Supplementary Materials:

This supplementary materials shows the graphical abstract of this manuscript and the results of the calibration curves in each experiment.

1. The graphical abstract of this manuscript.

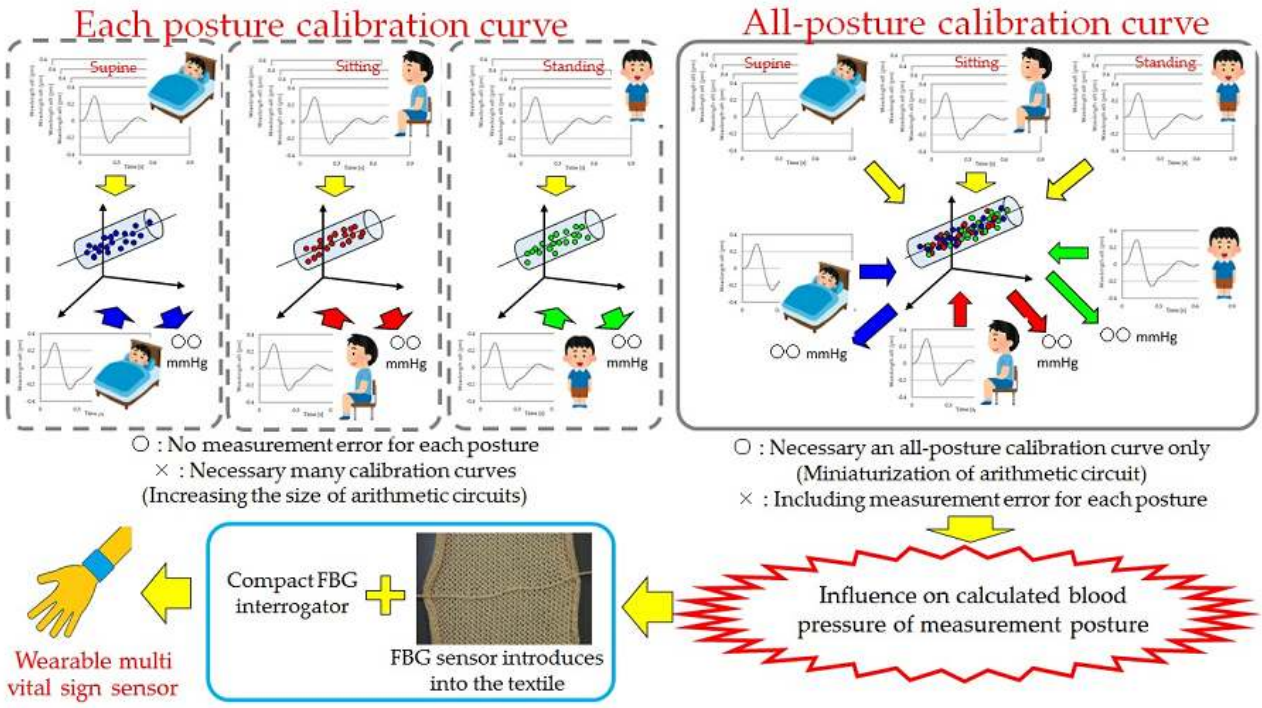


Figure 1 The graphical abstract of this manuscript.

In order to develop a wearable sensor using FBG sensor, it is necessary to reduce the size of the FBG interrogator. An arithmetic circuit is necessary, because a calibration curve is used in the proposed blood pressure calculation method. However, as the posture of the subject changes, the waveform of the pulse wave signal also changes, and the measurement error of the blood pressure calculated from the calibration curve is affected. In order to reduce this error, calibration curves corresponding to the posture can be constructed. However, multiple calibration curves require more complex calculations, leading to difficulties miniaturizing the arithmetic circuit, and thus wearable sensors cannot be developed. Therefore, it is necessary to have a calibration curve for calculating blood pressure that can reduce measurement error in various postures. The accuracy of the potentially wearable device may be further improved by developing a calibration curve that includes data from many more possible postures. We have already developed a method to introduce the sensing optical fiber into textile products. Thus, a compact sensor system using FBG sensors can be developed, and this system can be introduced into wearable textile products; these might include integration in the sleeves of clothes or wristband-type devices.

2. The calibration curve results in experimental 1.

In Experiment 1, the position of the wrist of the measuring part is changed while the subject is sitting, to investigate the influence due to the difference in height between the reference blood pressure measurement position and the FBG sensor. The position of the right wrist where the FBG sensor is installed is the same height as the reference blood pressure measurement part (Position 1A). In addition, the pulse wave signal using the FBG sensor is measured for two other positions of the arm: lowered by 45° (Position 1B) and lowered by 90° (Position 1C). Table 1 shows the calibration curve data set. Figure 2 shows the scatter diagram of calibration curve in each posture, and Table 2 shows the calibration curve results.

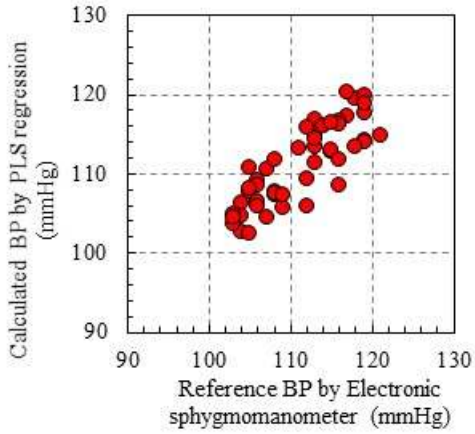
These calibration curves were used in calculating the results in Figure 6 of the manuscript.

Table 1 Calibration data set in Experiment 1

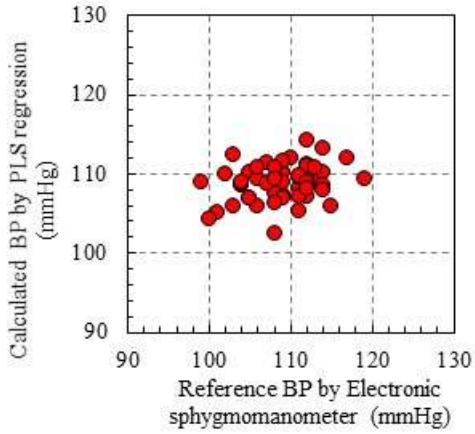
	Samples	Max (mmHg)	Min. (mmHg)	Avg. (mmHg)
Position 1A	50	121	103	111.3
Position 1B	50	119	99	108.8
Position 1C	50	117	90	104.9

Table 2 Calibration curve results in Experiment 1

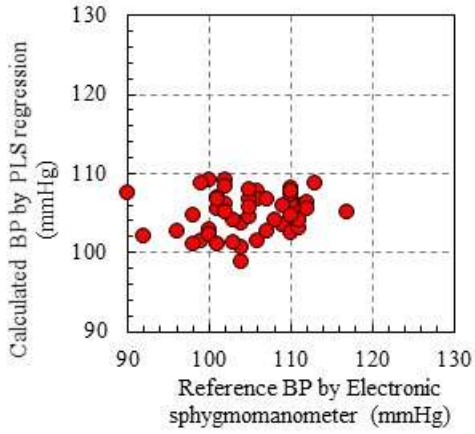
	Factors	Correlation coefficient	SEC (mmHg)
Position 1A	4	0.84	3.0
Position 1B	4	0.27	4.4
Position 1C	4	0.13	5.7



(a) The calibration curve in Position 1A.



(b) The calibration curve in Position 1B.



(c) The calibration curve in Position 1C.

Figure 2 The results of scatter diagram of the calibration curves in each posture: (a) Position 1A, (b) Position 1B, (c) Position 1C

3. The calibration curve results in experimental 2.

In Experiment 2, the subject's posture is changed with the reference blood pressure measurement value and the FBG sensor at the same height, in order to investigate the effect of posture without the influence of a measurement height difference. The pulse wave signal is measured with the subject in three postures: supine position, sitting position, and standing position. Table 3 shows the calibration curve data set in experiment 2. Figure 3 shows the scatter diagram of calibration curve in each posture, and Table 4 shows the calibration curve results.

These calibration curves were used in calculating the results in Figure 7 of the manuscript.

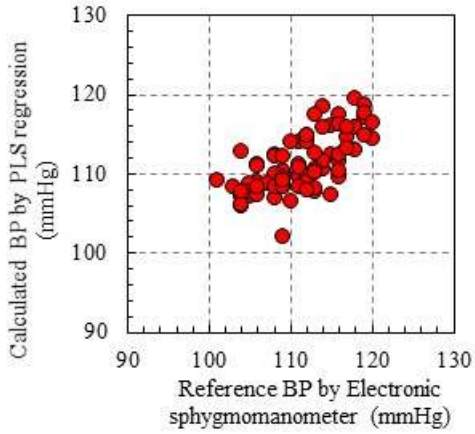
Table 3 Calibration data set in Experiment 2

(a) Calibration data set

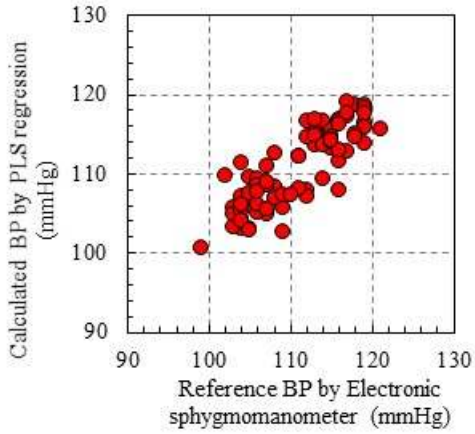
	Samples	Max (mmHg)	Min. (mmHg)	Avg. (mmHg)
Supine	80	120	101	111.3
Sitting	80	121	99	110.9
Standing	80	118	100	107.6

Table 4 Calibration curve results in Experiment 2

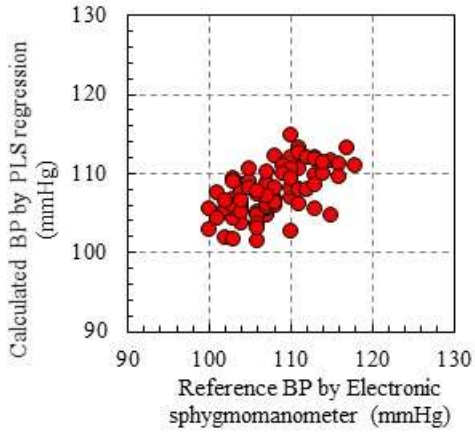
	Factors	Correlation coefficient	SEC (mmHg)
Supine	4	0.69	3.5
Sitting	4	0.84	2.9
Standing	4	0.56	3.6



(a) The calibration curve in supine position.



(b) The calibration curve in siting position.



(c) The calibration curve in standing position.

Figure 3 The results of scatter diagram of the calibration curves in each posture: (a) supine position, (b) sitting position, (c) standing position.

4. The all-posture calibration curve result.

In order to calculate blood pressure for various postures, a calibration curve is built using the data sets for three postures. 40 data points were selected from the supine, sitting, and standing positions calibration data sets, and a calibration curve (all-posture calibration curve) was constructed with the total of 120 data points. Table 5 shows the calibration data set in all-posture experiment. Figure 4 shows the scatter diagram of all-posture calibration curve, and Table 6 shows the all-posture calibration curve results.

This calibration curve was used in calculating the results in Figure 8 and Table 7 (b) of the manuscript.

Table 5 Calibration data set in all-posture experiment.

	Samples	Max (mmHg)	Min. (mmHg)	Avg. (mmHg)
All	120	120	100	110.0
(Supine)	40	120	100	110.2
(Sitting)	40	119	101	109.7
(Standing)	40	119	102	110.0

Table 6 The result of all-posture calibration curve.

	Factors	Correlation coefficient	SEC (mmHg)
All posture	4	0.69	3.8

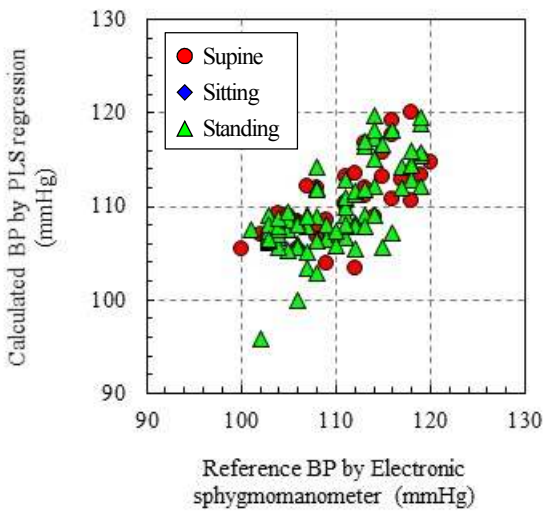


Figure 4 The results of scatter diagram of the all-posture calibration curve.