

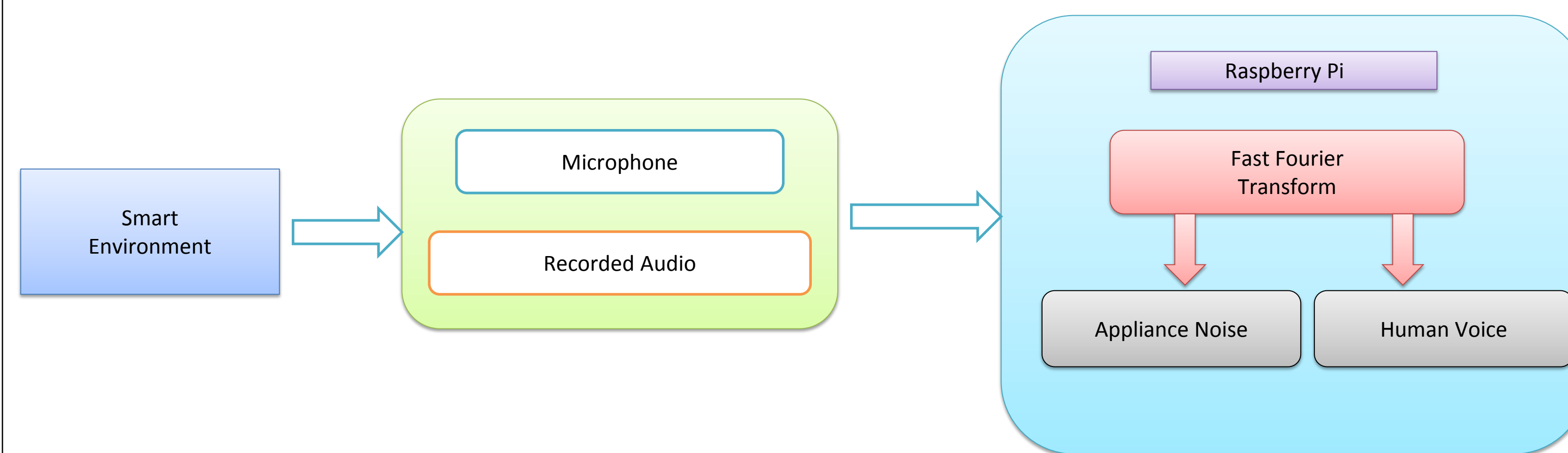
Motivation

- ▶ Building Energy Consumption Reduction
- ▶ Smartphone-based Context Sensing
- Acoustic Signal-based Occupancy Prediction
- ▶ Energy Disaggregation
- Multi-modal Sensing Integration
- Appliances' State Identifications
- Fine-grained Energy Metering

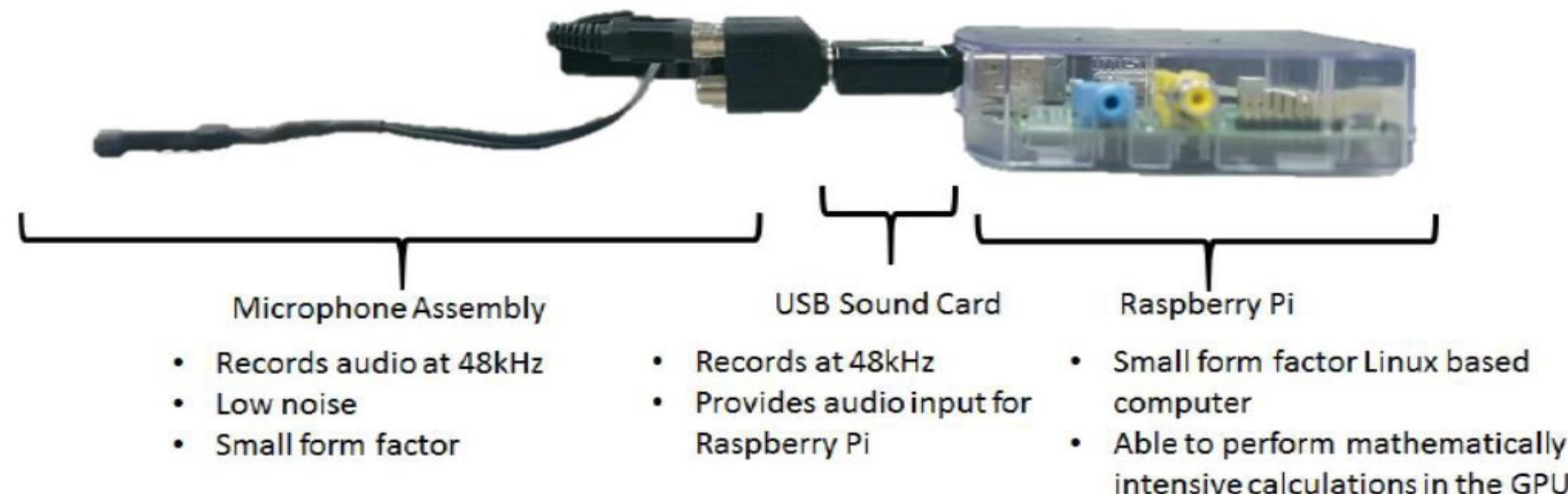
System Architecture

- ▶ Two Logical Components
 - Audio Signal Detector & Recorder
 - Recorded via SoX
 - Audio Stored as Wav Format
 - Sampling rate 48 kHz
- ▶ Voice Separator
 - Fast Fourier Transform (FFT)
 - Graphics Processing Unit (GPU)
 - Human Voice Recognition (400 Hz – 3000 Hz)
 - Appliance Noise Detection

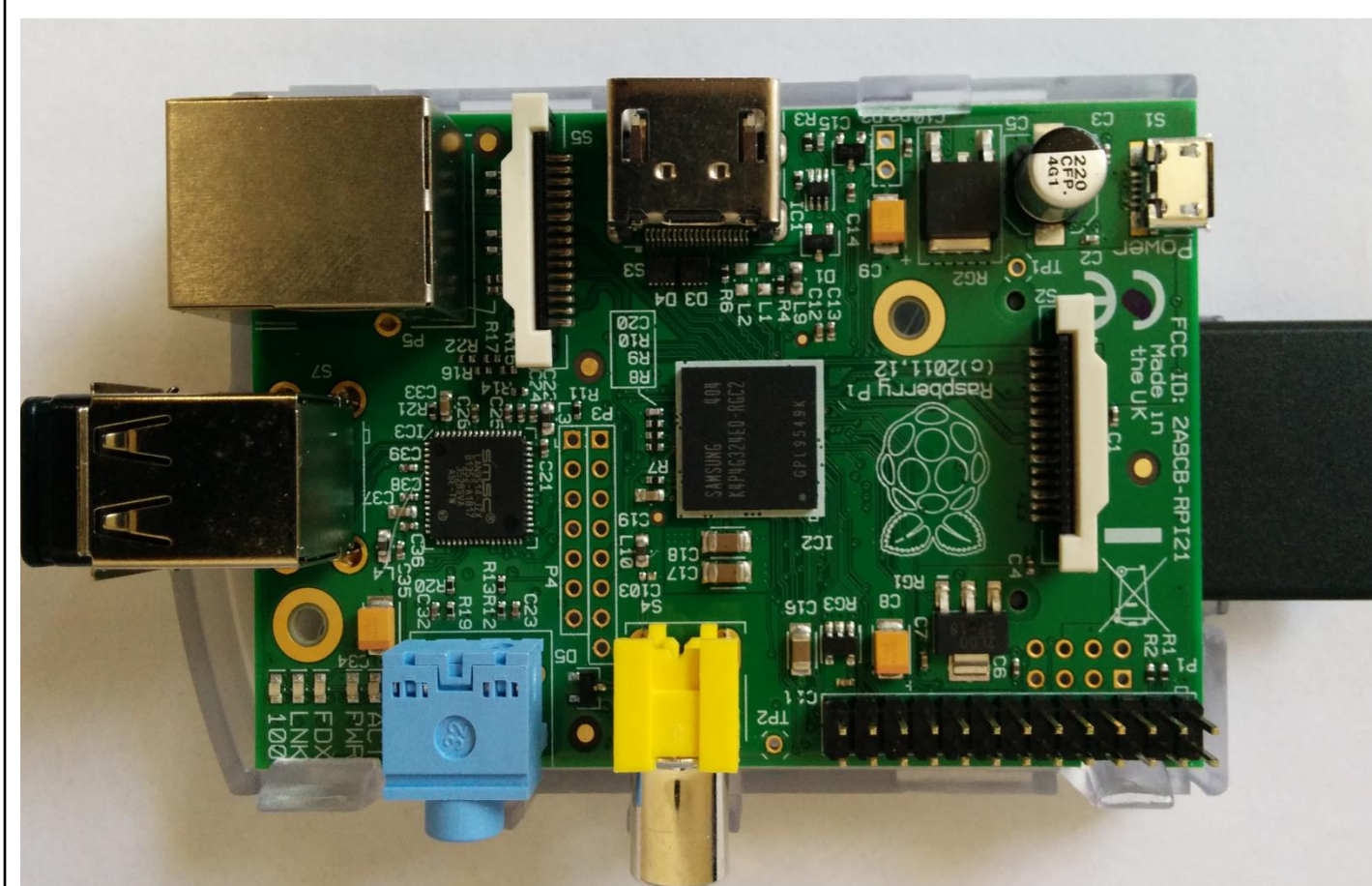
Functional Overview of Acoustic Sensor Node (ASN)



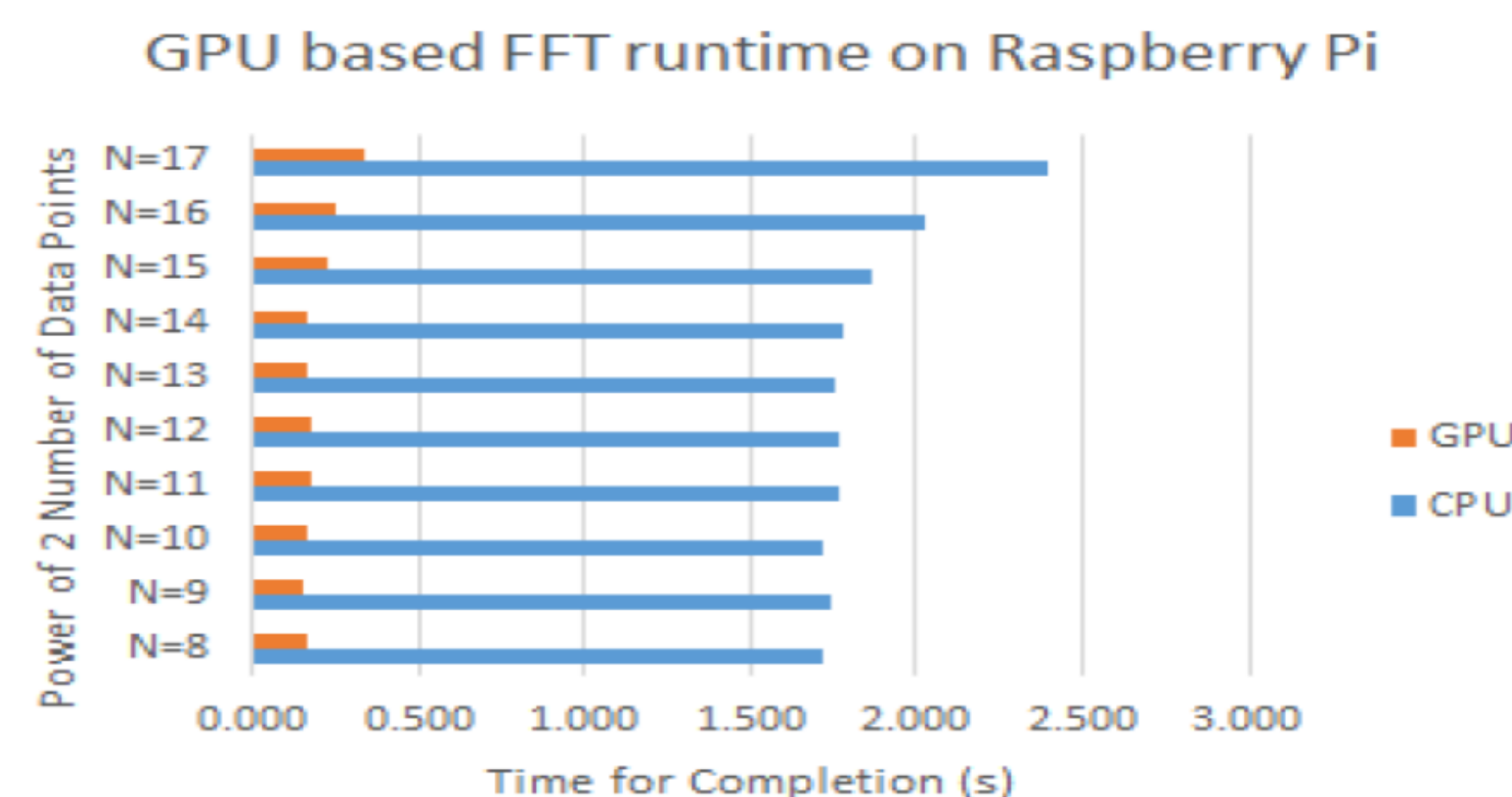
ASN Hardware System



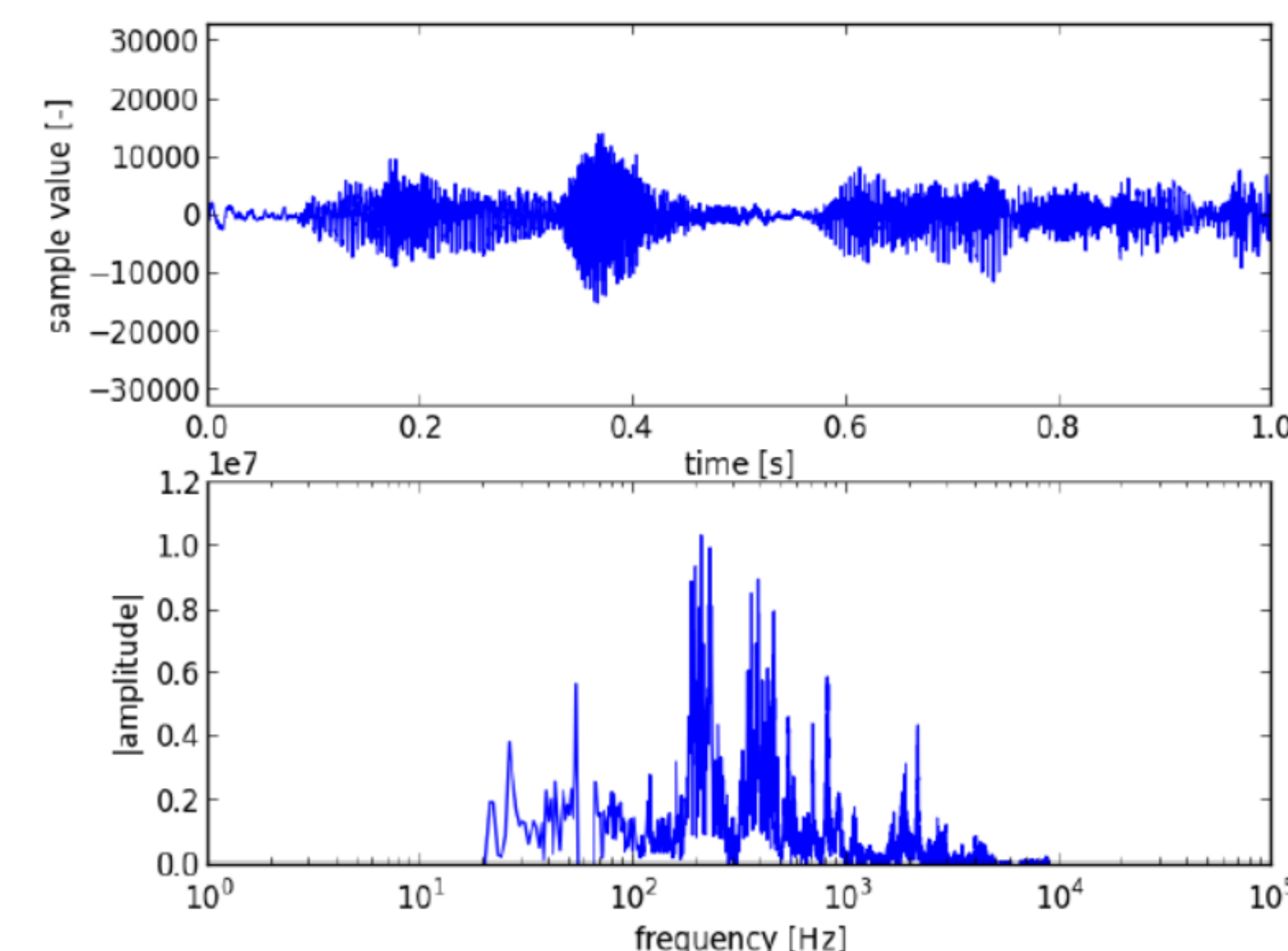
Raspberry Pi



Computational Enhancement



Human Voice Representation



Acknowledgements

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References

- § Sound Exchange (sox). <http://sox.sourceforge.net/>
- § Raspberry pi gpu. <http://www.raspberry-projects.com/pi/pi-hardware/bcm2835>
- § J. Cooley and J. Tukey. An algorithm for the machine calculation of complex fourier series. Mathematics of Computation, 19(90):297–301, 1965
- § N. Pathak, Md Abdullah Al Hafiz Khan, and N. Roy "Acoustic Based Appliance State Identifications for Fine Grained Energy Analytics" IEEE PerCom 2015