RESEARCH WHITEPAPER

From wearable signals to reviewable records

Abstract

A continuous wearable recording can span hours of variable sensor contact and motion. This paper describes a record format that keeps the original waveform, signal quality annotations, and the timeline of reviewer actions together. We outline how the format could be evaluated on synthetic recordings with known gaps and timing errors.

The review problem

Reviewers need to distinguish an uninterpretable interval from an interval that contains no marked event. A compressed timeline can hide that distinction when it omits missing samples or draws a continuous line through a recording gap. A reviewable record makes the distinction visible at every zoom level.

Proposed record format

Preserve sample timestamps, units, and channel identifiers as received. Store quality labels separately from the source samples and attach each label to a start and end time. Imported annotations retain their source and timestamp. When the source clock changes, record the correction alongside the original time axis.

A REVIEWABLE RECORD CONTAINS

Source samples, explicit gaps, time-aligned annotations, and a history of changes.

Workflow and evaluation

Show quality in the review interface

Display the source waveform next to a quality timeline. Render a missing interval as a break in the trace and mark degraded intervals with a brief reason when one is available. Let reviewers open the original samples from any summary view and record edits as additional entries in the audit history.

Test with known timing errors

Build synthetic recordings that include sample dropouts, clock offsets, and bursts of motion. Compare the review display with the known start and end of each injected interval. Record how often gaps remain visible at wider zoom levels and whether reviewers can locate the underlying samples from a flagged interval.

Measure reproducibility

Export the same recording twice and compare sample values, annotation boundaries, and reviewer action history. Repeat after applying a time correction and confirm that both the original times and the correction can be recovered from the export.

Limitations

Synthetic recordings can test timing and display behavior. Any future clinical evaluation would require representative recordings, a predefined review protocol, and independent comparison with an appropriate reference. This paper describes a design concept and presents no clinical performance results.