Infineon Alarm System (IAS) Simulator Guide

Instructions for testing the IAS using pre-recorded glass break data

About this document

Scope and purpose

The document describes a guideline for testing the IAS on a PC.

Intended audience

Developers who intend to test the IAS using pre-recorded glass break data on a PC.

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1 Introduction

The Infineon Alarm System (IAS) Simulator is an application that allows users to individually test audio and pressure processing of the IAS algorithm by feeding it pre-recorded audio or pressure data. The current version of the simulator does not fuse information from audio and pressure data unlike the final IAS algorithm running on Infineon's MicroIAS board.

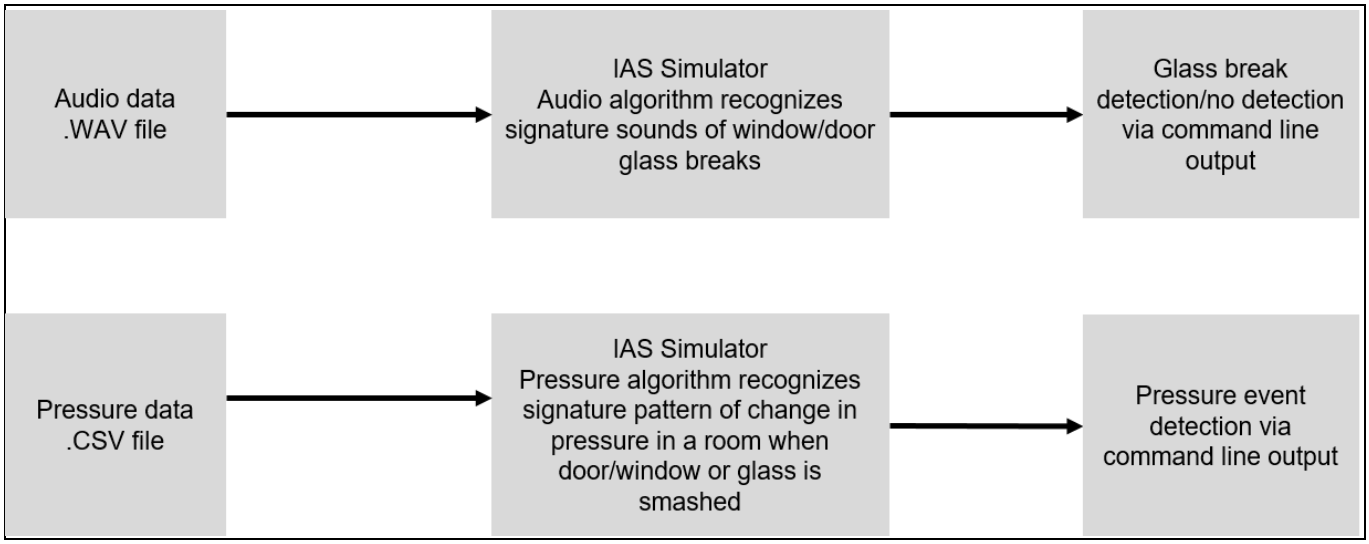

Figure 1 Overview of IAS Simulator

2 Requirements and Usage

- A Windows 10 PC with a Windows SubSystem for Linux (WSL) and Ubuntu distribution 18.04 LTS installed.
- Glass break audio data in .WAV file format, sampled at 16 KHz, -36dBFS (94dBSPL). The loudness is an important parameter. For instance, feeding an audio sound that spans across the full audio level corresponds to a signal level of 130 dBSPL and may lead to glass break detection, but is louder than most real world glass break sounds. Audio files with the aforementioned loudness level need to be fed to the simulator for appropriate testing. Additionally, the audio files must have a frequency cut-off only below 30 Hz and above ~7.5 KHz, otherwise glass breaks will not be reliably detected.

  Note: The current version of the simulator supports only .WAV audio files.
- Pressure data in .CSV file format and sampled at 64 Hz.

  Note: The current version of the simulator supports only .CSV pressure files.
- Open WSL distribution and navigate to the location of the simulator.
- Run the following command: ***./ias_simulator_vxyz_yyyymmdd_gitid your_glassbreak_audio_file.wav***
- If glass break(s) is (are) detected, they appear along with their timestamp(s) as shown in Figure 2. A single audio file may contain multiple glass breaks, hence the simulator will display all of them. If no glassbreaks are detected then a corresponding output is displayed as shown in Figure 3. Even if an audio file contains only one physical glass break, the simulator might detect it several times due to its longetivity, but in the final system (e.g.: MicroIAS), the software makes sure that the glass break is announced only once.

```
IAS Simulator version: 0.3.0

        ---- List of glassbreaks detected ----
        ---- glassbreak[0] at 1.44s ----
        ---- glassbreak[1] at 3.23s ----
```

Figure 2 Glass breaks detected along with timestamps

```
IAS Simulator version: 0.3.0

       no events of interest were detected
```

Figure 3 Glass break not detected

- Use of a non existing file or one not adhering to .WAV specifications will result in an error shown in Figure 4.

```
IAS Simulator version: 0.3.0
error: could not read file
```

Figure 4 Use of non existing file

- SOX utility in WSL can be utilized to correct the audio files. Open WSL in the folder containing audio files and run the following commands. The files will be adhered to .WAV specifications.

```
sudo apt install sox
for f in *.wav; do echo "Processing $f file.."; sox $f c-$f; done
```

Requirements and Usage

- Run the following command: ***./ias_simulator_vxyz_yyyymmdd_gitid your_pressure_csv_file.csv***

```
IAS Simulator version: 0.3.0

        ---- List of pressure events detected ----
        ---- open event at 1.65s ----
        ---- glassbreak event at 7.67s ----
```

Figure 5 Pressure events corresponding to a window/door opening and glass break

- If pressure event(s) are detected, they appear at the output with the type of event they correspond to along with their respective timestamps as shown in Figure 5 and 6. Pressure events can be related to glass break, window/door opening or closing.

```
IAS Simulator version: 0.3.0

        ---- List of pressure events detected ----
        ---- open event at 1.65s ----
```

Figure 6 Pressure event corresponding to a window/door opening

Note: The simulator only takes one audio file or one pressure file at a given time. Therefore for a user to run the simulator for a large dataset of audio or pressure files, it will have to be utilized in a script. An example of such a script in Python is provided in the following code snippet.

```
import subprocess
import os
import time
import fnmatch

#Path to audio dataset
file_path = 'Ring-GBTD-Volume01/Ring-GBTD-Volume01/01-01-LP-F1-
glass_break/'

#Extract list of files
list_of_files = os.listdir(file_path)

desired_file_format = "*.wav"
for entry in list_of_files:

    if fnmatch.fnmatch(entry, desired_file_format):
        file = file_path + entry
        output=(subprocess.check_output(['wsl', './ias_simulator_vxy
z_yyyymmdd_gitid', file]).decode('utf-8'))

        print(output)
```

Revision history

Document version	Date of release	Description of changes
0.1	16.07.2020	Initial release

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