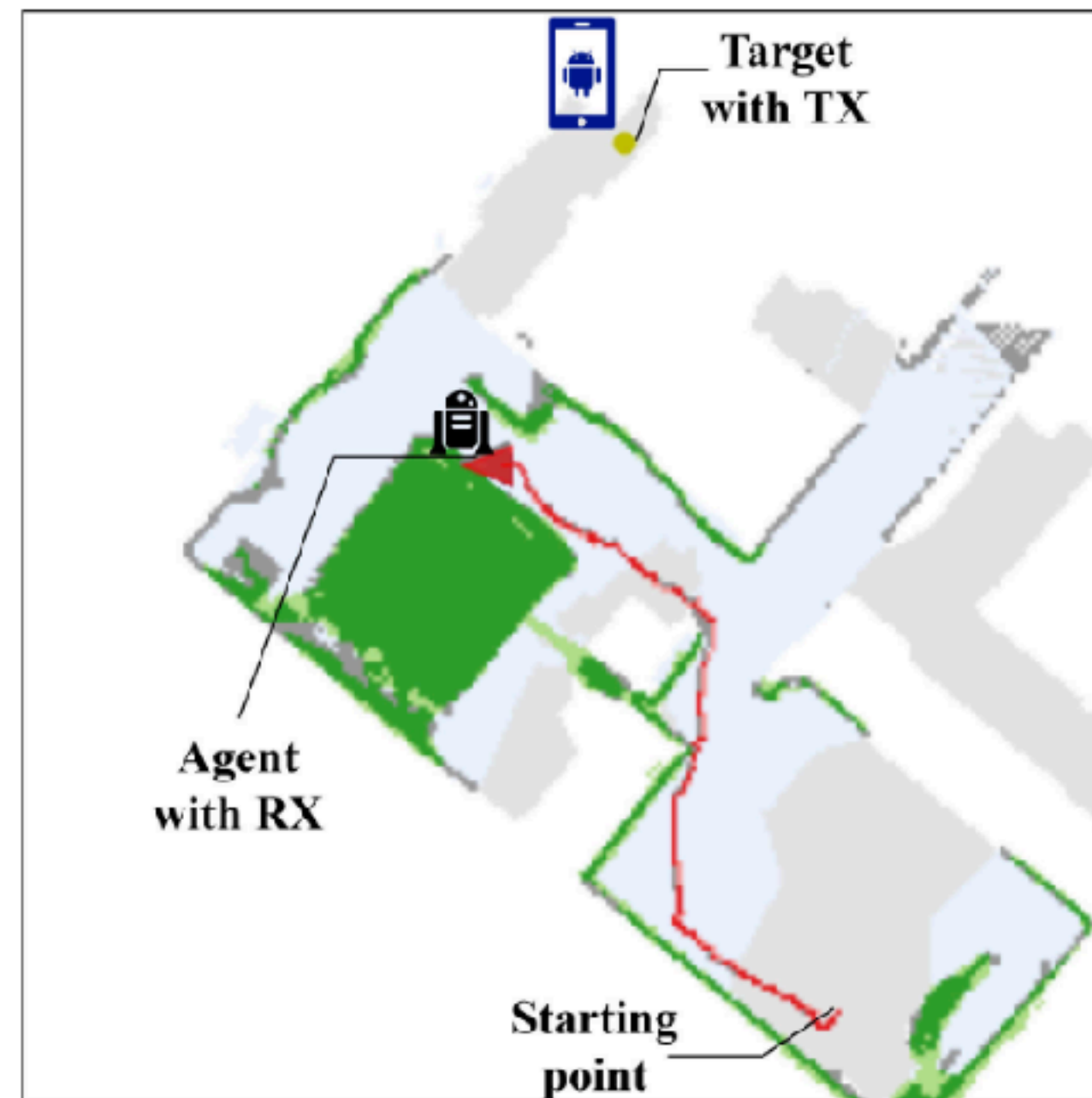


Challenge

=> Exploit opportunities offered by 5G wireless (high bandwidth, low latency and mmWave signal properties) to improve robotics autonomy

- Split control algorithms (Local + Edge)
- Wireless-aware perception
- Planning to reduce communication loss
- Robotics-centered wireless models



“Search-and-rescue” case study: finding a mmWave transmitter in an unknown environment

- use mmWave transmitter as a sensor (directionality)
- Find transmitter in shortest amount of time
- Path planning to reduce estimator uncertainty



Millimeter Wave Wireless Assisted Robot Navigation with Link State Classification



[Yin et al. 2022]

Open dataset and simulation framework for 5G robotics

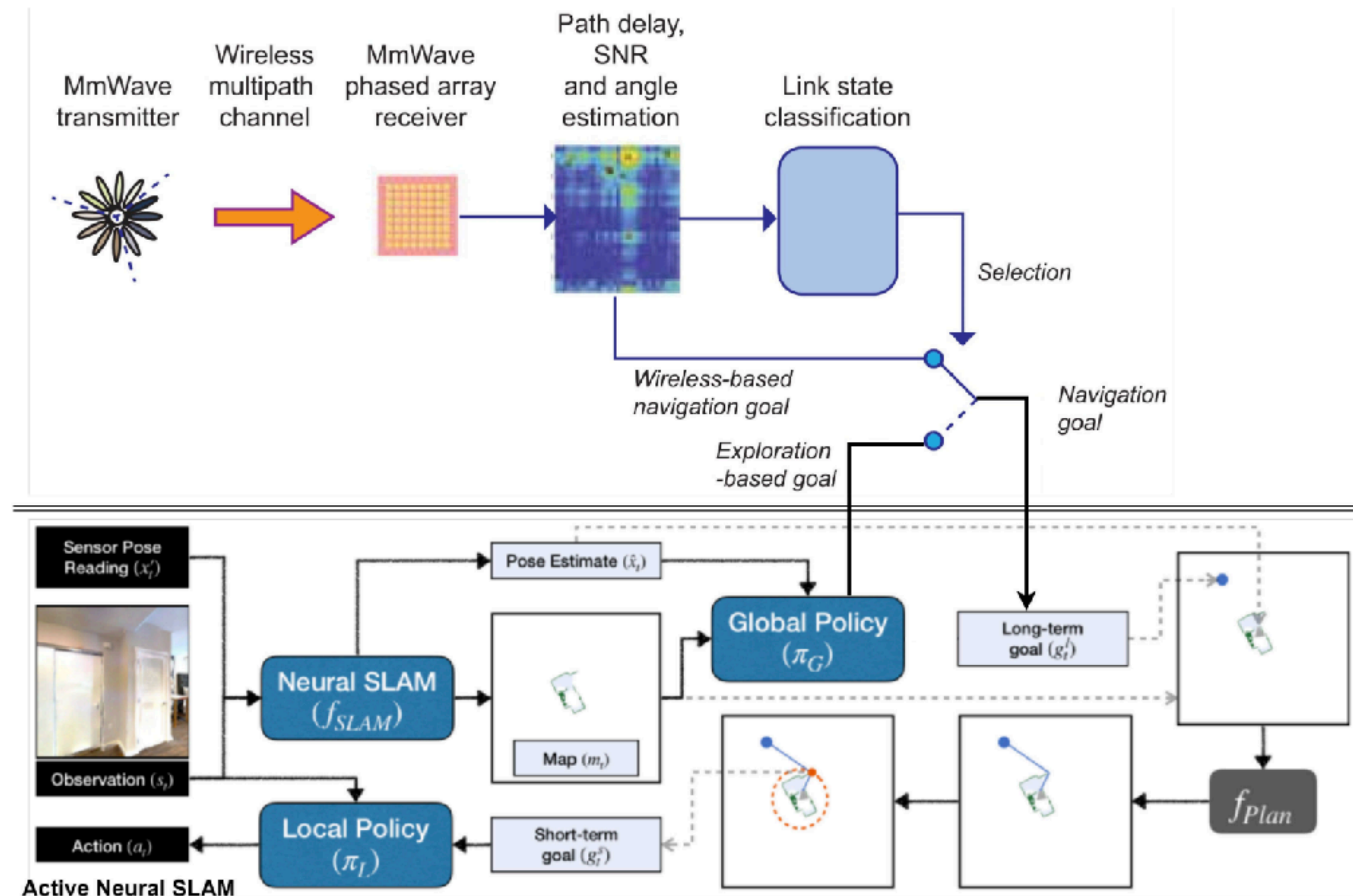
Wireless datasets

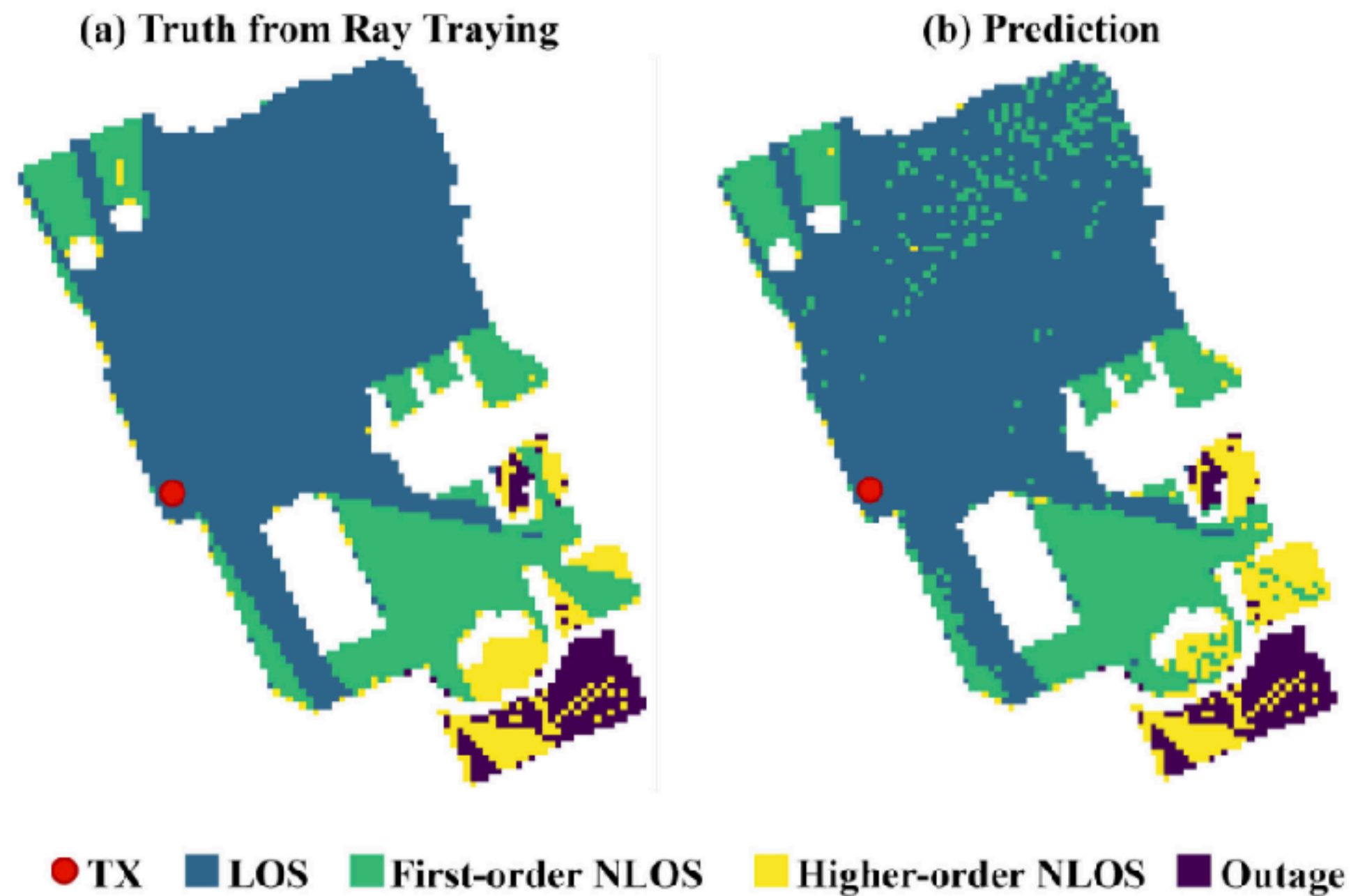
- Indoor 28GHz ray tracing
- MmWave MIMO channel modeling

Robot simulation

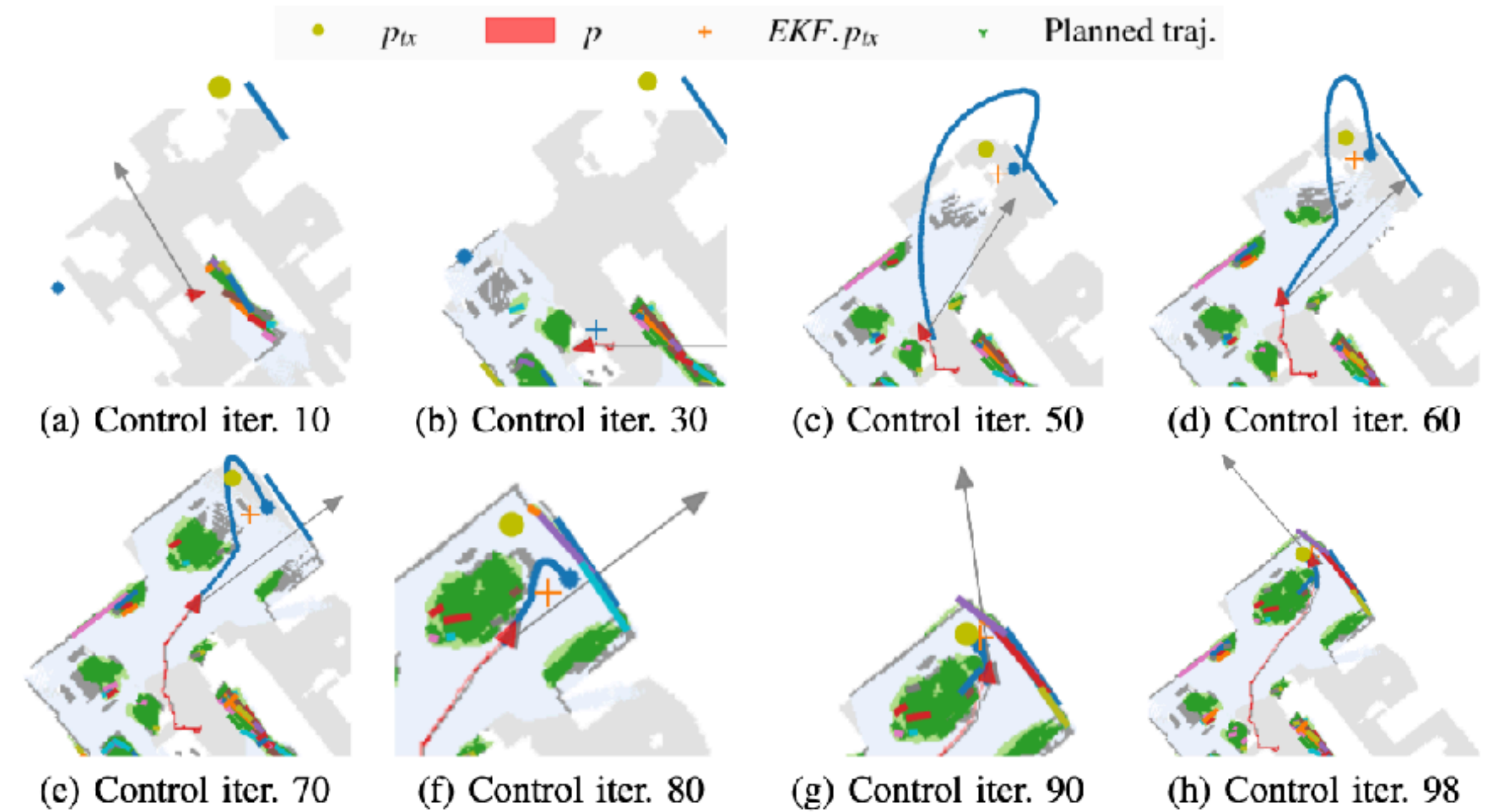
- Integration with Habitat-Sim and Neural SLAM
- Top-Down indoor maps

<https://github.com/nyu-wireless/mmwRobotNav>





link state ground truth (left) vs. neural network classification (right)



model predictive control under observation uncertainty (transmitter location variance reduction cost)



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Broader Impact

Lowering barrier to entry for industries and academia (open-source software / relation with industries through NYU Wireless)

K12 Summer Machine Learning Program (all PIs)
K12 ARISE: New York-centered summer research experience for high school students