Supplementary Material

**Screen-Printed Wearable Sensors for Continuous Respiratory Rate Monitoring: Fabrication, Clinical Evaluation, and Point-of-Care Potential**

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Table S1: The data collected from each subject and the calculated respiratory rate at three different postures

|  |  |  |  |  |  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- |
| Subject | Age | Gender | Height (cm) | Weight (Kg) | Smoking | Medical history | Chronic drugs | General fitness\* | Cardiorespiratory health\* | Posture | RRAFS (bpm) | RRRS (bpm) | Error  (bpm) |
| 1 | 23 | M | 172 | 74 | No | No | No | Good | Average | Sitting | 12.0 | 11.0 | -1 |
| Standing | 11.0 | 11.0 | 0 |
| Lying45° | 11.0 | 11.0 | 0 |
| 2 | 23 | M | 181 | 88 | No | No | No | Good | Average | Sitting | 17.0 | 17.0 | 0 |
| Standing | 15.0 | 15.0 | 0 |
| Lying45° | 12.0 | 12.0 | 0 |
| 3 | 23 | F | 168 | 65 | No | No | No | Average | Average | Sitting | 19.0 | 19.0 | 0 |
| Standing | 20.0 | 20.0 | 0 |
| Lying45° | 19.0 | 19.0 | 0 |
| 4 | 21 | F | 157 | 50 | No | No | No | Poor | Average | Sitting | 21.0 | 21.0 | 0 |
| Standing | 17.0 | 17.0 | 0 |
| Lying45° | 27.0 | 27.0 | 0 |
| 5 | 21 | M | 180 | 76 | No | No | No | Average | Poor | Sitting | 22.0 | 22.0 | 0 |
| Standing | 24.0 | 24.0 | 0 |
| Lying45° | 19.0 | 19.0 | 0 |
| 6 | 22 | M | 172 | 64 | No | No | No | Very Good | Very Good | Sitting | 18.0 | 18.0 | 0 |
| Standing | 22.0 | 22.0 | 0 |
| Lying45° | 16.0 | 16.0 | 0 |
| 7 | 21 | M | 179 | 74 | Yes | No | No | Average | Good | Sitting | 16.0 | 16.0 | 0 |
| Standing | 20.0 | 20.0 | 0 |
| Lying45° | 20.0 | 20.0 | 0 |
| 8 | 23 | M | 168 | 70 | No | No | No | Average | Average | Sitting | 23.0 | 23.0 | 0 |
| Standing | 18 | 20.0 | 2 |
| Lying45° | 24.0 | 24.0 | 0 |
| 9 | 24 | M | 167 | 62 | No | No | No | Good | Average | Sitting | 20.0 | 20.0 | 0 |
| Standing | 19.0 | 19.0 | 0 |
| Lying45° | 17.0 | 17.0 | 0 |
| 10 | 24 | M | 170 | 70 | No | No | No | Poor | Average | Sitting | 10.0 | 10.0 | 0 |
| Standing | 12.0 | 12.0 | 0 |
| Lying45° | 10.0 | 10.0 | 0 |
| 11 | 23 | M | 182 | 78 | No | No | No | Good | Very good | Sitting | 16.0 | 16.0 | 0 |
| Standing | 12.0 | 12.0 | 0 |
| Lying45° | 22.0 | 22.0 | 0 |
| 12 | 23 | M | 190 | 83 | No | No | No | Good | Average | Sitting | 19.0 | 19.0 | 0 |
| Standing | 17.0 | 17.0 | 0 |
| Lying45° | 16.0 | 16.0 | 0 |
| 13 | 24 | M | 178 | 80 | No | No | No | Good | Average | Sitting | 22.0 | 20.0 | -2 |
| Standing | 23.0 | 23.0 | 0 |
| Lying45° | 22.0 | 22.0 | 0 |
| 14 | 23 | M | 181 | 80 | No | No | No | Average | Average | Sitting | 21.0 | 21.0 | 0 |
| Standing | 20.0 | 20.0 | 0 |
| Lying45° | 23.0 | 23.0 | 0 |
| 15 | 24 | M | 173 | 64 | No | No | No | Very Good | Very Good | Sitting | 16.0 | 16.0 | 0 |
| Standing | 15.0 | 18.0 | 3 |
| Lying45° | 18.0 | 18.0 | 0 |

\* As evaluated by the participants.



Printed pattern

PDMS drop

Conductive thread

Galinstan

Figure S1: Connection method between the printed pattern and external circuitry. Galinstan liquid metal was used as a flexible connector to maintain connection with the conductive thread under strain. The PDMS drop secures the Galinstan and prevent it from spilling.

A person using a tool to paint a screen

Description automatically generated with medium confidence

Figure S2: The screen during printing, showing the squeegee after one pass on the stencil.

 A close-up of a white rubber band

Description automatically generated

b)

a)

Figure S3: The effect of protective coating on the screen-printed pattern. Figure a) shows a screen-printed pattern that remained uncoated for 1 month, discoloration and degradation can be observed. While figure b) shows a similar pattern yet remained unaffected since it has been coated with a thin layer of PDMS to protect against environmental conditions.

A person holding a yellow wire

Description automatically generated

Figure S4: A participant during test in sitting position. The belt with the sensor can be seen wrapped around the upper abdomen area with crocodile cables connected to the conductive threads.