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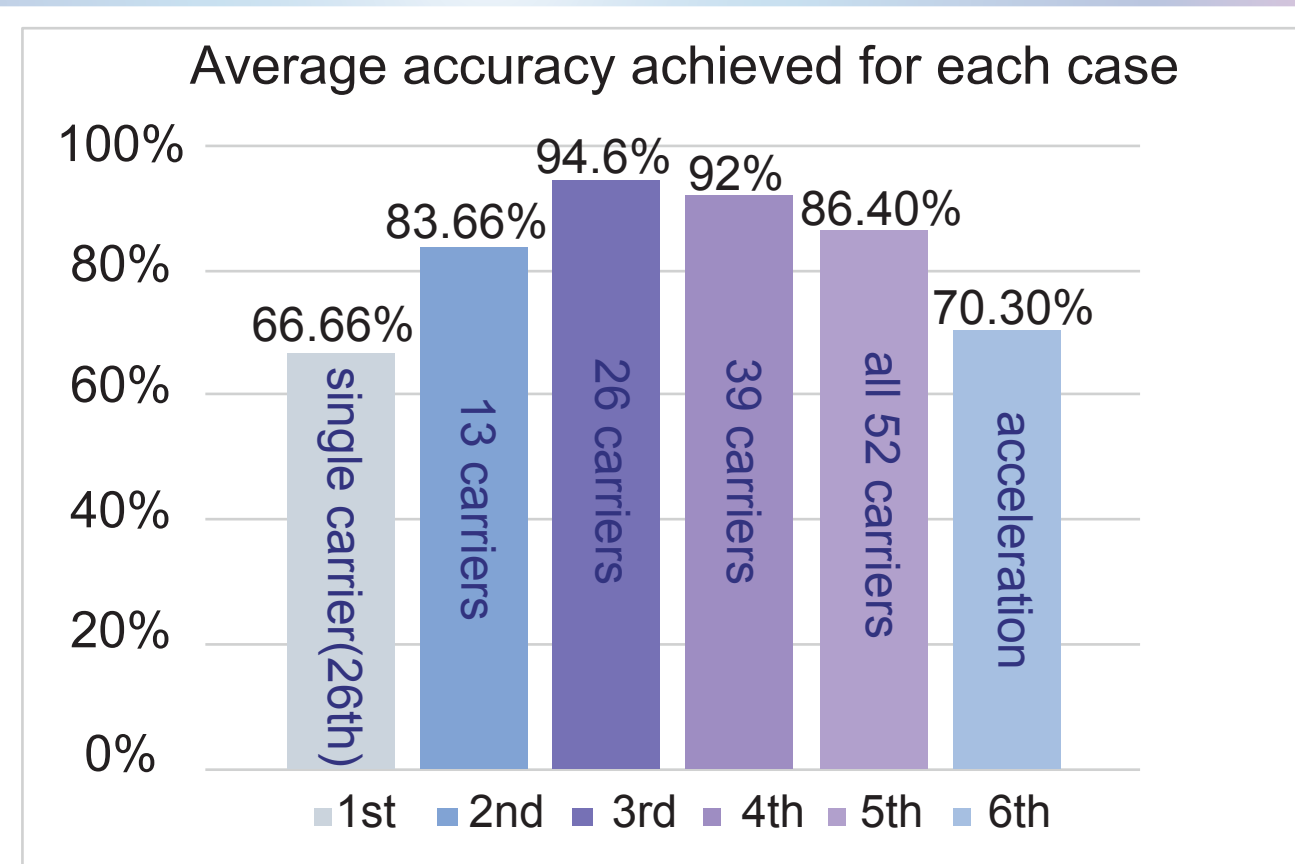
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Walking Speed Recognition from 5G Prototype System

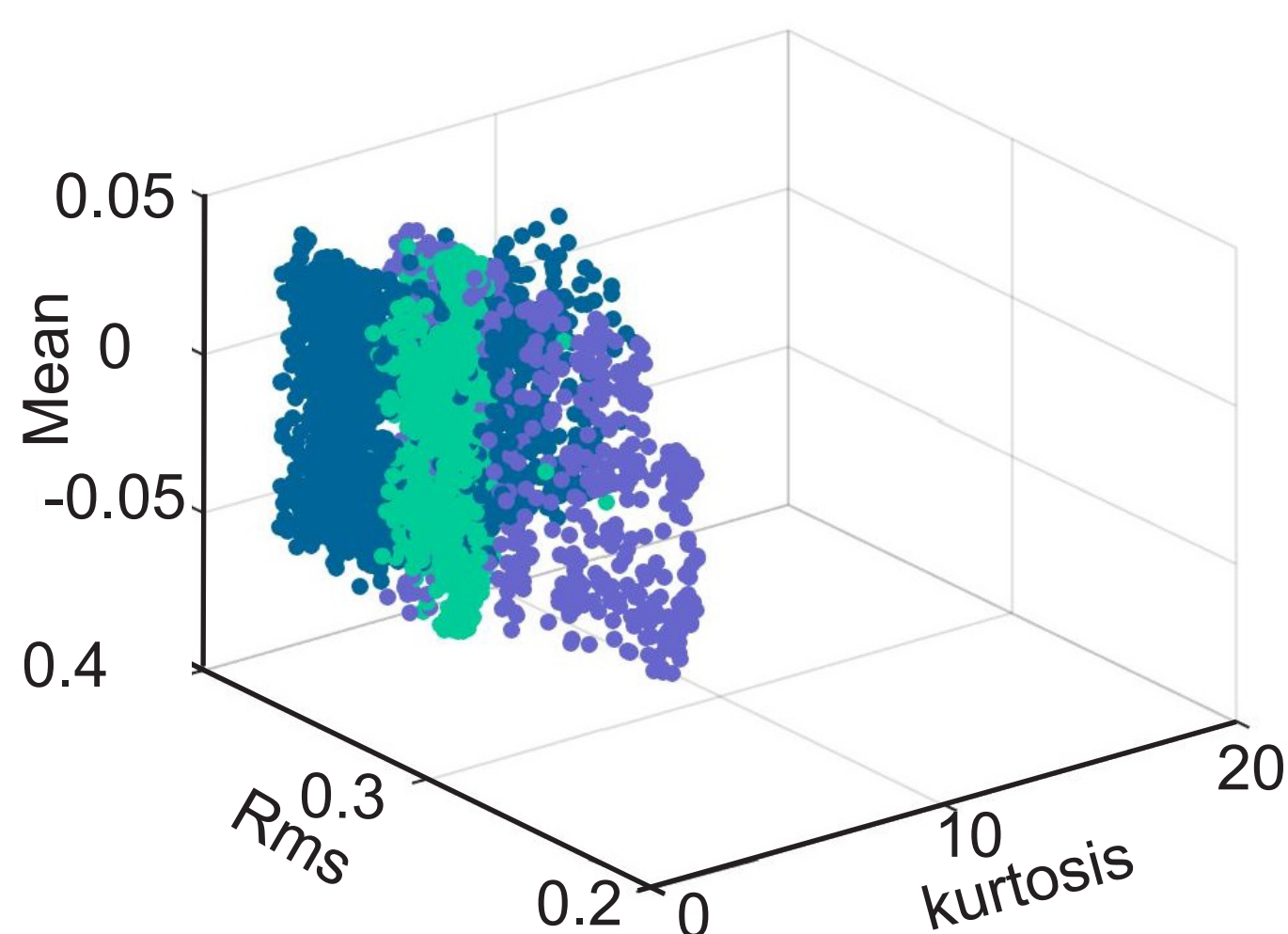
Overview

- Upcoming 5G technology allows continuous activity recognition capabilities.
- Walking speed recognition via Radio-Frequency promises ubiquitous integration into environments and convenience for subjects.
- The recognition of walking speed by a prototypical 5G system exploiting OFDM carriers is employed.
- Three classes of speeds are : Slow (0.7(m/s)), Medium (1.3 m/s) and fast (2.2 m/s)
- The impact of sub-channel count and comparison with acceleration-based sensing is considered

Result

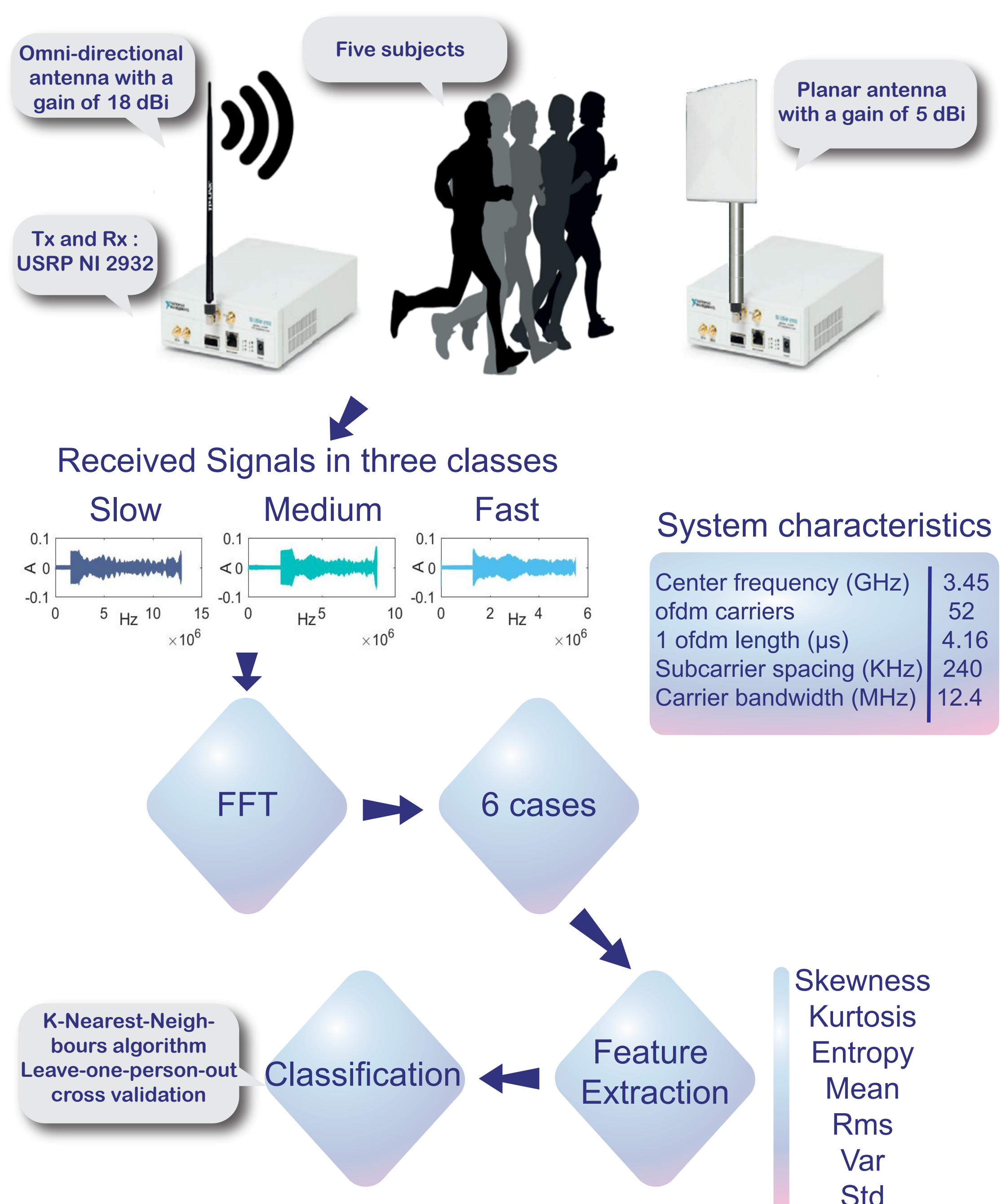


- Best result : 26 carriers
- Single-carrier case is most similar to traditional RS-SI-based recognition but with higher sampling frequency and sampling accuracy.
- Accuracies from RF-sensing are comparable, or better than acceleration sensing.



- A three dimensional (3D) plot of three selected features (Mean, Rms, Kurtosis) through all speeds for the best case (26 carriers).
- Beside the slight interference, three speed classes are well distinguished.

Experimental Procedure



Concluding Remarks

- 5G technology for ubiquitous activity detection
- Desirable frequency of 3.45 GHz
- Excellent walking speed recognition accuracy

Future Work

- More fine-grained activities such as open and strong gestures/movement, close and weak getures/movements.
- Exploitation of higher frequency up to 15 GHz
- Analysis of recognition capabilities of prototype 5G in different environment such as outdoor
- Further advanced prototype system utilizing multiple-in-multiple-out (MIMO) transmission exploiting multiple antennas.