Human Activity Detection Indoors using a Low-power Radar-Enabled Sensor Network

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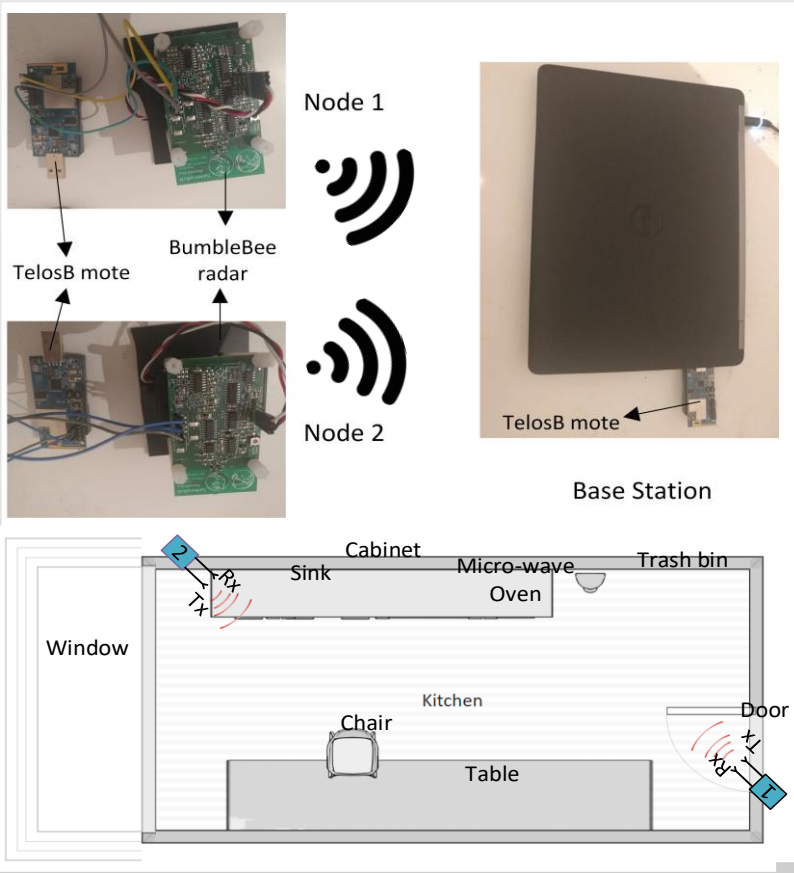
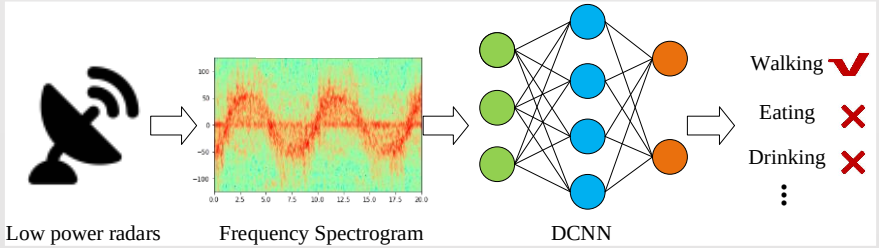
Low-power Radar Sensor Network



Characteristics of our radar sensor network:

- Non-intrusive
- Through-wall ability
- Device-free
- Energy-efficient
- Light-insensitive
- All-weather

Deep learning based activity detection

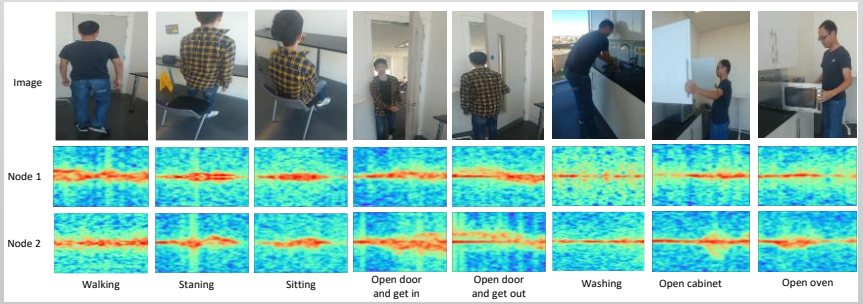


Step 1: Measuring human activities using the radar sensor network

Step 2: Converting radar signals from amplitude domain to frequency domain (frequency spectrograms)

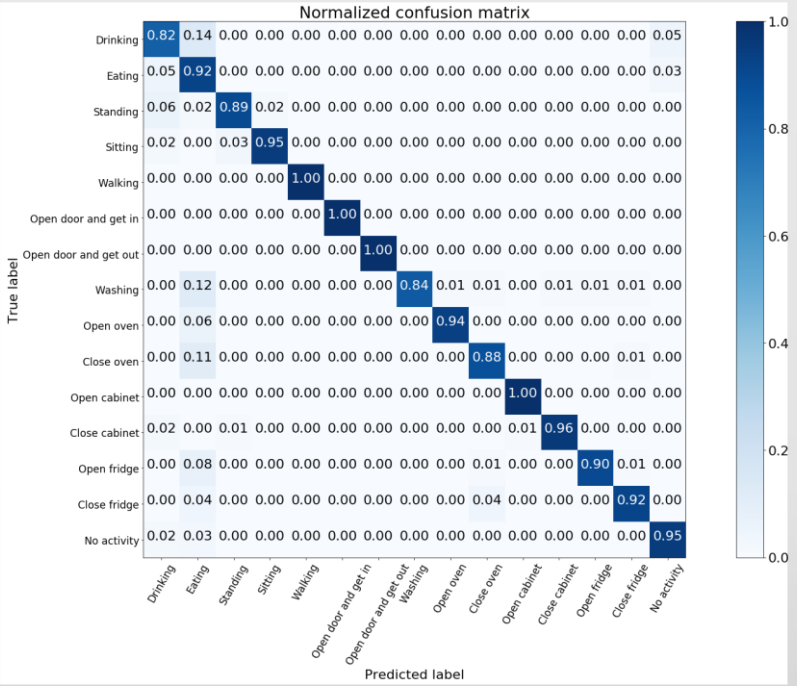
Step 3: Feeding spectrograms to Deep Convolutional Neural Network (DCNN) for automatic feature learning and classification

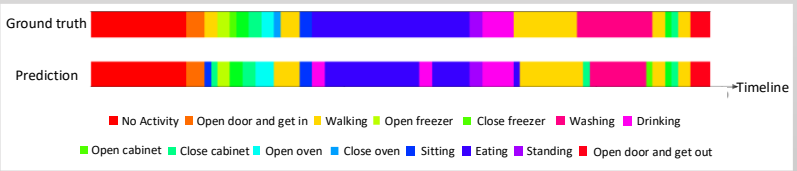
Micro-Doppler signatures of human activities



Fifteen activities were investigated in a ***kitchen scenario***

Results





- In test, **92.81 overall accuracy** was achieved
- In nearly real-time detection, human activities were recognized successfully in **89% of the time**

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