Category B. Localization of RF Sources

Goal

Design and build a system for the localization of RF sources.

Specifications

・The system must be able to measure the transmitted RF signals and localize their positions by methods of your choice.

・The system must not have transmit function. Teams can use an RF system on the market such as Software Defined Radio receiver. The teams can also use RF measurement instrument such as a spectrum analyzer.

・Total dimensions of the system (sum of width, height, length) must not exceed 200cm, excluding an external computer (if needed).

・The finalists must join an online competition in the ISAP2020 virtual conference. In the online competition, the finalist must give a presentation and show a video containing a demonstration of their system.

Instruction for final design submission

The finalists must submit a document about their final design in the final design submission. The document should include the following information:

　　　・A detailed description of the system and localization method in your system.

　　　・A detailed description of the system's performance.

　　　・Photos of the system (including the front, top, and side views with a ruler).

　　　・A list of parts in the system setup.

Instruction for online competition

・The finalists must join an online competition in the ISAP2020 virtual conference, give a presentation, and show a video containing a demonstration of their system.

・In the presentation via online conference system, the finalists must explain at least the localization method, system overview, and some experimental results of the system.

・Presentations (including questions and discussions) should not exceed 20 minutes.

Instruction for Demonstration Video

・The finalists should record the demonstration of the system in a video.

・The video should not exceed 10 minutes.

・In the demo video, the explanation and subtitles should be in English. The video does not need to be elaborate. The quality of the video is not evaluated in the review process.

・In the demonstration of the system, the finalists should prepare their own transmitter(s), measure the transmitted signals, and determine the location(s) of the transmitter(s) using the systems (see Fig. 1). The transmitters may be visible.

・The finalists have to prepare transmitter(s) by themselves. The transmitter frequency must be within the following three frequency ranges:

> A. 300 – 320 MHz
> B. 2.402 – 2.480 GHz
> C. 5.012 – 5.025 GHz

・The finalists may place a single or multiple transmitters with the same frequency or different frequency ranges. Additional points will be scored for localization of multiple transmitters.

・There are no limitations of transmit power, antenna, polarization and signal(modulation) as long as they comply with local regulations or laws on the radio wave transmissions. If the demonstration is suspected of violating the local regulations or laws, the team will be disqualified.

・Detailed instructions for the video submission will be announced in the ISAP2020 webpage (http://www.isap2020.org/sdc.html) in the near future.
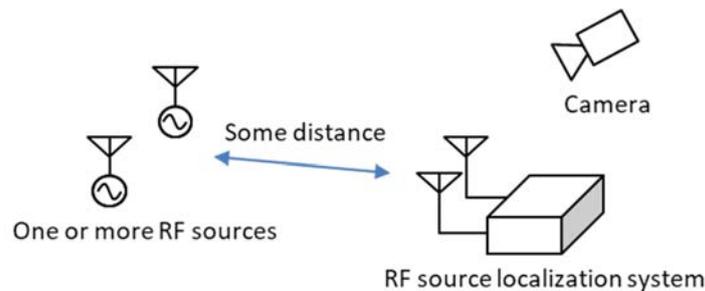
Figure 1 Example setup of the demonstration.

Review process

The score will be assigned to designs based on the following criteria. The Team with the highest score will win the award. In the online competition, the localization accuracy of the system does not affect the score because the measurement environment is different for each finalist.

> ・Novelty (novelty of the localization method and system)
> ・Originality (originality of the localization method and system)
> ・Validity (whether the system is valid for the localization method)
> ・Feasibility (whether the system can be actually constructed and operated from the viewpoint of cost, size, processing time, etc.)
> ・Theory (whether the theory about estimation method is described)
> ・Quality of the written materials and presentation