# Multi-Parametric QoS Predictions in WSNs

GOALS

- Design and run experiments covering diverse parameter and network settings (including configurable stack parameters, and protocols), and collect comprehensive performance data.
- Analyze the relationships among various input parameters and output metrics
- Use ML to achieve practically acceptable prediction accuracy for target QoS metrics.

CHALLENGES

- Adaptive design for QoS
- Seamless integration with the existing infrastructure
- Multiple QoS metrics often conflict, leaving NP-hard optimization problems
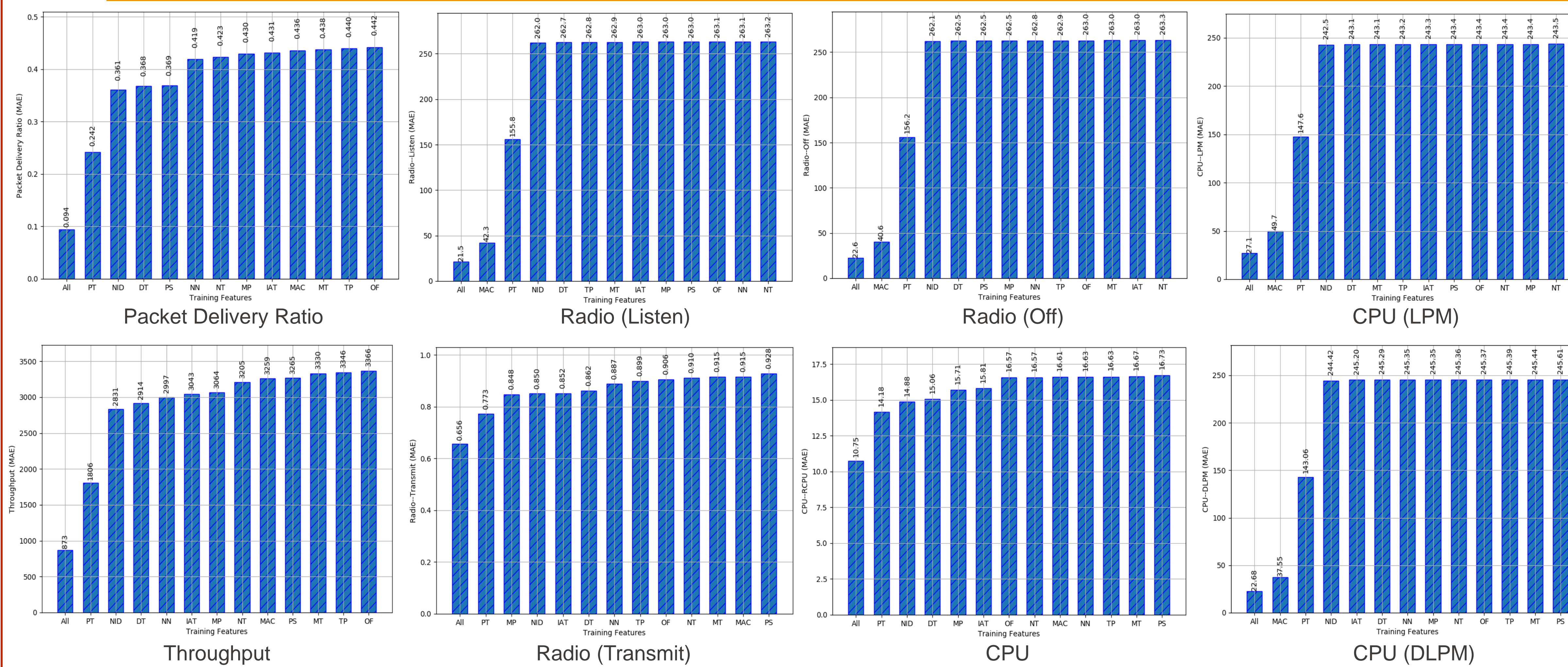
DEMO SETUP
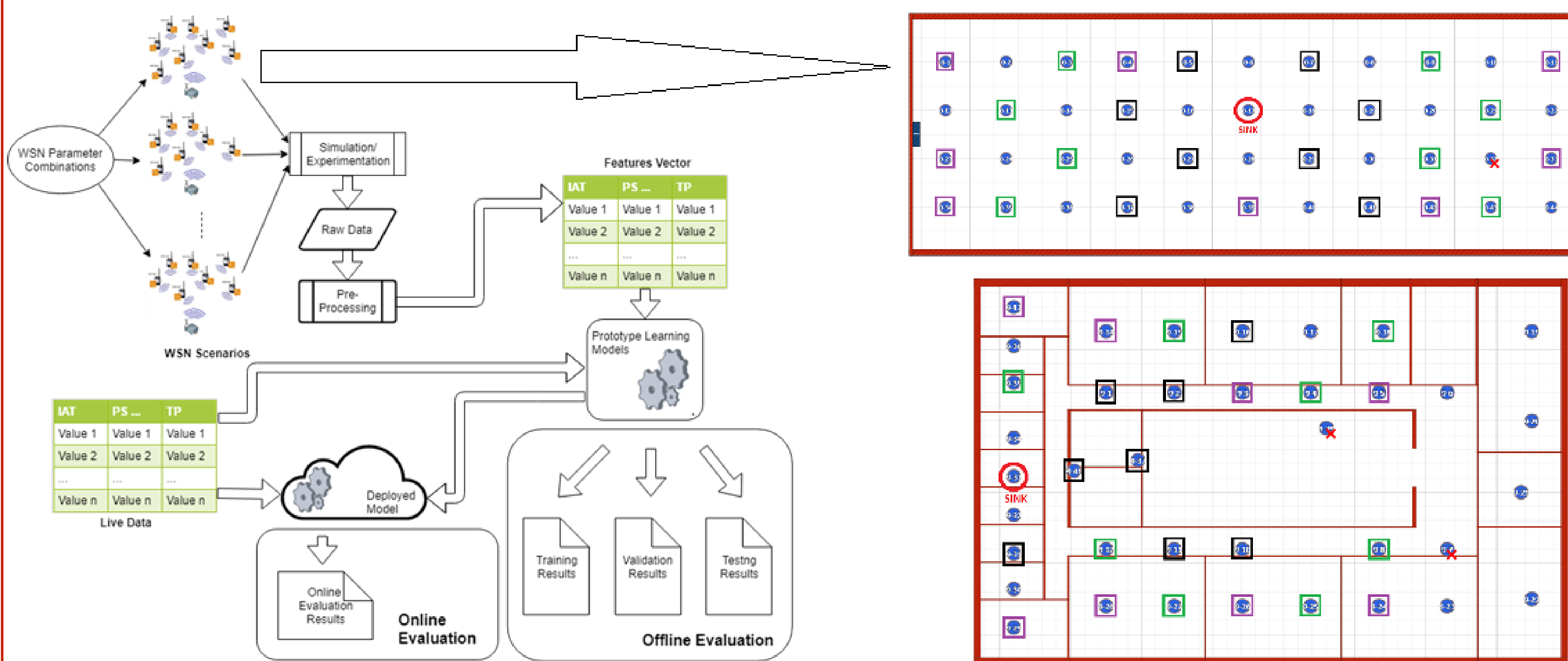
Data collected under diverse parameters settings from different topologies in DC and floor-9 (wilab-1). Pre-processing done locally. Machine learning performed using GPU Lab.
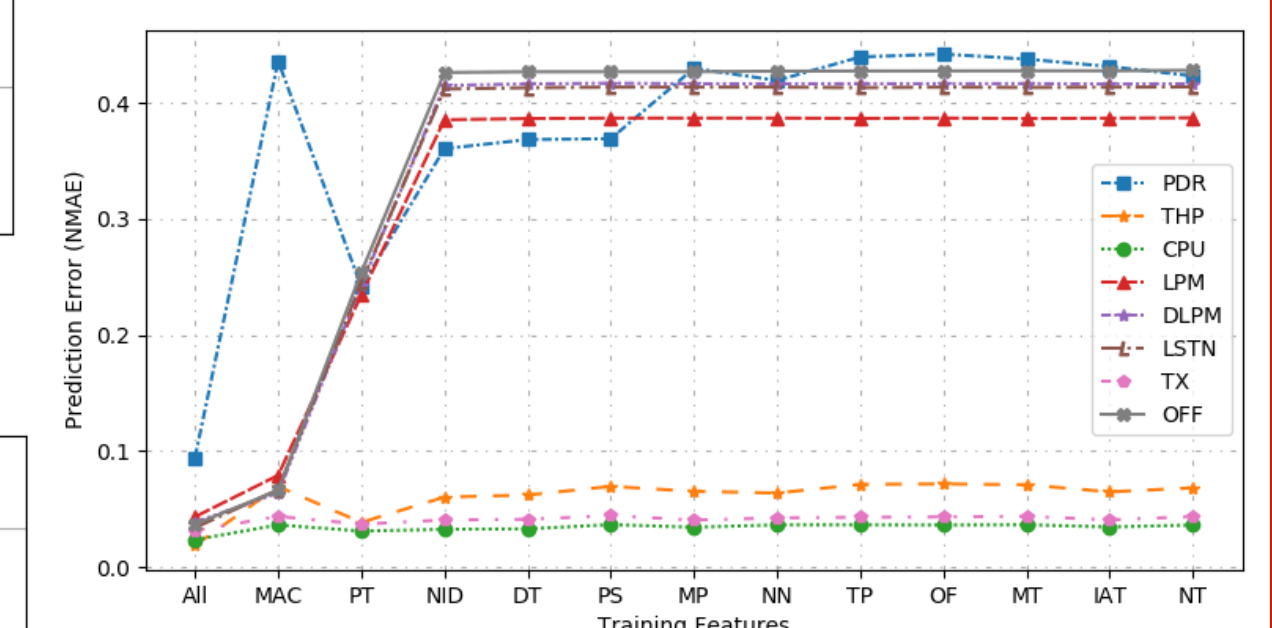
RESULTS

Correlations among parameters and QoS metrics

MORE RESULTS

Packet Delivery Ratio

Radio (Listen)

Radio (Off)

CPU (LPM)

Throughput

Radio (Transmit)

CPU

CPU (DLPM)

- The bar charts reveal mean absolute error for each parameter and the all combined

- The normalized error shows that the prediction accuracy is above 90% for all metrics

CONCLUSIONS

- Certain combinations of parameters influence certain QoS metrics in varying ways

- The QoS metrics can be forecasted based on the variations in the parameters/protocols/topologies etc.

- The predictability (with sufficient accuracy) encourages the desing for a cognitive framework for QoS in WSNs

POST MORTEM

- The facilities and support from Fed4FIRE+ consortium made this research possible

- There is sufficient infrastructe that enables furutre experiments

- Potential for predictiable QoS in other types of networks (e.g., WiFi, LTE, 5G etc) are next in the line

- Design of a fully functions cognitive framework for QoS in IoT is aimed