

**Développement d'une plateforme expérimentale radar MIMO 2D pour  
l'imagerie microonde**  
*Development of a 2D MIMO radar experimental platform for microwave  
imaging*

*J. Leszczynski<sup>1</sup>, S. Protat<sup>1</sup>, S. Mostarshedi<sup>1</sup>, F. Nadal<sup>1</sup>, B. Poussot<sup>1</sup>*

*<sup>1</sup>Univ Gustave Eiffel, CNRS, ESYCOM (UMR 9007), F-77454 Marne-la-Vallée, France*

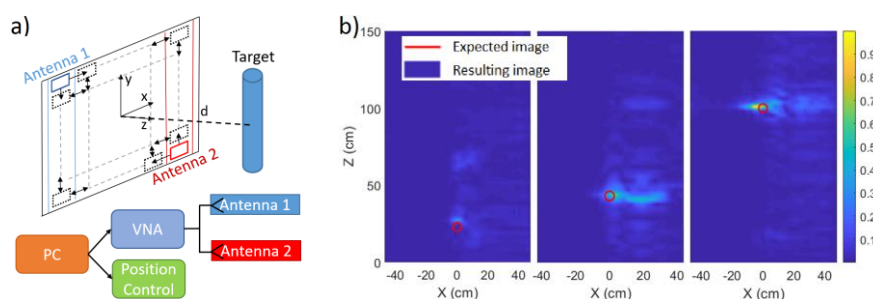
*jimmy.leszczynski@univ-eiffel.fr*

*Mots clés (en français et en anglais) : Radar MIMO, imagerie microonde, détection, plateforme expérimentale  
MIMO Radar, microwave imaging, detection, experimental platform*

**Abstract**

This article presents a study on the development and validation of an experimental MIMO radar platform based on the use of a network analyzer associated with two movable antennas in a plane. It is a direct continuation of the work presented in [1]. The newly developed structure is modular and reconfigurable as it allows the use of different antennas and independent adjustment of the horizontal and vertical pitch between the elements. The mobility of the antennas is ensured by position-controlled antenna mounts while each antenna is connected to a port on the analyzer. This allows spatial sampling in the x0y plane and frequency sampling of the S parameters. The servo-controlled movement of the antennas is carried out along the x and y axes, using motors equipped with encoders and controlled via a PC. The area covered can reach a surface area of 120 cm × 110 cm. Under the assumption of stationary measurement conditions, the acquisition of S parameters following predefined antenna positions allows the reconstruction of the matrix of a MIMO radar equipped with an arbitrary planar antenna array by applying the principle of superposition.

Initial measurements allow the platform to be tested by using a microwave imaging post-processing technique. Figure 1.a) shows a schematic view of the measurement configuration. A 1D measurement is performed by scanning the x-axis across 120 positions with one antenna while the second antenna is positioned at the centre and illuminates a cylinder of diameter 5.5cm. The use of the S parameters measured in the Ku band (12-18GHz) using a VNA enables the reconstruction of the image of a cylindrical target placed at different positions using a technique based on Fourier transform as shown in Figure 1.b).



**Figure 1 : a) 2D MIMO Radar platform schematic b) Reconstructed image of a cylindrical target positioned at z=20 cm, z=40 cm and z=100 cm**

**References**

[1] O. Gómez et al., "MIMO Radar with colocated antennas : theoretical investigation, simulations and development of an experimental platform", 2014