IEEE Signal Processing Society

IEEE Signal Processing Cup 2019

Search & Rescue with Drone-Embedded Sound Source Localization

A joint initiative of

The IEEE Technical Committee for Audio and Acoustic Signal Processing

The IEEE Autonomous System Initiative

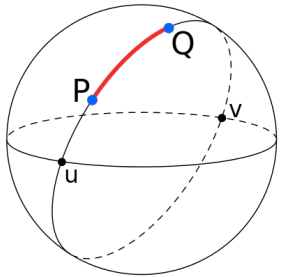
Sponsored by MathWorks®

Summary

- 20 complete submissions
- 13 different countries
- 12 submissions beated the baseline method in total score
- 14 submissions provided bonus materials

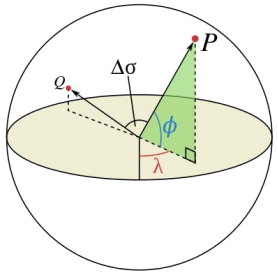
Evaluation Metric for Localization

- 1 point was given for each correct localization
- "correct" means less than 10° of angular error using the great circle distance on the sphere. [more detail on Wikipedia]

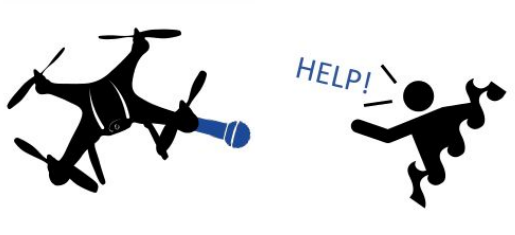


$$\Delta\sigma = \arctan \frac{\sqrt{(\cos\phi_2 \sin(\Delta\lambda))^2 + (\cos\phi_1 \sin\phi_2 - \sin\phi_1 \cos\phi_2 \cos(\Delta\lambda))^2}}{\sin\phi_1 \sin\phi_2 + \cos\phi_1 \cos\phi_2 \cos(\Delta\lambda)}.$$

1 point $\Leftrightarrow \Delta\sigma < 10°$

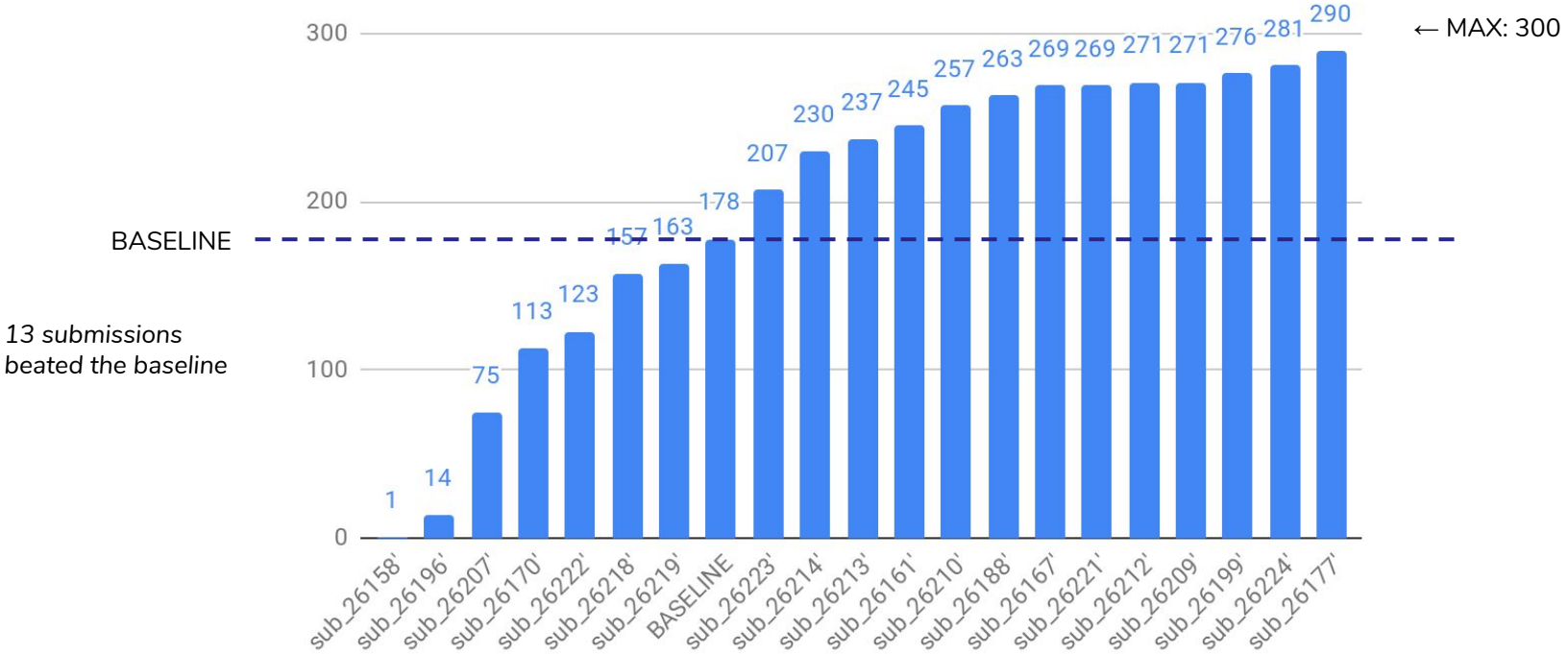


- We chose this metric over the initially planned one (<10° error on both azimuth and elevation) because it is more reliable for high absolute elevation angles, as pointed out by some participants during the challenge.



Partial Score:

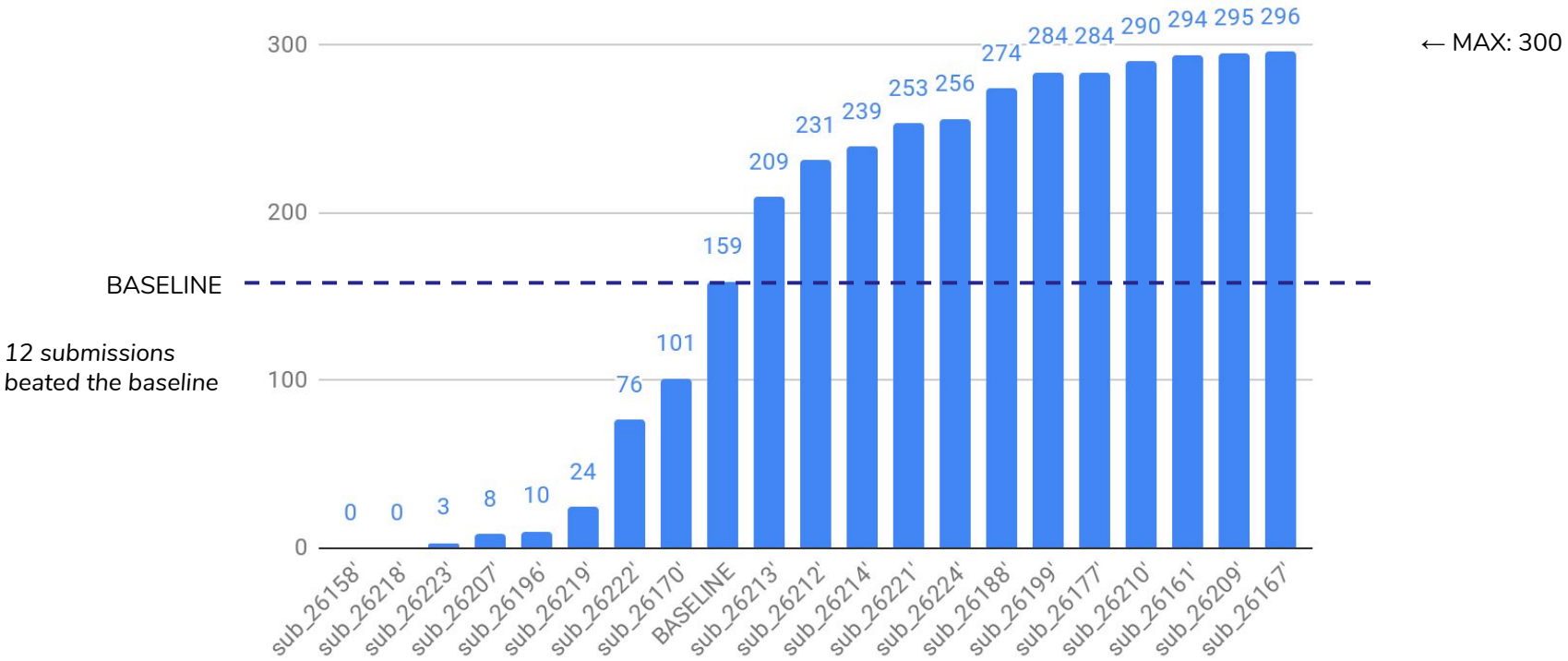
Task 1 - STATIC



13 submissions beated the baseline

Partial Score:

Task 2 - FLIGHT BROADBAND



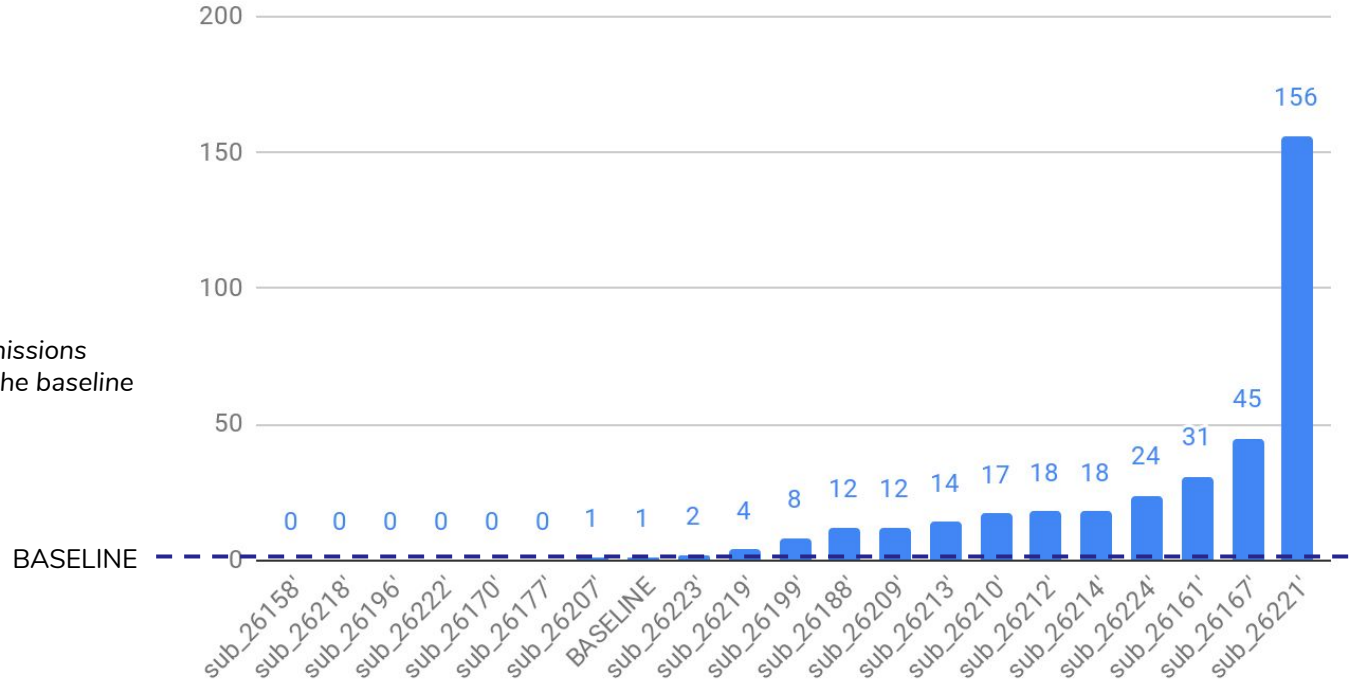
12 submissions beated the baseline

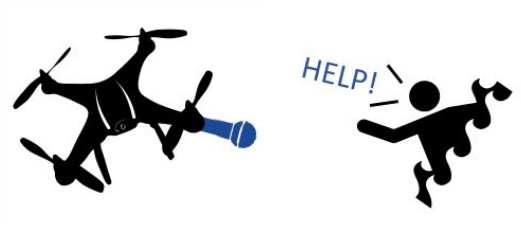
Partial Score:

Task 3 - FLIGHT SPEECH

← MAX: 240

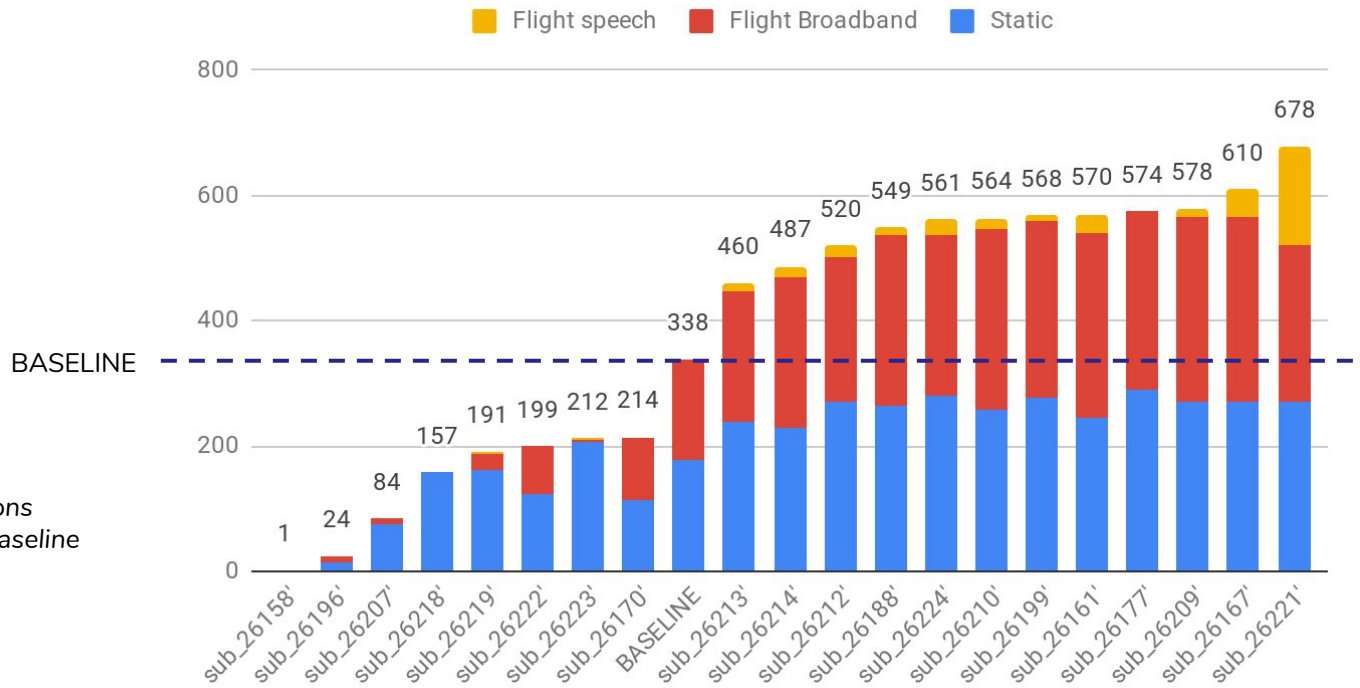
13 submissions beated the baseline





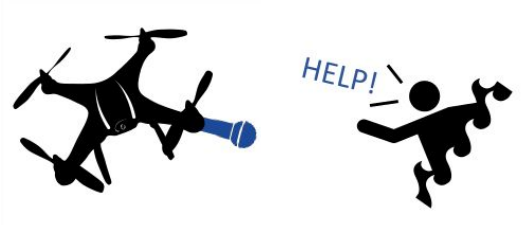
Total Score*

*without the bonus task



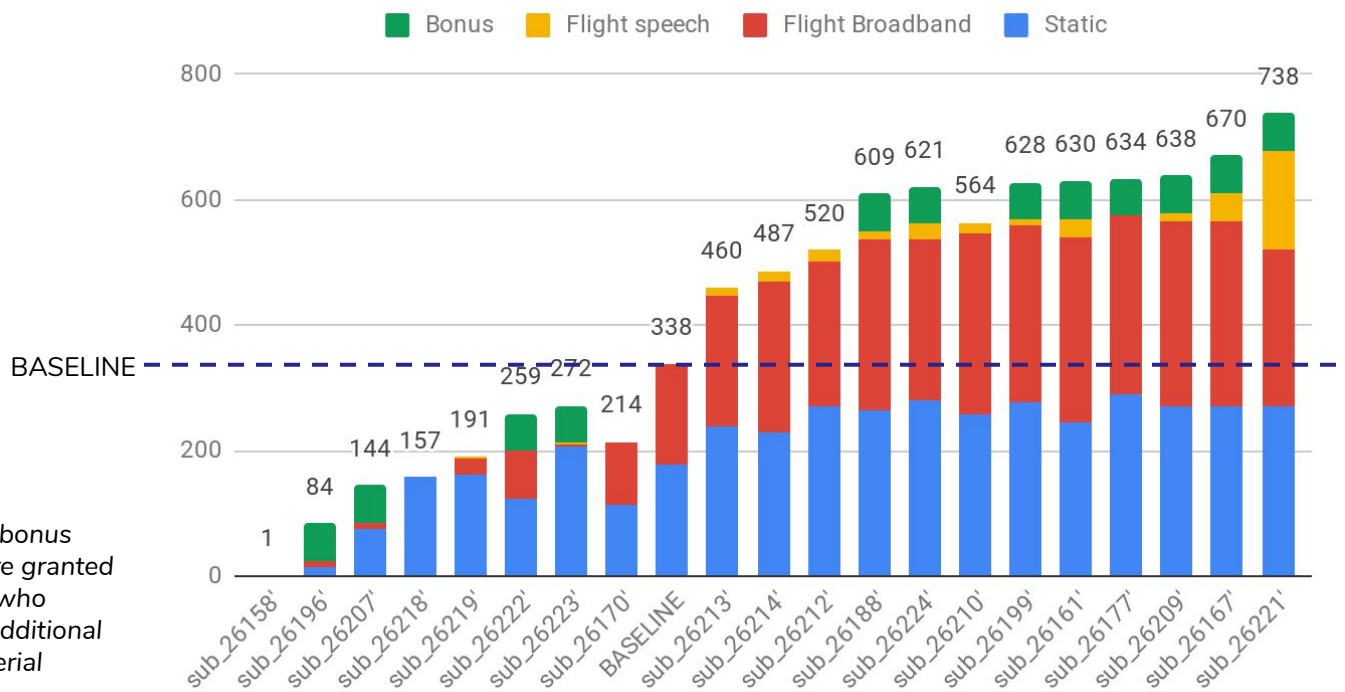
← MAX: 840

12 submissions beated the baseline



Total Score*

***WITH the bonus task**



← MAX: 900

NOTE: *60 bonus points were granted for teams who provided additional audio material*