# Environment Detection Leaderboard

**Sarah Tanveer, Gianna McLeod, Professor Ali Abedi**
sarah.tanveer@wisc.edu, gmmcleod@wisc.edu, aabedi@wisc.edu
University of Wisconsin - Madison, Department of Computer Sciences

## I BACKGROUND

- Due to advancements in wireless technologies, frequency spectrum scarcity and the risk of interference between user transmissions
- is a growing concern
- Current research focuses on devices automatically detecting whether they are indoors or outdoors
- Frictionless reproducibility: shareable data, shareable code, and competitive challenges

## II RESEARCH GOALS

**Adopting frictionless reproducibility in wireless spectrum management**

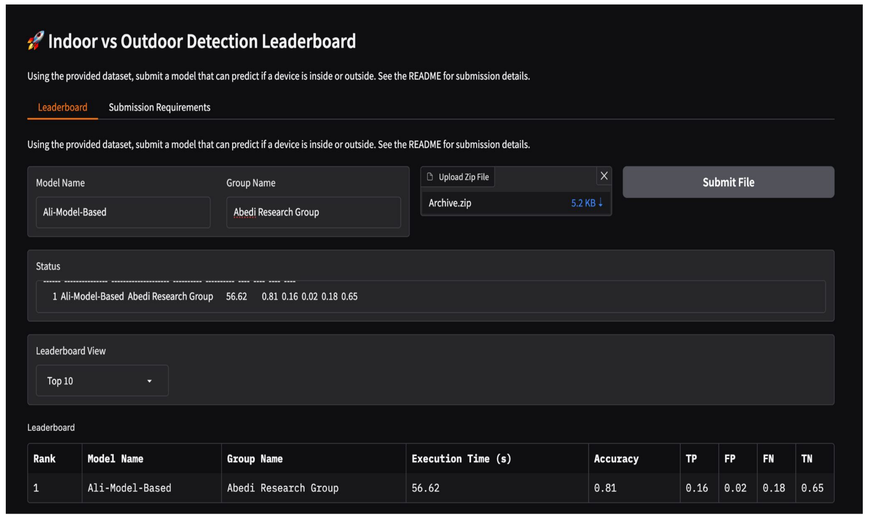
- Build a platform for researchers to seamlessly submit and run their code on similar data to compare different models
- Collect and maintain repositories of wireless data that can be used for environment detection e.g. ADSB signals

## III METHODS AND MATERIALS

- We 56 ADS-B datasets, each containing fifteen minutes of data across multiple U.S. locations are hosted on HuggingFace for researchers to use
- The platform “Indoor vs Outdoor Detection Leaderboard” is built in Python with a Gradio front-end
- The leaderboard is accessed via huggingface_hub APIs, while the evaluation engine runs directly on Hugging Face’s “Spaces” environment with dedicated compute resources
- Users submit classifiers containing a standard entry point, making it simple to adapt existing codebases
- The leaderboard evaluates each entry based on standard metrics like standard metrics including accuracy, false positives, false negatives, and runtime

## IV RESULTS

- Forty-one ADS-B datasets across multiple US and Canada are publically available while fifteen are kept private for secret testing
- The leaderboard is currently being used in a graduate-level course at UW-Madison
- The platform is openly available for other researchers in other graduate or undergraduate courses.




## V CONCLUSION

The main contributions of this work are:

- A public platform for researchers to easily test their environment detection models and compare with recent work
- A diverse, publicly available dataset of ADS-B signals for future research

By lowering the barrier to entry and fostering reproducibility, this project lays the groundwork for future community challenges and broader engagement in spectrum coexistence research

## VI ACKNOWLEDGEMENTS

This work has been supported in part through SpectrumX, the U.S. National Science Foundation (NSF) Spectrum Innovation Center, funded via Award AST 21-32700 and operated under Cooperative Agreement with NSF by the University of Notre Dame.

## VII REFERENCES

[1] J. Sanz, A. Abedi and A. Sahai, "Automatic Indoor-Outdoor Detection Using Signals of Opportunity," 2024 IEEE International Symposium on Dynamic Spectrum Access Networks (DySPAN), Washington, DC, USA, 2024, pp. 509-516, doi: 10.1109/DySPAN60163.2024.10632851.