Wave to Exit

User Guide

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1.1 Source Code

ref_app_wave_to_exit.c

1.2 Description

The Wave to Exit reference application shows how to implement a touchless "Wave to Exit"-button for close range. It does this by utilizing Acconeer's Presence Detector.

When the presence score is above the detection threshold a "Wave to Exit" is triggered. To not risk having multiple "Wave to Exit" triggers on the same hand movement a cool-down criteria has been added. The application will not trigger a "Wave to Exit" until the presence score has fallen below the cool-down threshold. It is also possible to set a cool-down time where a new "Wave to Exit" is not triggered until the given time has elapsed since the last trigger. This cool-down time is set to 0 as default.

1.3 Configuration

As mentioned above, the Wave to Exit reference application uses the Acconeer Presence Detector, see Acconeer Exploration Tool docs for a detailed description and acc_detector_presence.h for the API. The Presence Detector is built on top of the Sparse Service, see Acconeer Exploration Tool docs for a detailed description and acc_service_sparse.h for the API.

To be able to visualize the data and test different configurations, use the Wave to Exit processing in the Python Exploration Tool

The table below shows the configuration parameters that the reference application is using.

Presence Detector Parameter	Value
start	0.12
length	0.18
detection_threshold	1.4
update_rate	80.0
sweeps_per_frame	32
intra_frame_time_const	0.05
intra_frame_weight	1.0
output_time_const	0.02
power_save_mode	sleep
profile	2

Reference Application Parameter	Value
cool_down_threshold	1.1
cool_down_time_ms	0

1.4 Testing

1.4.1 Test setup

The reference application is tested in a lab environment setup. The lab environment was setup to test multiple sensors over temperature using a reference card XR111, a validation board and a temperature chamber. The door of the temperature chamber was replaced with foam which is invisible to the radar sensor. The test was performed on 8 sensors over three temperatures, -10, 25 and 50 degrees Celsius.

1.4.2 Test Execution

A person was performing a hand swipe motion with the side of the hand facing the sensor 24 cm from the sensor 10 times and the number of correctly detected swipes was noted.

1.4.3 Test Results

Table 3: Memory Usage for Reference Application Wave to Exit.

Hardware	Flash [kB]	Static memory [kB]	Stack [kB]	Heap [kB]
XM132	72	1.5	1.6	5.2
XM122*	107	12.2	1.8	5.2

*Memory and flash used by the SoftDevice and the bootloader is not included in the table

Table 4: Power consumption for Reference Application Wave to Exit

Hardware	Update rate [Hz]	Mean current [mA]	Voltage [V]	Power [mW]
XM132	80.0	18.3	1.8	32.5
XM122	80.0	18.8	2.0	37.6

Table 5: Over temperature.

Temperature	Detections
-10C	100%
25C	98.8%
50C	98.8%

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