**Inkyu An**

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| Researcher at Electronics and Telecommunications Research Institute (ETRI)  Integrated Intelligence Research Section  Email: inkyu.an@etri.re.kr  Website: https://inkyuan.github.io/ |

**Research Interests**

My research interest is the **robot audition**. Especially, I have been studying **sound source localization (SSL)** in robotics by considering as follow:

- Considering indirect sound, i.e., reflection and diffraction

- Handling a non-line-of-sight source occluded by an obstacle

- Exploiting a large size of training dataset for a deep-learning model.

I am focusing on overcoming **difficult cases**, i.e., NLOS sources, many indirect sounds, and a lack of training datasets, for robots that can occur in real environments. I am also interested in other kinds of robot auditions like sound event detection (SED), source separation, speech enhancement and so on.

Recently, I have been conducting research using **deep-learning technology**, and the results were submitted to the conference (under review). I am also interested in utilizing sound simulators (e.g., Habitat 2.0 and Pyroomacoustics) to obtain a large amount of realistic sound data; realistic sound data is essential for the high performance of deep-learning models.

**Experience**

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| * **Research** | 08/2023-Present |
| Electronics and Telecommunications Research Institute (ETRI)  *Superintelligence Creative Research Laboratory*  *Intelligence Information Research Division*  *Integrated Intelligence Research Section* | |

**Education**

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| * **Ph.D., School of Computing** | 03/2018-08/2023 |
| Thesis title: Sound Source Localization with Novel Acoustic Cues for Robots  Advisor: Sung-Eui Yoon  KAIST, South Korea | |
| * **M.S., Robotics Program** | 03/2016-02/2018 |
| Advisor: Sung-Eui Yoon  KAIST, South Korea | |
| * **B.S., Electronic Engineering** | 03/2009-02/2016 |
| Dongguk Univ., South Korea | |

**Publications**

1. **Diffraction- and Reflection-Aware Multiple Sound Source Localization**

Inkyu An, Youngsun Kwon, and Sung-Eui Yoon

IEEE Transactions On Robotics (T-RO) 2022

1. **Inexpensive Indoor Acoustic Material Estimation for Realistic Sound Propagation**

Taeyoung Kim, Inkyu An, and Sung-Eui Yoon

Computer Animation and Virtual Worlds 2022

1. **Robust Sound Source Localization considering Similarity of Back-Propagation Signals**

Inkyu An, Byeongho-Jo, Youngsun Kwon, Jung-woo Choi, and Sung-Eui Yoon

*IEEE International Conference on Robotics and Automation (ICRA) 2020*

1. **Super Rays and Culling Region for Real-Time Updates on Grid-based Occupancy Maps**

Youngsun Kwon, Donghyuk Kim, Inkyu An, and Sung-Eui Yoon

*IEEE Transactions On Robotics (T-RO) 2019*

1. **Diffraction-Aware Sound Localization for a Non-Line-of-Sight Source**

Inkyu An, Doheon Lee, Jung-woo Choi, Dinesh Manocha, and Sung-Eui Yoon

*IEEE International Conference on Robotics and Automation (ICRA) 2019*

1. **Reflection-aware Sound Source Localization**

Inkyu An, Myungbae Son, Dinesh Manocha, and Sung-Eui Yoon

*IEEE* *International Conference on Robotics and Automation (ICRA) 2018*

1. **A Content-Aware Non-Uniform Grid for Fast Map Deformation**

Pio Claudio, Inkyu An, Sung-Eui Yoon

*CASA 2017*

**Patents**

1. **System and Method for Localization for Non-line-of-sight Sound Source**

Inkyu An, Doheon Lee, Sung-Woo Choi, and Sung-Eui Yoon  
US, Registration Number/Date (US11353581B2 / 2022-06-07)

1. **System and Method for Localization for Non-line of-sight Sound Source Using Diffraction aware**

Inkyu An, Doheon Lee, Sung-Woo Choi, and Sung-Eui Yoon  
South Korea, Registration Number/Date (10-2174598-0000 / 2020-10-30)

1. **System and Method for Sound Source Localization Using Reflection aware**

Inkyu An, Myungbae Son, and Sung-Eui Yoon  
South Korea, Registration Number/Date (10-2105752-0000 / 2022-04-22)

**Media Coverages**

1. **Interview of Young researcher in MERIC, 2020**:  
   <https://www.materic.or.kr/v2/mp/content.asp?f_id=78&page=6&listType=20&s_kinds=&s_word=&listCnt=>
2. **2021 Annual R&D Report, KAIST**: Our back-propagation signal-based sound source localization techniques were chosen as research highlights of 2020 and covered in the Annual R&D Report
3. **2020 Annual R&D Report, KAIST**: Our diffraction- and reflection- aware sound source localization techniques were chosen as research highlights of 2019 and covered in the Annual R&D Report

**Research Activities**

1. **A workshop at IEEE International Conference on Robotics and Automation (ICRA) 2019: Sound Source Localization and Its Application**

Main organizer: Sung-Eui Yoon, Co-organizer: Dinesh Manocha, Publicity chair: Inkyu An

1. **A tutorial at KCC 2021: Sound Source Localization techniques for AI speakers and Robots**

Speakers: Sung-Eui Yoon, Inkyu An, Taeyoung Kim

1. **Teaching Assistant for Senior Data Scientist at Samsung SDS**  
   Machine learning: Tree model and Recommendation, 2019-2020  
   Lecturer: Sung-Eui Yoon  
   Teaching Assistants: Woobin Im, Jaeyoon Kim, Heechan Shin, Inkyu An

**Experiments**

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| 1. **Research Internship at Korea Electronics Technology Institute (KETI)** | 08/2013-07/2015 |
| Hardware design and Firmware | |
| 1. **Samsung Software Membership (Talent development program)** | 06/2013-12/2015 |
| Supported by Samsung Electronics | |