Moving sound source tracking from a multi-rotor drone

Lin Wang, Ricardo Sanchez-Matilla, Andrea Cavallaro

Can a mini drone detect and track a moving sound source?

Motivations:

- Human-robot interaction
- Surveillance
- Search and rescue

Challenges:

- Very strong ego-noise
- Extremely low SNR (< -15 dB)
- Time-varying ego-noise
- Time-varying target location

Audio captured by the mini drone

Sound source localization and tracking

Audio

Segmentation

Time-frequency spatial filtering & spatial confidence computation

Peak detection

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Time-frequency spatial filtering & spatial confidence computation

Peak detection

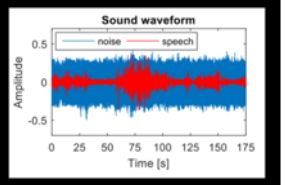
…

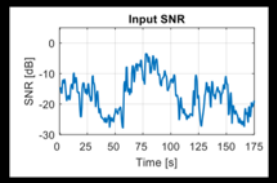
Particle filtering

Estimated angles

Sound source localization and tracking

Audio





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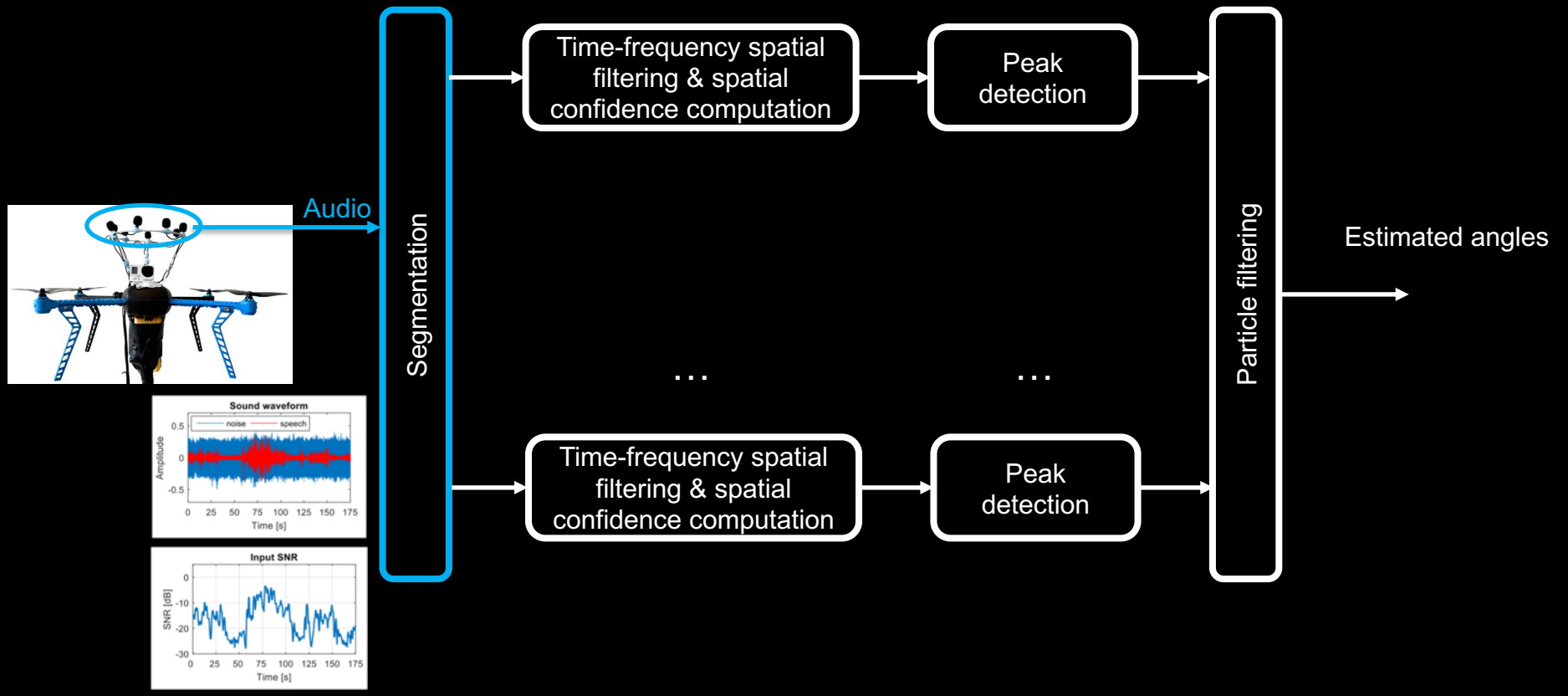

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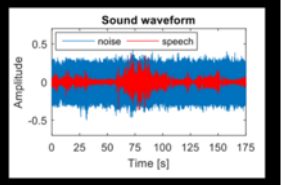

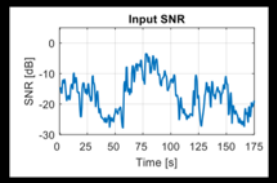

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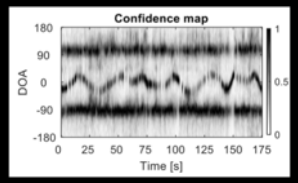

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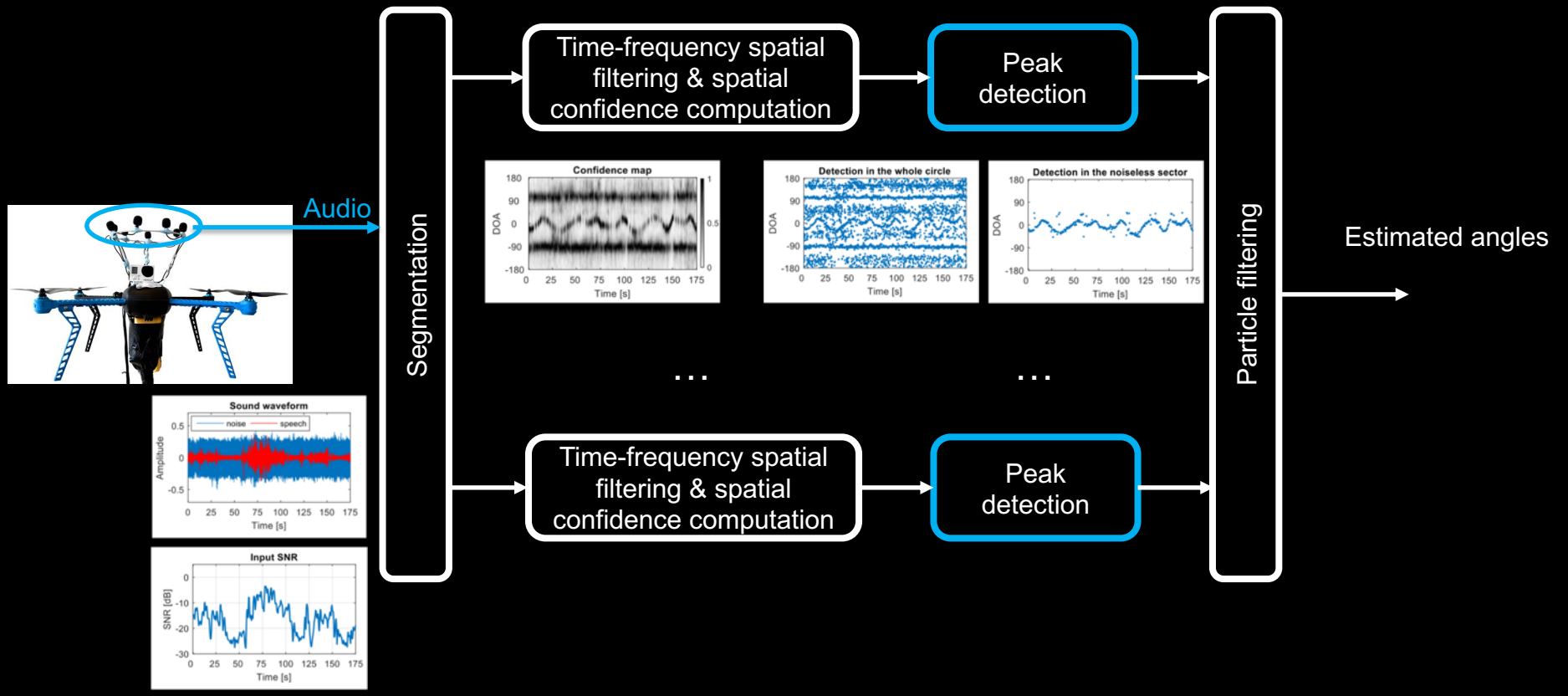

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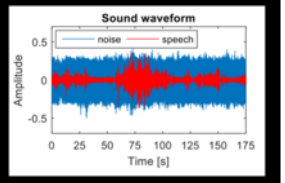

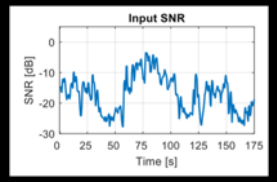

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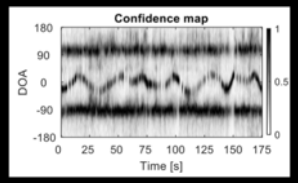

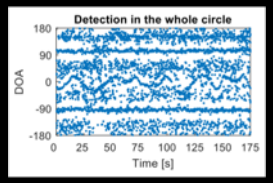

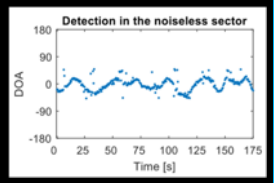

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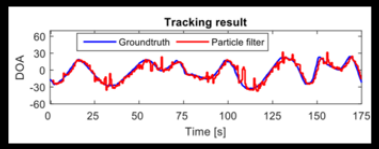

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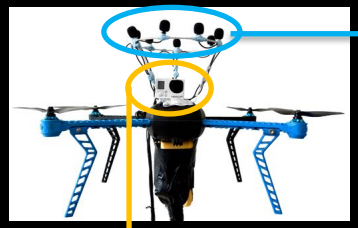
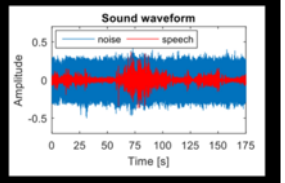
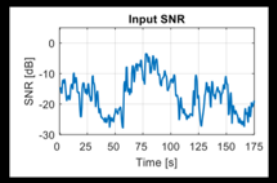


Audio

Video





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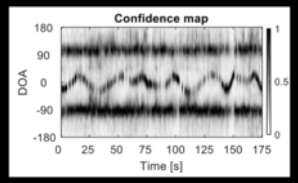

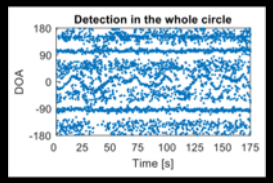

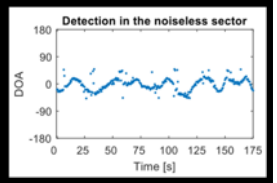

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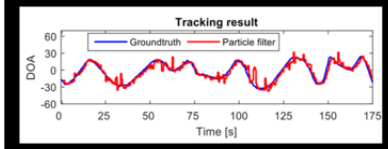
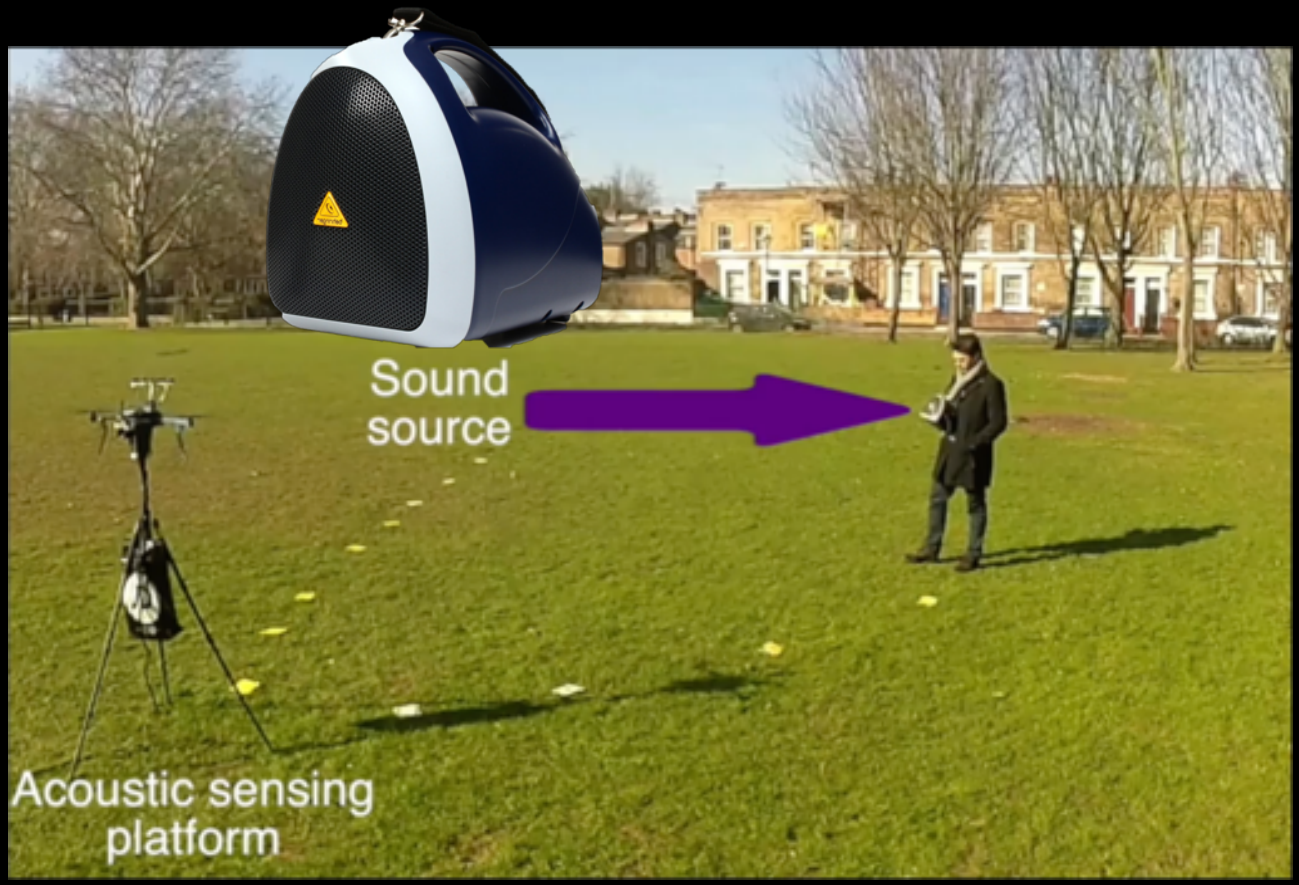


Estimated angles

Evaluation

GT estimation

Ground truth angles


Sound
source
Acoustic sensing
platform

Scenario 3

Speaker: unconstrained region
Drone: stationary mode

Scenario 2

Speaker: constrained region
Drone: dynamic mode

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Audio Demo & Dataset

http://www.eecs.qmul.ac.uk/~andrea/sst.html
http://cis.eecs.qmul.ac.uk/projects/multimodalmav/
http://www.eecs.qmul.ac.uk/~andrea/ear-in-the-sky.html
http://www.eecs.qmul.ac.uk/~andrea/auditory-mav.html

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