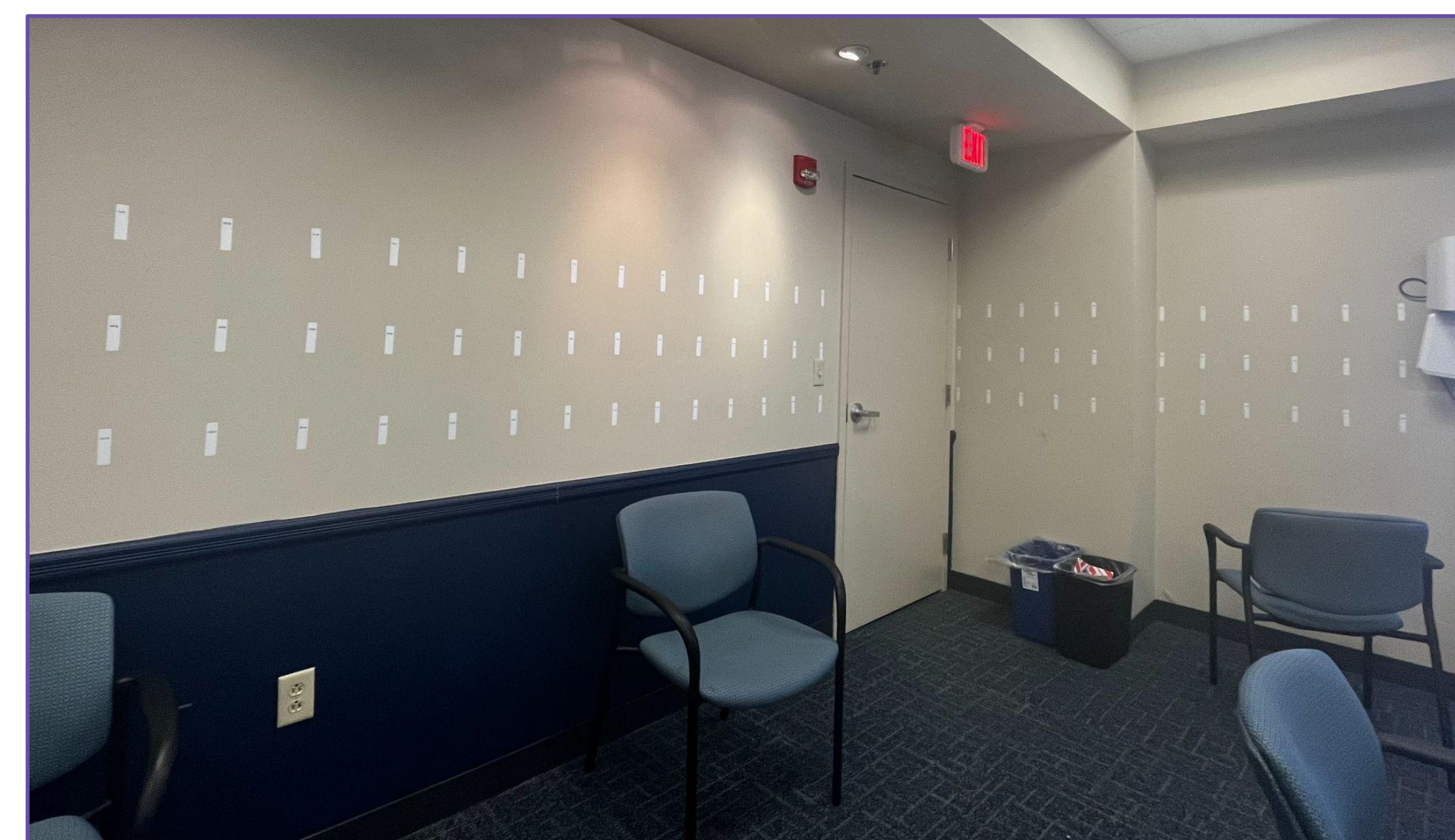
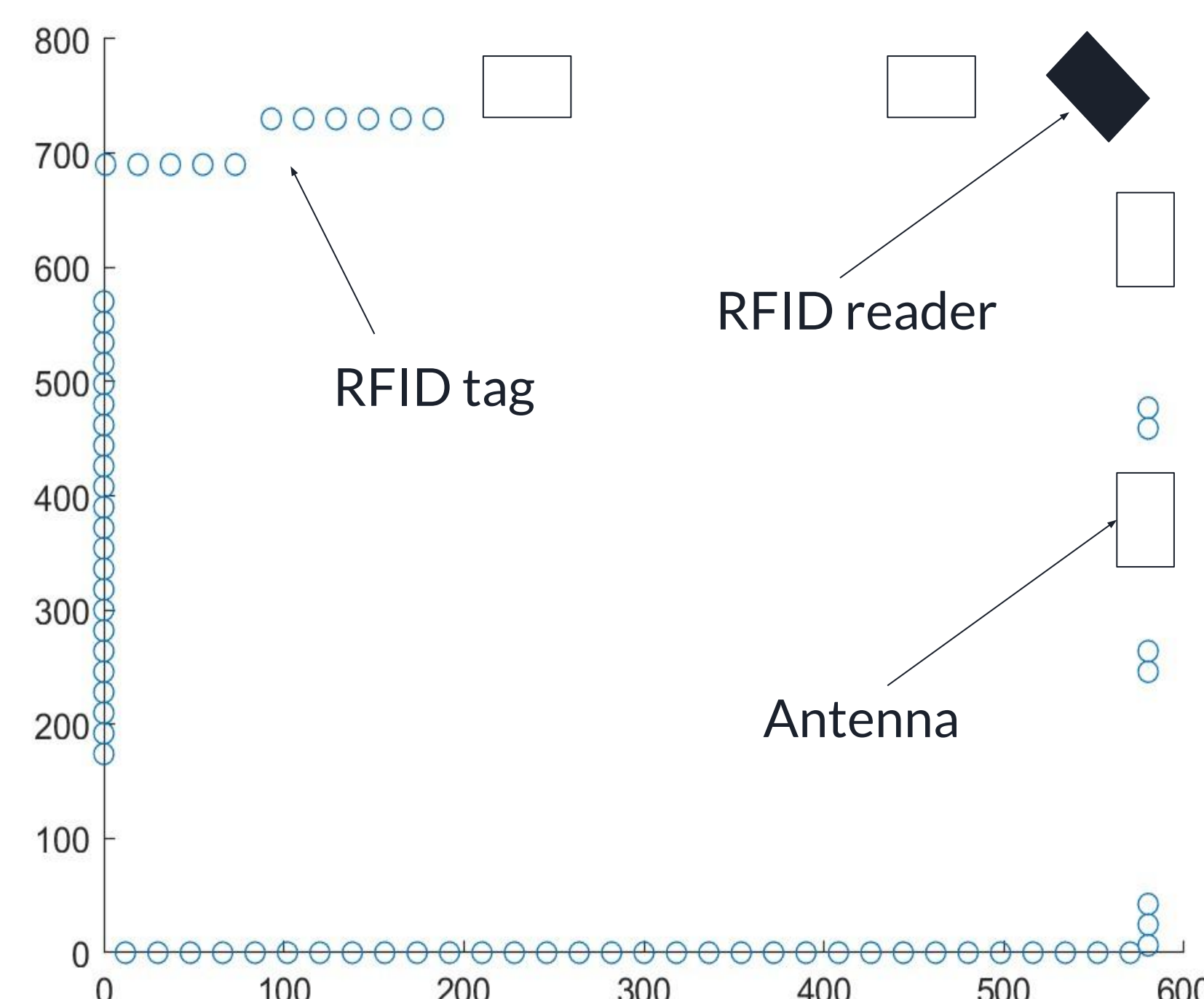
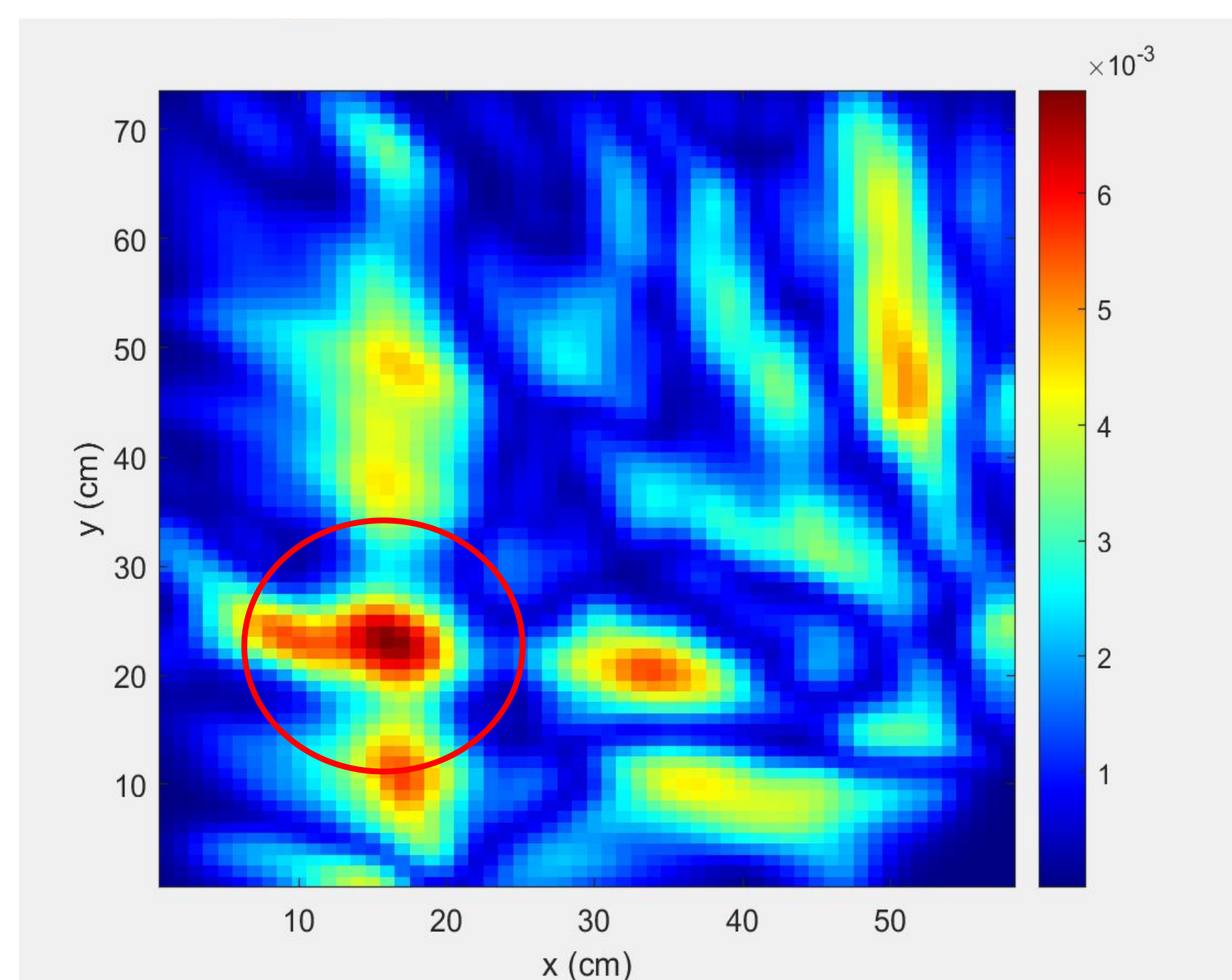
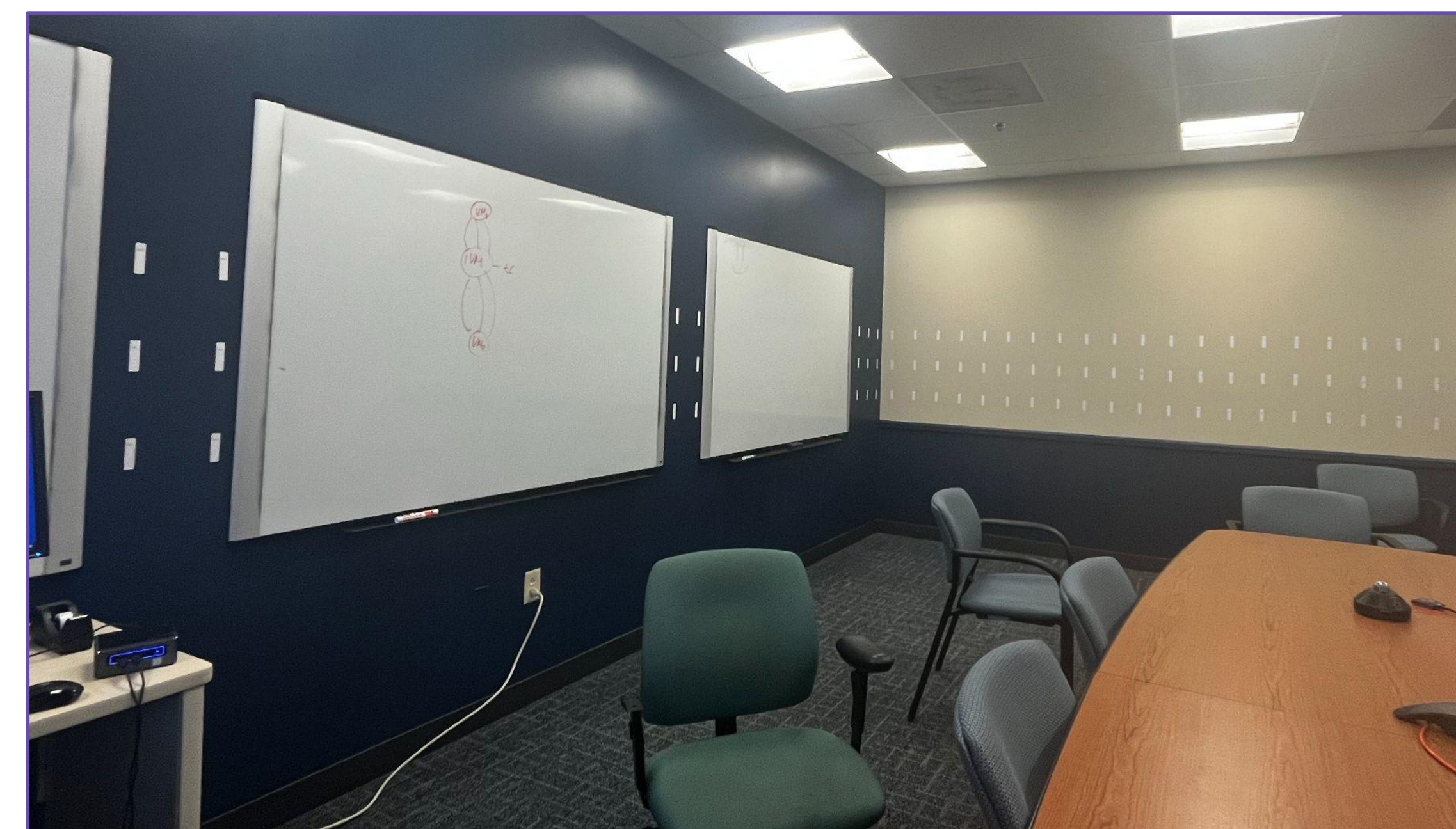


Background

Batteryless, ultra-low cost RFID (radio frequency identification) tags have shown promising results for locating objects in a space without attaching devices to those objects [1]. By placing RFID tags around a room, we can estimate the location of people inside a room. However due to the interference from signals bouncing around indoors, we need a large amount of data. This summer we sought to expand this work by:

- Adding more tags. We placed 219 RFID tags across four walls along with four antennas
- Adding multiple rows of tags to increase the accuracy of localization



Challenges

- Irregularities in the room when tagging
- Low number of tag reads for two of the four antennas (~160-180 out of 219)
- The left image illustrates the RSSI (receive signal strength indicator) heat map when one person is in the room (largest bottom left blob). As can be seen, there is a lot of noise compared to the original experiment on the right which we tried to replicate [1].

Future Work

- Utilize neural networks to analyze the images produced for enhanced precision
- Scale up room size and number of people/test different room and tag configurations
- Remove as much noise as possible from current RSSI heat maps
- Improve and stabilize room setup
- Attain better antennas/cables for increased tag reads

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References

[1] A. Kleniatis, A. Dimitriou and A. Bletsas, "Device-Free Localization of Multiple Humans with Passive RFID and Joint RSSI-Phase Techniques," 2024 IEEE International Conference on RFID, Cambridge, MA, USA, 2024, pp. 1-6