

Pulmonary Acoustic Sensor Telemetry Array (PASTA)

TOMORROW

Reid D. Jockisch¹, Connor R. Davey¹, Nick Manos³, Colin Diercks³, Zuguang Liu³, Md Suruz Miah³, Adam R. Cross^{1,2}

¹OSF Innovation, ²University of Illinois College of Medicine, ³Bradley University

PROBLEM TRYING TO SOLVE

- Respiratory conditions remain the number one cause of hospitalization in children nationwide
- Pulse oximetry changes are an insensitive marker for respiratory distress in children
- Heightened demand for *remote* and *contactless* methods of clinical care and continuous monitoring



Figure 1: Example Digital Stethoscope, Eko CORE 500

GOALS

- A novel hardware prototype capable of recording data from an array of acoustic pulmonary sensors simultaneously
- Simultaneously recording eight channels of audio at a frequency of 48 kHz and depth of 24 bits
- Low-cost, modular, and open-platform architecture

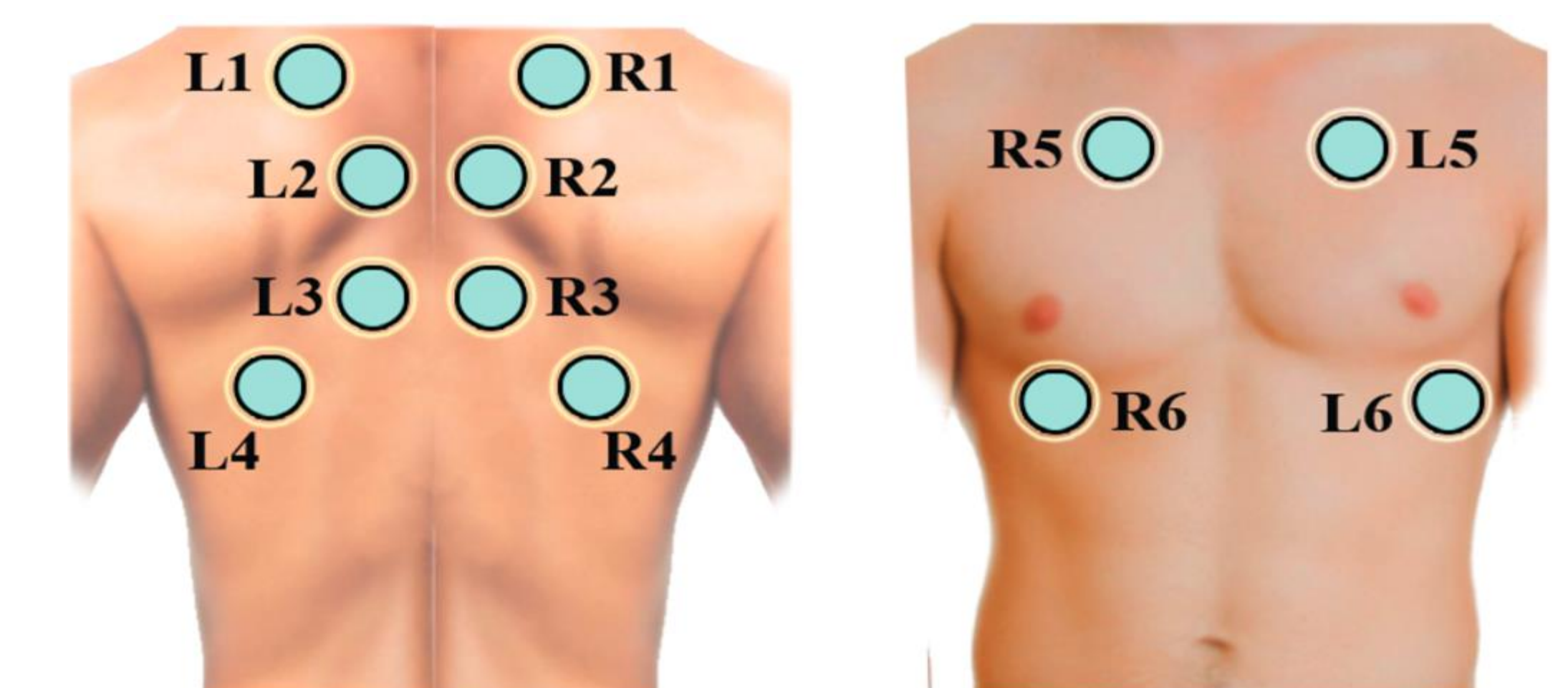


Figure 2: Target monitoring locations include L1, R1, L4-L6 and R4-R6

JOURNEY

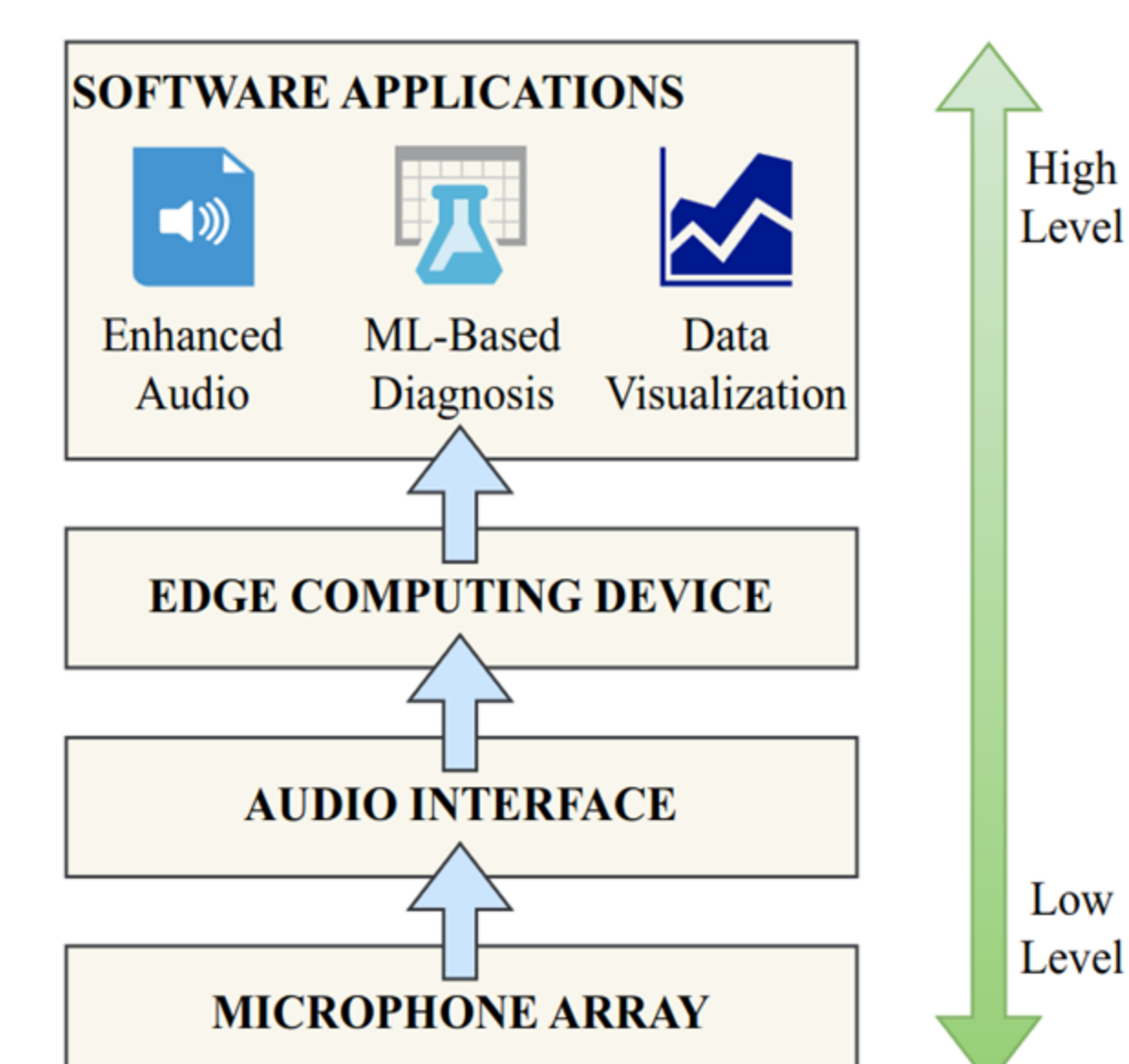


Figure 3: Data flow in PASTA prototype



Figure 4: On-site data collection

- Laerdal SimMan 3G mannequin patient model generated nine lung diagnostic sounds for testing
- Recorded lung acoustics with PASTA prototype and compared against two competitor digital stethoscopes

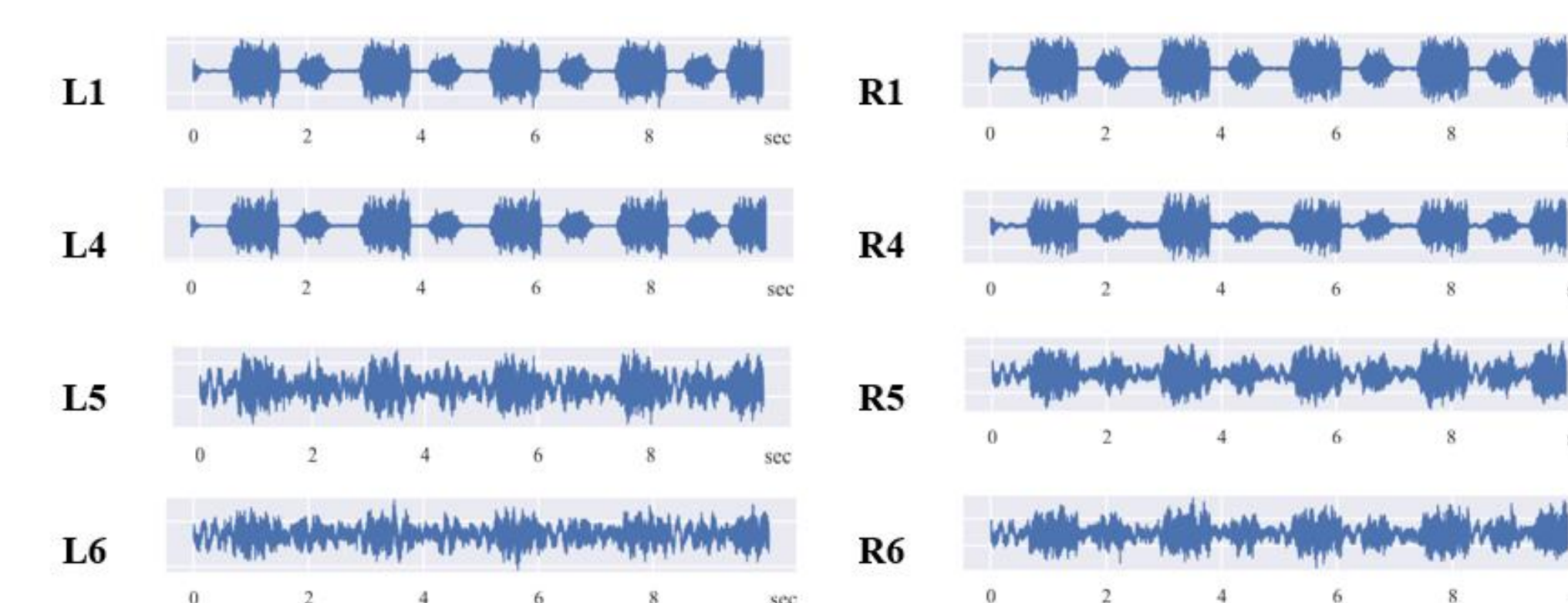


Figure 5: Lung acoustics over time recorded on 8 channels simultaneously

IMPACT

- PASTA will allow for:
 - Real-time detection of deterioration
 - Identification of focal pneumonias
 - Measurement of patient response to therapy
 - At-home respiratory monitoring
- This advancement in monitoring could reduce unnecessary diagnostic procedures that could result in misdiagnosis, overtreatment, and unnecessarily prolonged hospitalization

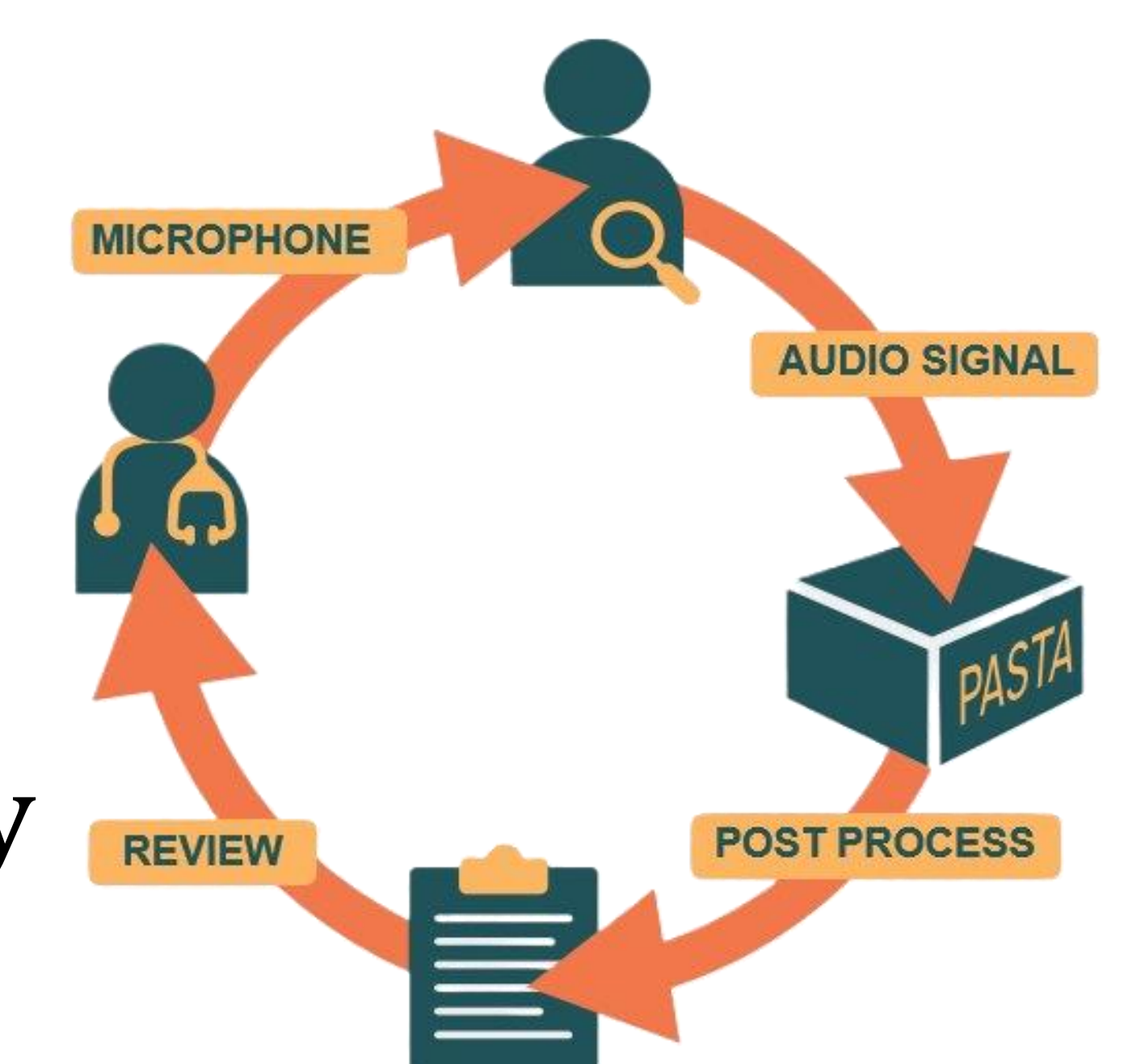


Figure 6: PASTA system architecture