

# Speaker Localization using Enhanced Beamforming

Hussein Attiya Lafta,

Ali Yakoob Yousif

University of Babylon College of Science - Computer Dept.

[wsci.husein.attia@uobabylon.edu.iq](mailto:wsci.husein.attia@uobabylon.edu.iq)

[wsci.ali.yakoob@uobabylon.edu.iq](mailto:wsci.ali.yakoob@uobabylon.edu.iq)

## Abstract

This paper deals with the speaker localization inside the room, the proposed system based on using distributed microphones arrays and benefit from its advantages over single microphone and enhances new method for speaker localization using direction of arrival DOA and enhanced Minimum variance distortionless response (MVDR) beamforming method. Each microphone array containing four microphones with uniform spaced on line is placed in a suitable location inside the room, the obtained results from the proposed system reveals the efficiency and robustness of proposed techniques comparing with other localization method. It is also improves SNR computed to evaluate the enhanced beamforming the results show that the output signal is stronger against the noise and interferences.

**Keyword:** Speaker localization, Microphone array, beamforming.

## الخلاصة

هذا البحث يتناول موضوع تحديد مكان المتكلم داخل الغرفة، حيث ان الموضوع المقترح مبني على أساس استخدام مصفوفة الميكروفونات الموزعة للاستفادة من مميزاتها عن استخدام ميكروفون مفرد وكذلك العمل على تحسين طريقة جديدة لتحديد مكان المتكلم باستخدام طريقة الاتجاه الواصل وطريقة تكوين الشعاع نوع استجابة التباين الأقل المقاوم للتشويه (MVDR). كل مصفوفة ميكروفونات تحتوي على أربعة ميكروفونات موزعة بانتظام وموضوعة بأماكن مناسبة داخل الغرفة. النتائج المتحصلة من عملية المحاكاة للطريقة المقترحة تعكس الكفاءة والقوة للنظام المقترح مقارنة مع طرق أخرى، وكذلك تبين من استخدام عامر الإشارة-الضوضاء المحسن بين ان الإشارة الناتجة تكون ذات مقاومة اعلى للضوضاء والتداخل.

**الكلمات المفتاحية:** تحديد مكان المتكلم، مصفوفة الميكروفونات، تكوين الشعاع.

## 1 Introduction

Microphone arrays have become important technology in the field of speech processing. These systems may be electronically directed to promote the desired source signal while attenuating interfering talkers and ambient noise. An array of microphones can typically overtake a single, well-aimed, highly directional microphone without requiring local placement of transducers or inconveniencing the talker with a hand-held or head-mounted microphone. These criteria make it beneficial in settings comprising multiple or moving sources. In addition, they possess a features that a single microphone does not have; namely automatic detection, localization, and tracking of active speaker in its recipient part.

A fundamental requirement of these microphone array arrangements is the need for determining the site of speech source. For audio-based functions, a precise fix on the main speaker, in addition to acknowledging any interfering speakers or intelligible noise source, it is essential for the effectiveness of array conduction as well as the enhancement of a particular source concurrently while attenuating those regarded as undesirable.

An efficient beamformer must be able to include a continuous and exact location process within its algorithm. This method demands the usage of a location predictor capable of fine resolution at high update speed. Moreover, any estimator of a similar manner will be required to less demanding computationally, so it will be applicable for actual systems (Stoica and Moses, 2005).