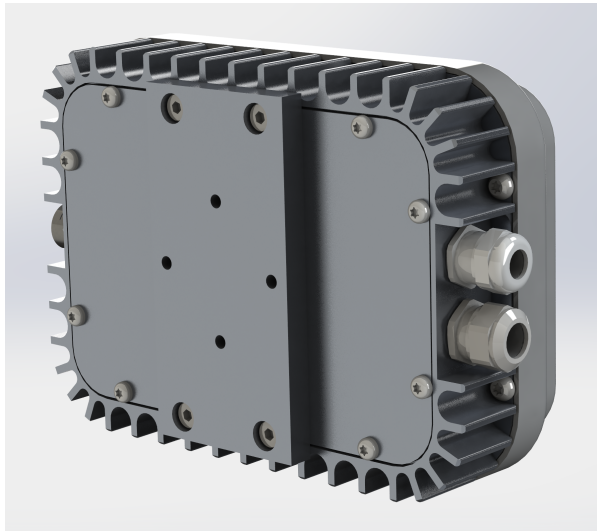
The radar produces unbiased estimates of the range, range-rate, azimuth, and elevation on a moving platform up to 40m/s and yaw-rates up to 15 deg/sec. (This requires that the radar get information about the vehicle longitudinal velocity and the vehicle yaw-rate together with the geometry for the radar position in relation to the vehicle attached coordinate system used to compute the longitudinal velocity and the vehicle yaw-rate. The vehicle lateral velocity may be assumed to be negligible.)

Development tools

The development system includes the following supporting tools:

- a data logging tool which produces files that can be loaded in e.g. Matlab.
- a real-time tool for overlaying and visualizing the stream of radar detections on video from a camera aligned with the radar
- a time-stamp of the capture time of the transmitted radar data

Technical Specification

Area	Data
Max range resolution	0.1 m @ 20 dB SNR
Max. speed resolution	0.2 m/s @ 20 dB SNR
Update rates	20 Hz
Cycle time	50 ms
Number of detected objects (raw detections)	64
Outputted parameters per each detection	Range (m) Range rate (m/s) Azimuth (deg) Elevation (deg) Amplitude SNR isValid
Interfaces	1pcs USB3
Size, Approximately	205x150x75 (mm)

Area	Data
Frequency range (selectable)	76 GHz to 79 GHz
Angular beam coverage	Azimuth ± 45 @ 6dB two way Elevation ± 15 @ 6dB two way
Unambiguous angular coverage at receive	Azimuth ± 50 Elevation ± 20
Angular resolution	Azimuth 5 mrad @ 20 dB SNR Elevation 10 mrad @ 20 dB SNR
Unambiguous range	125 m
Unambiguous speed	±50 m/s (Depending on Waveform selected)