# 2SC8093 – Separation of sound sources from recordings of several microphones

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**Language of instruction:** FRANCAIS
**Campus:** CAMPUS DE METZ
**Workload (HEE):** 80
**On-site hours (HPE):** 48,00

### Description
This project, which is part of the thematic sequence 7 "Source separation for optimal signal exploitation", focuses on the separation of multiple sources in audio signals.

There are many concrete situations in which you want to capture a sound so you can either record it for replay or amplify it live so that all participants have a good perception.
In order to allow good intelligibility in the case of several speakers, a microphone is usually placed in front of each speaker, or, in the theater, a radio transmitter microphone is placed directly on the actors.
A significant improvement could be to use a fixed microphone array and to have a processing algorithm to separate the sources, thus giving the illusion of having an individual microphone per speaker or actor.

### Quarter number
ST7

### Prerequisites (in terms of CS courses)
Probability 1A (CIP-EDP, 1SL1000),
Signal processing ST4 (1CC4000)
Statistics, Machine learning and Data processing ST4 (1CC5000),
Digital environment, computer and programming SG1 (1CC1000).

### Syllabus
Evaluation of sound processing algorithms using matrix programming language.
Computer development in C / C ++ language of the retained algorithms.

**Class components (lecture, labs, etc.)**

This teaching is in the form of a project.
For the duration of the project, students will be asked to keep a "laboratory notebook", specifying in a few lines for each experiment or test carried out, its motivations, the results obtained, the source codes and the data used. During the last week dedicated to the project, students will be asked to:
- provide the project report; and
- to carry out the defense in the presence of the partner.
A progress report of the project with reading of the "laboratory notebook" and the draft report will take place regularly.

**Grading**

The project will be evaluated in two situations:

- in continuous assessment during the progress points and the reading of the "laboratory notebook" and provisional report, with individual evaluation of the contributions of each member (CC grade)
- during the final defense (grade S corresponding to the individual presentation of each participant)

and by the quality of the deliverables (final report, commented source codes, laboratory notebooks: grade QL).

The final grade = CC / 3 + S / 2 + QL / 6.

The evaluation of skills is specified in the paragraph "description of acquired skills".

**Resources**

A network of microphones available in the smartroom of the Metz campus makes it possible to make sound acquisitions. Students will work on computers to develop the computer algorithm to achieve the desired function.
80 HEE (48 HPE) of project.

**Learning outcomes covered on the course**

At the end of this course, students will be able to:
- Represent and decompose audio signals in an "optimal" way

- Adjusting a model to data
- Use a programming language to effectively write a signal processing algorithm

**Description of the skills acquired at the end of the course**
C4 : Have a sense of value creation for his company and his customers (evaluated during project monitoring)
C6 : Be operational, responsible, and innovative in the digital world (evaluated throughout the project)
C7 : Know how to convince (evaluated during the follow-up, at the defense and in the deliverables)
C8 : Lead a project, a team (evaluated by the laboratory notebooks)