2026 Signal Processing Cup

AV Zoom: Real-Time Audio-Visual Zooming on Smartphones

(Theme: Multimodal Intelligent Edge Sensing)

Official Document of the 2026 Signal Processing Cup
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1. Introduction

This challenge aims to inspire young minds to tackle practical technical problems. Smartphones are now indispensable, offering features that simplify daily tasks—from entertainment to health tracking. One exciting development is audio zooming, which allows smartphones to focus on specific sounds while reducing background noise. This feature is especially useful in noisy environments like public gatherings, railway stations, and stadiums. While this technology has appeared in high-end models, it remains limited or ineffective in many devices.

When capturing images with a smartphone, one typically focuses on the scene and takes a shot. If specific details in the scene need emphasis, optical zooming in the camera provides a solution. Nowadays, optical zooming is also available while shooting videos. However, regardless of where the camera is pointed or how zoomed it is, audio is also captured. This can lead to a mismatch in synchronization between the captured video and audio, resulting in an unnatural experience. While the camera has an optical field of view, it lacks an auditory field of view. Achieving synchronization between *what is seen* and *what is heard* is crucial for enhancing user experience. This concept, known as "audio-visual zooming," integrates visual zoom capabilities with enhanced audio capture, enabling synchronized focus on both visual and auditory details (see Figure 1). This technology has the potential to revolutionize applications where precise audiovisual alignment is essential, such as photography, cinematography, and more.

The main issue is how to accurately locate and track audio-visual targets in a dynamic environment using low-power hardware. The goal is to improve the intelligent zooming in on sounds and visuals of interest, such as a person speaking in a noisy outdoor scene. This problem matters because most current solutions for audio-visual analysis require heavy computation and centralized processing, which makes them unsuitable for real-time use in remote, low-power, or privacy-sensitive situations. Processing at the edge in real time can create more efficiency. Current limitations include limited integration of sound source localization with visual tracking on low-resource devices, unreliable real-time performance, and constrained capabilities under tight compute budgets. Most systems either focus only on video or require cloud processing to achieve acceptable accuracy.

For more clarity: The participants are encouraged to watch the concept video of LG, Xiaomi and Samsung which it made available for public viewing.

[1]. LG's concept video: https://youtu.be/SoX2rw9BbI4?feature=shared
[2]. Xiaomi's concept video:https://youtu.be/FXZL5e-4Cdw?feature=shared
[3]. Samsung's concept video: https://youtu.be/weFBHhuDJUo?feature=shared

2. Competition Details

2.1 Task Description

The audio zooming problem can be viewed as 'spatial filtering' in the array signal processing context. There are many contemporary methods available, not many for audio zooming but in different applications (some useful references are provided in section 2.3). In general, the resolution of spatial filtering techniques such as beamforming is a function of the number of sensors (in this case, microphones). Higher resolution typically requires more microphones; however, due to space constraints, smartphones usually include only two or three microphones. There is no requirement that this problem must be addressed solely through beamforming. Since both audio and visual zooming are involved, creative and hybrid approaches are encouraged whether based on classical signal processing, artificial intelligence (Machine learning (ML) / Deep Learning / TinyML) or novel combinations of both. The focus of this challenge is to design a real-time audio-visual zooming system. This includes designing a microphone array configuration, developing processing algorithms, and building a mobile application for Android or iOS. The solution must also include real-time implementation and evaluation similar to the example presented in Figure 2. The system should integrate the following components:

- Real-time audio zooming using microphone arrays to focus on specific sound sources.
- Visual alignment with the chosen sound source, ensuring that what is heard matches what is seen.

All components should be optimized for edge devices (smartphones), with emphasis on low power, low latency, and fully on-device operation.

This challenge has three phases. In Phase I, participants are required to submit their proof-of-concepts, which should adhere to the following specifications:

Task 1: Anechoic Chamber Simulation (Ideal Case)

Objective: Simulate an ideal anechoic scenario using MATLAB (toolboxes) for room acoustics and array signal processing.

Specifications:

1. Room Setup

- Type: Anechoic chamber (no reflections, no reverberation)
- Absorption: Perfect (no reflections)
- Purpose: Baseline testing (ideal separation)
- Dimensions: 16 ft × 16 ft × 16 ft (≈ 4.9 × 4.9 × 4.9 m)
- Reverberation Time (RT60): ≈ 0.0 s
- Simulation in MATLAB (any one of the following):
  - Image Source Method (ISM):
    - Use rirGenerator with ReflectionOrder = 0, or
    - Use audioRoom('Method','imagesource') with Reflectivity = 0 (direct path only).
  - Stochastic Ray Tracing (SRT):
    - Use audioRoom('Method','stochastic') with Reflectivity = 0 to simulate anechoic direct path.

Resources:

- *MATLAB Audio Toolbox – Room Impulse Response Simulation with Image Source Method and HRTF Interpolation* *https://www.mathworks.com/help/audio/ug/room-impulse-response-simulation-with-image-source-method-and-hrtf-interpolation.html*
- *MATLAB Audio Toolbox – Room Impulse Response Simulation with Stochastic Ray Tracing* *https://www.mathworks.com/help/audio/ug/room-impulse-response-simulation-with-stochastic-ray-tracing.html*

2. Microphone Array

- Position: At room center
- Mic 1: (2.41, 2.45, 1.5) m
- Mic 2: (2.49, 2.45, 1.5) m
- Array center: (2.45, 2.45, 1.5) m
- Configuration: 2-microphone linear array
- Spacing (d): 8 cm
- Sampling Rate: 16 kHz

  Note: The microphone spacing must satisfy the condition

$$d \leq \frac{C}{2F_{max}}$$

  This relation is analogous to the Nyquist sampling theorem for time-domain sampling.
  Here, C is the speed of sound in air, approximately 340 m/s at 20 °C.
  Example:
  - *The speech spectrum is typically defined in the range 300 Hz – 3400 Hz.*
  - *Using* $F_{max} = 3400\ Hz$ *then the maximum permissible spacing is about 5 cm*
  - *Therefore, to avoid spatial aliasing across the full speech band, a spacing of 5 cm or less is required. However, due to the physical constraints of smartphones, the microphone spacing is typically 6–10 cm. Participants should therefore work with the native microphone configuration of their device. With the current spacing of 8 cm, alias-free operation is restricted to approximately 2.14 kHz, which still preserves essential speech intelligibility (first two formants).*
- Simulation in MATLAB: Use MATLAB Audio Toolbox to model the 2-element linear array with the specified geometry.

Resources:

- *MATLAB* - Audio Toolbox – microphone array
  https://www.mathworks.com/help/audio/ug/acoustic-beamforming-using-a-microphone-array.html
- *MATLAB - Phased Array System Toolbox*
  https://www.mathworks.com/products/phased-array.html

3. Sources

Source 1 (Target Speaker – Male Speech)

- Azimuth: 90° (directly in front of array)
- Height: 1.5 m
- Position: (2.45, 3.45, 1.5) m
- Dataset: Male speech from LibriSpeech or MUSAN Corpus (OpenSLR 17), which can be accessed through the links provided below.
  https://www.openslr.org/12
  https://www.openslr.org/17

Source 2 (Interference)

- Azimuth: 40° (to the right-front)
- Height: 1.5 m
- Position: (3.22, 3.06, 1.5) m
- Dataset: Female speech, Babble, traffic/car, café, office fan from MUSAN Corpus (OpenSLR 17)

Note: Participants can download these datasets externally and load them into MATLAB for simulation and processing

4. Mixture Conditions

- Signal-to-Interference Ratio (SIR): 0 dB (equal power target & interferer)
- Signal-to-Noise Ratio (SNR): 5 dB (additive background noise)
- Noise type: White Gaussian noise (for controlled simulation)
- Simulation in MATLAB:
  - Use awgn() function to add white Gaussian noise at a specified SNR.
  - Use scaling in MATLAB to adjust target and interference levels to achieve the desired SIR (0 dB).

Resources:

- *MATLAB – Add white Gaussian noise to signal*
  https://www.mathworks.com/help/comm/ref/awgn.html
- *MATLAB – Audio mixing and scaling*
  https://www.mathworks.com/help/audio/ref/audiomixer.html

5. Evaluation metrics

Evaluation of the proposed solution for the above setup should be performed using the following metrics:

- Output Signal-to-Noise Ratio (OSINR)
- Perceptual Evaluation of Speech Quality (PESQ)
- Short-Time Objective Intelligibility (STOI)

Resources for Objective Performance Metrics:

- *MATLAB Audio Toolbox - Psychoacoustics*
  https://www.mathworks.com/help/audio/psychoacoustics.html
- *Short-time objective intelligibility (STOI) measure*
  https://www.mathworks.com/help/audio/ref/stoi.html
- *Objective metric for perceived audio quality (ViSQOL)*
  https://www.mathworks.com/help/audio/ref/visqol.html
- *Measuring Speech Intelligibility and Perceived Audio Quality with STOI and ViSQOL*
  https://www.mathworks.com/help/audio/ug/measure-speech-intelligibility-and-perceived-audio-quality-with-st

oi-and-visqol.html

Task 2: Reverberant Room Simulation (Realistic Case)

Repeat the above procedure for a reverberant room (realistic scenario) using the following specifications:

1. Room Setup

- Type: Reverberant room
- Dimensions: ≈ 4.9 × 4.9 × 4.9 m (same as Task 1)
- Reverberation Time (RT60): ≈ 0.5 s (moderate reverberation)
- Simulation in MATLAB (any one of the following):
    - Image Source Method (ISM):
        - Use rirGenerator with ReflectionOrder > 0, or
        - Use audioRoom('Method','imagesource') with reflectivity values set to achieve RT60 ≈ 0.5 s.
    - Stochastic Ray Tracing (SRT):
        - Use audioRoom('Method','stochastic') with appropriate absorption coefficients to yield RT60 ≈ 0.5 s.
  - Absorption Coefficients: Walls, ceiling, floor set to yield RT60 ≈ 0.5 s

2. Microphone Array

- Same as Task 1 (2-element linear array, 8 cm spacing, 16 kHz sampling)

3. Sources

- Same as Task 1
    - Source 1: Male speech (target, at 90°)
    - Source 2: Female speech, Babble, traffic/car, café, office fan (interferer, at 40°)

4. Mixture Conditions

- SIR: 0 dB
- SNR: 5 dB (with reverberant included)

5. Evaluation Metrics: Same as Task 1: OSINR, PESQ, STOI

Task 3: Mobile Application Integration and Real-Time Evaluation

- To make this task manageable within the competition timeline, the final real-time demonstration can be conducted in a controlled environment, as illustrated in Figure 2.
- Develop a mobile application (Android or iOS) that integrates the proposed solution for a 2-element microphone array and 2 sources.
- Evaluation setup:
    - The same two sources used in Task 1 and Task 2 will be played back through loudspeakers.
    - The speakers should be placed with the same angular spacing specified in Task 1 and Task 2.
    - The evaluation must be conducted at the same SIR and SNR levels as defined earlier.
- Quantitative Evaluation Metrics
    - Audio quality (OSINR, PESQ, STOI)
    - System efficiency (latency, memory)

Resources

- *MATLAB & Simulink for Embedded AI*
  https://www.mathworks.com/solutions/deep-learning/embedded-ai.html
- *MATLAB and Python Integration*
  https://www.mathworks.com/products/matlab/matlab-and-python.html
- *Smartphone Support with MATLAB*
  https://www.mathworks.com/hardware-support/android-programming-simulink.html
  https://www.mathworks.com/hardware-support/iphone-matlab-coder.html

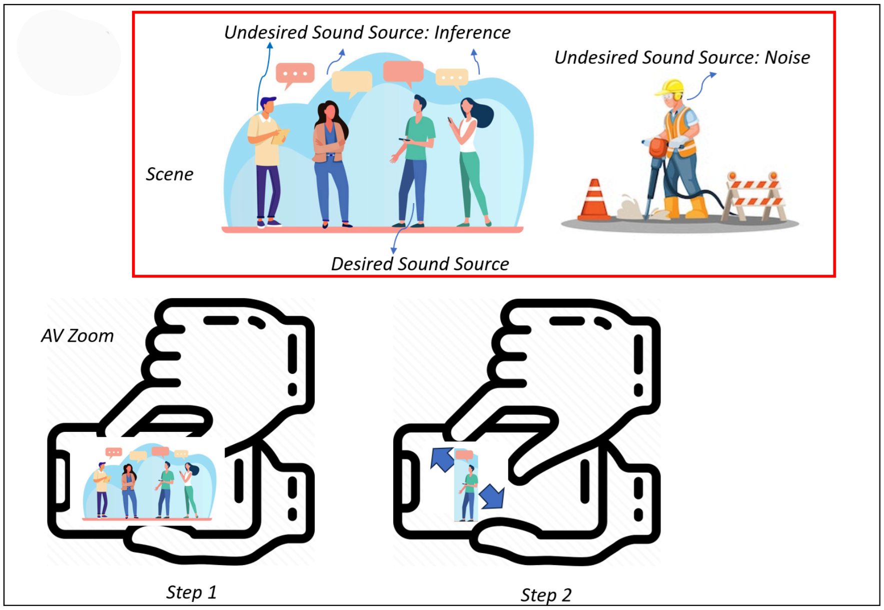


Figure 1. Illustration of the audio-visual zooming concept: the desired sound source is selected while suppressing undesired sources (interference and background noise) using a zoom gesture on the mobile device.

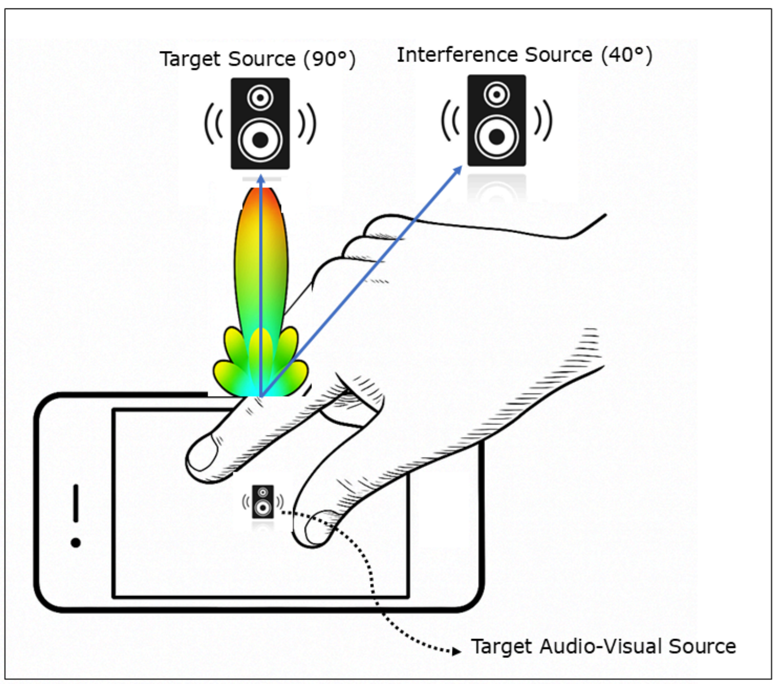


Figure 2. Controlled experimental setup: a 2-microphone array on a smartphone selects the target source at 90° while rejecting an interference source at 40°, demonstrating audio-visual zooming in a realistic scenario.

2.2 Submissions and Expected Demonstration

Solutions to Task 1 and Task 2 should be submitted in Phase 2, while Task 3 should be submitted in Phase 3. In Phase 3, participants must demonstrate real-time functionality, where a pinch gesture on the smartphone screen during video recording triggers audio-visual zooming. As the user zooms in, the audio from the focused subject should be amplified in real time, synchronized with the visual zoom as illustrated in Figure 2.

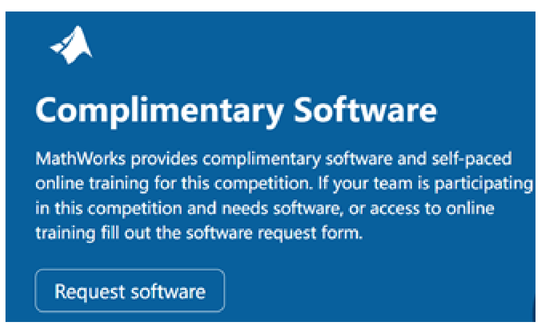
2.3 Useful References

- A. M. Elbir, K. V. Mishra, S. A. Vorobyov, and R. W. Heath, “Twenty-five years of advances in beamforming: From convex and nonconvex optimization to learning techniques,” *IEEE Signal Processing Magazine*, vol. 40, no. 4, pp. 118–131, June 2023.
- A. A. Nair, A. Reiter, C. Zheng, and S. Nayar, “Audiovisual zooming: What you see is what you hear,” *Proceedings of the 27th ACM International Conference on Multimedia (ACMMM)*, pp. 1107–1118, 2019.
- A. Khandelwal, E. Goud, Y. Chand, S. Prasad, N. Agarwala, and R. Singh, “Two-channel audio zooming system for smartphone,” *IEEE Workshop on Applications of Signal Processing to Audio and Acoustics (WASPAA)*, 2021.
- A. Khandelwal, *Two-Channel Robust Audio Zooming System for Smartphone*, Master’s Thesis, June 2018.
- N. Q. K. Duong, P. Berthet, S. Zabre, M. Kerdranvat, A. Ozerov, and L. Chevallier, “Audio zoom for smartphones based on multiple adaptive beamformers,” *International Conference on Latent Variable Analysis and Signal Separation*. Springer, pp. 121–130, 2017.
- Yu, Meng and Dong Yu. “Deep Audio Zooming: Beamwidth-Controllable Neural Beamformer.” Tencent AI Lab, 2023.

2.3.a Complementary MATLAB License and Resources

Note: Participants will receive technical support for MATLAB during the challenge phases.

- **How to Apply for the Complimentary MATLAB License?**
  If your university already has a MATLAB Campus-Wide License, you can use it to enter the IEEE SP Cup 2026. All other students are welcome to apply for complimentary MATLAB license:
  1. Visit the MathWorks webpage for the IEEE SP Cup:
     https://www.mathworks.com/academia/student-competitions/sp-cup.html
     Click “Apply for Software”, then click “Software Request Form” in the pop-up window, fill it out and submit. The window also lists the products included and the link to self-paced online trainings.



Note: If you do not yet have a MathWorks account or are not signed in, you will be prompted to create one or sign in with your regular email address. Make sure the university name filled in the form must be accurate and complete, and the applicant’s name must exactly match the name in your MathWorks account.

2. Within 3–5 business days after submission you will receive a response email. If approved, the email will contain license information.

3. Follow the steps below to link the license to your MathWorks account and then download and install the software:

Link the license
– Go to https://www.mathworks.com/mwaccount/ and sign in.
– Click “Link a License” and enter the Activation Key from the approval email.

Download & install
– Visit matlab.mathworks.com and sign in.
– Click “Install MATLAB,” choose the latest release, download and install.

- **How to Find Free MathWorks Resources and Training？**

Visit the MathWorks page: https://www.mathworks.com/academia/student-competitions/sp-cup.html
We also recommend the following free MATLAB learning resources:

- Visit matlabacademy.mathworks.com and take bowser-based, hands-on introductory courses (1–2 hours each) on MATLAB, signal processing, machine learning, deep learning, computer vision, and more.
- Visit the MathWorks website (www.mathworks.com) and search keywords such as Room Impulse Response, iOS and Android, or TinyML etc. to find relevant solutions, functions and examples.

2.4 Evaluation Protocols

The evaluation of the competition will be conducted across three phases, each with specific procedures for assessing performance.

Phase 1 – Proof of Concept (PoC)

- Remote evaluation of submitted reports.
- Judges assess innovation, technical feasibility, and clarity of documentation.
- Teams are ranked using weighted scores (Innovation 20%, Technical Feasibility 20%, Documentation 10%).

*Teams will be ranked based on total Phase 1 scores out of 50. The top teams will advance to **Phase 2** for technical evaluation (Task 1 and Task 2).*

Phase 2 – Video Presentation (VP)

- Remote evaluation of MATLAB simulation results.
- **Task 1:** Anechoic environment (ideal)
- **Task 2:** Reverberant environment (RT60 ≈ 0.5 s)
- Signal conditions: SIR = 0 dB, SNR = 5 dB
- Teams run simulations, record quantitative metrics (OSINR, PESQ, STOI), and submit a video demonstrating methodology and results.
- Teams are ranked based on measured metric values.

Phase 3 – Real-Time Demonstration (RTD)

- Live evaluation on a smartphone in a controlled environment.
- Two audio sources played at specified angles; participants demonstrate real-time audio-visual zooming with a pinch gesture.
- Quantitative metrics recorded: OSINR, PESQ, STOI, latency, memory usage
- Qualitative assessment: innovation, usability, report and presentation clarity
- Judges combine quantitative and qualitative performance for final rankings.

2.5 Data organization

All data used in this competition follow a structured organization to ensure consistency, reproducibility, and clarity across all tasks.

File Naming Convention:
TaskX_Condition_SNRdB.mat

- **TaskX:** Indicates the task number
  - Task1 – Anechoic Chamber Simulation (Ideal Case)
  - Task2 – Reverberant Room Simulation (Realistic Case)
  - Task3 – Real-Time Mobile Application Integration
- **Condition:** Environment type (Anechoic or Reverberant)
- **SNRdB:** Signal-to-Noise Ratio (5dB as specified in the task)

Files to be Submitted

Task 1 – Anechoic Chamber Simulation

- `Task1_Anechoic_5dB.mat` – Mixture at SIR = 0 dB, SNR = 5 dB
- `process_task1.m` – MATLAB script implementing the processing algorithm
- Corresponding audio files:
  `target_signal.wav` – Clean male speaker
  `interference_signalX.wav` – Interference audio files
  (examples: `interference_signal1.wav`, `interference_signal2.wav,etc.,`)
  `processed_signal.wav` – Output from the implemented algorithm

Task 2 – Reverberant Room Simulation

- `Task2_Reverberant_5dB.mat` – Mixture at SIR = 0 dB, SNR = 5 dB, RT60 ≈ 0.5 s
- `process_task2.m` – MATLAB script implementing the processing algorithm
- Corresponding audio files:
  `target_signal.wav` – Clean male speaker
  `interference_signalX.wav` – Interference audio files
  (examples: `interference_signal1.wav`, `interference_signal2.wav,etc.,`)
  `processed_signal.wav` – Output from the implemented algorithm

Task 3 – Real-Time Mobile Application

- Processing code
- Corresponding audio files:
  `target_signal.wav`
  `interference_signalX.wav` – Interference audio files
  (examples: `interference_signal1.wav`, `interference_signal2.wav,etc.,`)
  `processed_signal.wav` – Processed output signal from the mobile application

Folder Contents (for Tasks 1 and 2)

Each `.mat` file must contain the following variables:
`target_signal` – Clean waveform of the male target speaker
`interference_signal` – Waveform of the interference signal
`mixture_signal` – Combined mixture audio at specified SNR/SIR
`rir_data` – Room Impulse Response (anechoic or reverberant, as applicable)

`processed_signal` – Output of the participant's audio-visual zooming algorithm
`metrics` – Evaluation results: OSINR, PESQ, STOI
`params` – Metadata including microphone positions, array spacing, sampling rate, source azimuth/height, SNR/SIR values

Directory Structure
/Task1_Anechoic/
/Task2_Reverberant/
/Task3_RealTime/

Notes

- Audio files must exactly match the signals stored in the corresponding `.mat` files (for Tasks 1 and 2).
- Strict adherence to the naming and folder structure is required for automated and subjective evaluation.
- This organization ensures reproducibility and facilitates both quantitative and qualitative assessments by the judges.

3. Competition Phases

The competition consists of three phases:

Phase 1: Proof of Concept (PoC) - Remote Mode

- To register, teams must first submit a registration form that includes the team's name and composition. Then, the PoC report, which contains a brief description (using the provided template), must be submitted separately using the submission links.
- A panel of judges, including expert members and industry professionals, will evaluate the PoC based on innovation. The judging panel will adhere to conflict-of-interest guidelines.

Phase 2: Video Presentation (VP) - Remote Mode

- Each team must create a video showcasing a detailed demonstration of their project.
- The video should not exceed 30 minutes in length.
- Teams must upload both the video and a report to the IEEE SPS website.
- The video will be evaluated by the same judging panel from Phase 1.

Phase 3: Real-Time Demonstration (RTD) - Physical Mode

- Teams must submit a report using the provided template.
- Evaluation will include a live demonstration to the judging panel.
- Winners will be determined based on evaluation metrics and awarded prizes.
- Finalist teams are requested to produce a short (≈5-minute) video explaining their solution to a general, non-specialist audience.

4. Evaluation Metrics

The evaluation of the competition will be conducted across three phases, each emphasizing different aspects of innovation, performance, and implementation efficiency.

Phase 1 – Proof of Concept (PoC)
Assess the novelty, technical soundness, and feasibility of the proposed approach for real-time audio-visual zooming on smartphones.

1. Innovation and originality - 20%
   (Novelty of concept and creativity of proposed solution)
2. Technical Feasibility - 20%
   (Potential for implementation on low-power edge devices)
3. Clarity of documentation -10%
   (Organization, readability, and completeness of the PoC report)

Phase 2 – Video Presentation (VP)
(Technical Evaluation (Task 1 and Task 2))
Evaluate the technical performance of the proposed system under ideal (anechoic) and realistic (reverberant) simulated environments using MATLAB.

Quantitative Metrics:

1. OSINR – Output Signal-to-Interference-plus-Noise Ratio
2. PESQ – Perceptual Evaluation of Speech Quality
3. STOI – Short-Time Objective Intelligibility

Note: Only quantitative metrics are used for ranking;

Phase 3 – Real-Time Demonstration (RTD)

1. **Quantitative Metrics:** OSINR, PESQ, STOI, latency, memory usage
2. **Qualitative Metrics:** Innovation and usability, report and presentation quality
   Scoring: *Judges assign points for both quantitative and qualitative performance during the live demo; combined scores determine final rankings.*

4. Participants submissions

4.1 Submission of Work

All work that is being submitted for evaluation in the competition must be submitted to the official SP Cup registration system located in Section 7 of this document.

4.2 Technical Report

Each submission should include a report, in the form of an IEEE conference paper, up to 6 pages, on the technical details of the methods used and the results, as well as the programs developed.

4.3 Results

Team scores and rankings for each phase of the competition will not be shared publicly. Only the final ranking of the entire competition will be shared after the final round has concluded and the winners have been selected.

5. SPS Competition Details

5.1 Team Eligibility

Full details of team eligibility are also available in the Terms and Conditions document available on the [SP Cup] and [VIP Cup] pages of the SPS website.

5.1.a. Team Composition

- Each team MUST be composed of: (i) One faculty member (the Supervisor) and (ii) At least 3 but no more than 10 undergraduates; *Optionally* (iii) At most one graduate student (the Tutor).
    - At least three of the undergraduate team members must be SPS student members at time of team registration, and maintain this status until the end of the competition
- Further definitions of each team position are as follows:
    - Faculty (Supervisor): Postdocs and research associates are not considered as faculty members.
    - Graduate Student (Tutor): A graduate student is a student having earned at least a 4-year University degree at the time of submission. *Please note: Tutors are not eligible to receive travel grants or prize money.*
    - Undergraduate: An undergraduate student is a student without a 4-year degree.
- Team members cannot be changed after the team registration deadline.
- At least one undergraduate team member must be in attendance (in-person) of the final round of the competition held at the respective conference (ICASSP or ICIP) to present the team's work.*****

***Important notice:** Upon registering a team for the competition, the team must commit to at least one undergraduate team member representing the team by attending the physical competition and participating in the final round of the competition at the physical conference. Should a team not be able to participate physically (in-person) in the final round of the competition held at the respective conference (ICASSP or ICIP) for any reason, at any point in the competition, then the team must notify SPS Staff and organizers immediately. This will likely result in the team being ineligible to continue in the competition, therefore forfeiting their position in the competition. Teams must make every effort to attend the final round at the conference; visa issues *may* be an exception*. If all team members are unable to obtain visas, please be prepared to present proof of visa process, communication to obtain visa, as well as a visa denial. All eligibility decisions are at the discretion of the SPS Student Services Committee and competition organizers*.

Should a team be disqualified or forfeit their finalist position for any reason, the next team selected by the organizers may be contacted to compete in the final round, following the same guidelines as above.

Only one team from a given institution may place as a finalist in the competition. If more than one team from the same institution placed in the top three ranking teams based on the phase one evaluation results, then only the team with the highest ranking will be considered as a finalist team All other teams from the same institution will be considered ineligible to compete as a finalist team. *Please note, there is no limit for how many teams from the same institution can register for the competition and compete in the first phase of the competition.*

5.1.b Team ineligibility (Further clarification)

Specific team **ineligibility** in addition to the above. *Any of these criteria will result in the team being disqualified/ineligible to continue in the competition:*

- Teams that are composed with 50% or more of its undergraduate members being students who have previously participated on a finalist team of add the 'consecutive' verbiage
- Any team members who have placed in the top three teams of any SPS competition held during the previous conference, i.e. a member from one of the 3 finalist teams of the 2023 SP Cup (at ICASSP) will not be eligible to participate in the 2023 VIP Cup (at ICIP). any team member that has previously received travel support would not be eligible to receive travel support again (calendar year)
- Team members cannot simultaneously participate in more than one competition at the same time. Team members cannot participate on more than one team at the same time.

5.2 Final Round Judging Criteria for SPS Competitions

The judging for the final phase of the competition held live at the conference will be based on five equally weighted criteria unless otherwise specified by the competition organizers in the Call for Participation. Each of the three finalist teams will be scored on the five criteria and the team with the highest score will place 1st, the team with the second highest score will place 2nd, and the team with the third highest score will place 3rd in the competition.

The five equally weighted criteria are:

1. Innovation of the proposed approach
2. Performance of the first stage competition (by choosing the best submission)
3. Performance of the last submission (second phase held live at the conference) separately on the dataset(s)
4. Quality and clarity of the final report
5. Quality and clarity of the presentation

Each criterion is scored with a 1, 2, or 3; the best team in each criterion will receive 3 points, the second best team will receive 2 points, and the third best team will receive 1 point. The final winning rankings will be based on the highest points awarded from the five criteria during judge deliberations at the end of the competition. Final rankings are ultimately decided by the Society, at their discretion. All ranking decisions are final.

5.3 Judge Participation & Conflict of Interest Final Round Judging Criteria for SPS Competitions

Any judge or team supervisor participating in the competition must sign a Conflict-of-Interest Form agreeing to the following key points. Full information is on the Conflict-of-Interest Form.

Conflict of Interest concerns shall be disclosed and addressed in accordance with IEEE Policies 9.9 A, B. and C and IEEE Policy 4.4.H. - Eligibility and Process Limitations. Judges involved at any stage of the team rankings/scoring process for an SP competition shall be ineligible to judge/vote on the outcome of team rankings for the competition in which the conflict exists. Any real and perceived conflict of interest shall be avoided. Conflict of interest shall be defined as any relationships, professional or otherwise, that can affect impartiality and objectivity. Such relationships include, but are not limited to the below list. This list also applies

a. faculty supervisor/student,
b. faculty supervisor/post-doc,
c. manager/employee,
d. shared institutional affiliations,
e. recent (less than five years) research collaborations or joint authorship,
f. judge/team supervisor
g. In the case of a conflict of interest, the judge should neither listen to nor speak in the discussion and should not vote on the team scoring/ranking process.

In the case of a conflict of interest, the judge should neither listen to nor speak in the discussion and should not vote on the team scoring/ranking process.

In the SPS Policies and Procedures (https://signalprocessingsociety.org/volunteers/policy-and-procedures-manual)
! Required action: The IEEE Conflict of Interest form must be completed *before* participating in the competition evaluation. Please complete the following steps:

1. **The Conflict of Interest form can be completed at the following link: https://www.ieee.org/about/compliance/conflict-of-interest/coiandpob.html**

2. **Confirm your submission of the completed Conflict of Interest form from Step 1 by at the following link: https://app.smartsheet.com/b/form/5c32170d1d8b444383c2635b033cf694**

5.4 Prizes for Finalists

The [eligible] three teams with the highest performance in the open competition based on the judging criteria will be selected as finalists and invited to participate in the final competition at ICASSP or ICIP. The champion team will receive a Grand Prize of $5,000. The first and the second runner-up teams will receive a prize of $2,500 and $1,500, respectively, in addition to travel grants and complimentary conference registrations for up to three team members.

- Up to three student members from each finalist team will be provided travel support to attend the conference in-person. In-person attendance of the physical conference is required for reimbursement.
  - Travel grant funds are offered on a reimbursement basis of up to $1,200 for continental travel and $1,700 for intercontinental travel. There are no exceptions.
  - Funds will be issued by way of a bank transfer after the competition via Concur.
  - Receipts for reimbursement must be uploaded into Concur
    - Prior to claiming your travel grant award, you must submit receipts of your travel expenses that are equal to or exceed the grant amount in order to receive the full travel grant payment. Travel expenses include: air fare, train tickets, hotel, visa fees, transit, meals, and conference registration. Receipts are required for all items and must equal to or exceed the total reimbursement amount. **The receipts must show** form of payment used, name, date, and amount paid. Hotel reservation confirmations or bookings, invoices, or quotes for airfare are not acceptable receipts unless the proof of payment is also provided with the document.
    - All travel expenses should be submitted through IEEE's NextGen Expense Reimbursement (Concur) tool. Detailed instructions will be shared with the (up to) 3 undergraduate members receiving travel support as part of one of the finalist teams.

- Complimentary conference registration for up to three team members.
  - These complimentary conference registrations cannot be used to cover any papers accepted by the conference.
  - You must notify Jaqueline Rash, Jaqueline.rash@ieee.org, via email of the three team members who have been chosen to receive complimentary registration.
  - **VISA information:** Once registered for the conference, each individual will have the opportunity to request an invitation letter through the conference website to be used for the visa application process. This is the only way to receive a letter for visa purposes.
- The finalist teams will also be invited to join the Conference Banquet and the SPS Student Job Fair, so that they can meet and talk to SPS leaders and global experts. Please note registration for the Conference Banquet and Student Job Fair is limited and based on availability. You must add this event to your registration. If you are unable to add these events, then maximum capacity has been reached. *There may be additional availability for the Student Job Fair, but not the Conference Banquet. You can inquire by emailing Jaqueline.Rash@ieee.org*.
- *Please note that IEEE may not be able to provide certain services to certain designated countries, entities, or individuals from those countries or entities per OFAC. View a list of these countries*.

6. Important Dates

- Competition Announcement: 20 October 2025
- Team Registration Deadline: 10 November 2025
- Phase 1 Team Work Submission Deadline: 11 December 2025
- Announcement of the Phase 1 Results: 21 December 2025
- Phase 2 Team Work Submission Deadline: 08 February 2026
- Announcement of 3 Finalists Teams: 02 March 2026
- Final Round of Competition at ICASSP 2026: 4 May 2026

7. Registration and Important Resources

7.1 Official SP Cup Team Registration

All teams must be registered through the official competition by the deadline in order to be considered as a participating team. Official team registration can be submitted via: https://www2.securecms.com/SPCup/SPCRegistration.asp

All work that is being submitted for evaluation in the competition must be submitted to the official registration system using the above link. Only the work submitted to the official registration system can be considered for the competition.

All team members MUST also acknowledge and agree to the 'SP and VIP Cup Terms & Conditions' prior to the team registration deadline to be eligible for the competition. *Submit your signed Terms & Conditions form here*

7.2 Complimentary MATLAB License

MathWorks, Inc. continues to support the IEEE SP Cup. Participating students are encouraged to download the complimentary MathWorks Student Competitions Software for use in the competition

Instructions on how to apply for the complimentary MATLAB License can be found in the following DropBox folder:

DropBox Folder: SP Cup - Complimentary MATLAB License (MathWorks)

7.3 Resource Links

- SPS Competition Terms & Conditions: Located on both SP Cup and VIP Cup pages of SPS website
- IEEE Conflict of Interest form
- Submit your signed Terms & Conditions form and Conflict of Interest confirmation here
- Complimentary MATLAB License instructions
- Official Team Registration and Work Submission System

8. Contacts

Competition Organizers (technical, competition challenge-specific inquiries):
Dr. Ashok Chandrasekaran
Email: ashok.c@saiuniversity.edu.in
(alternate email: ieeespsavzoom@gmail.com)

SPS Staff (Terms & Conditions, Travel Grants, Prizes):
Jaqueline Rash, SPS Membership Program and Events Manager
Email: Jaqueline.Rash@ieee.org

SPS Student Services Committee
Lucas Thomaz, Chair
Email: lucas.thomaz@ieee.org

To be copied on ALL email communications:
sp-competitions@listserv.ieee.org

9. Competition Organizers

The 2026 Signal Processing Cup has been endorsed by the Multimedia Signal Processing Technical Committee (MMSP TC)

Competition Organizers:

- Dr. Ashok Chandrasekaran, *Assistant Professor & Program Director – Computer Science (Artificial Intelligence), School of Computing and Data Science, Sai University, India*
- Dr. Mita Paunwala, *C.K Pithawalla College of Engineering & Technology, India*
- Dr. Angshul Majumdar, *IIIT-Delhi, India*
- Dr. Jin Zeng, *Tongji University, China*

Sponsor

We gratefully acknowledge MathWorks, Inc. for their continued support of IEEE Signal Processing Cup. Participating students are encouraged to download the complimentary MathWorks Student Competitions Software for use in the competition.

MathWorks®

Please note, any work submitted during this competition may be made available to MathWorks for commercial use.