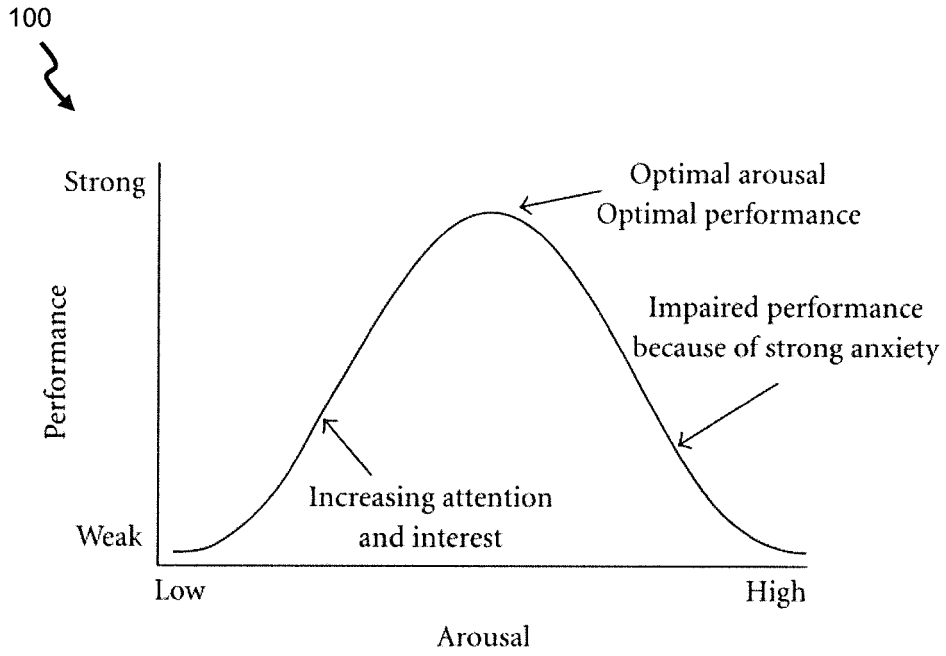


FIG. 1 (Prior Art)

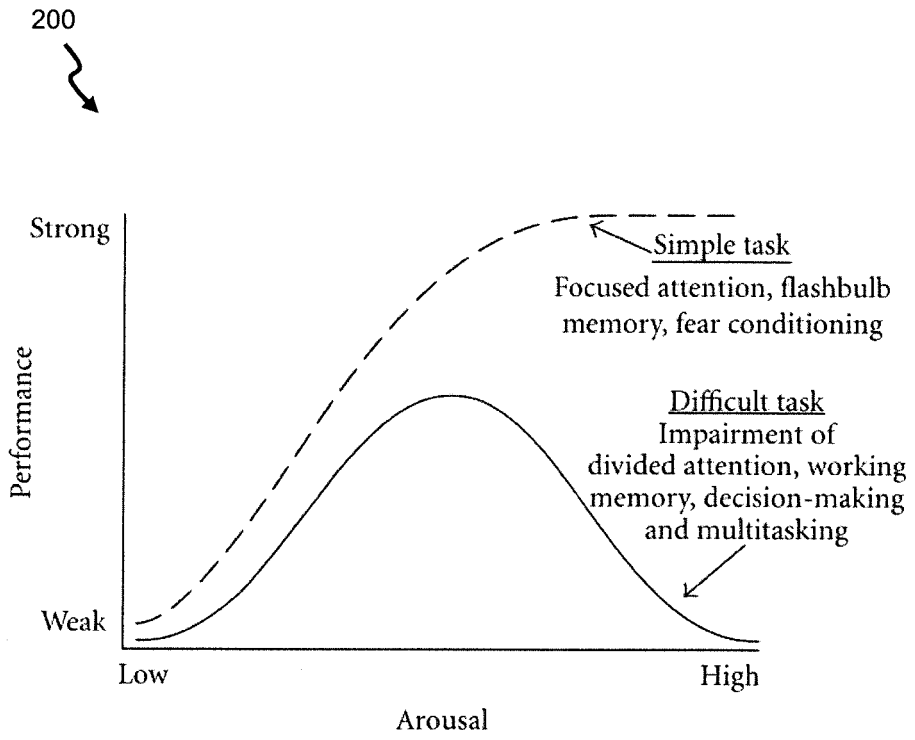


FIG. 2 (Prior Art)

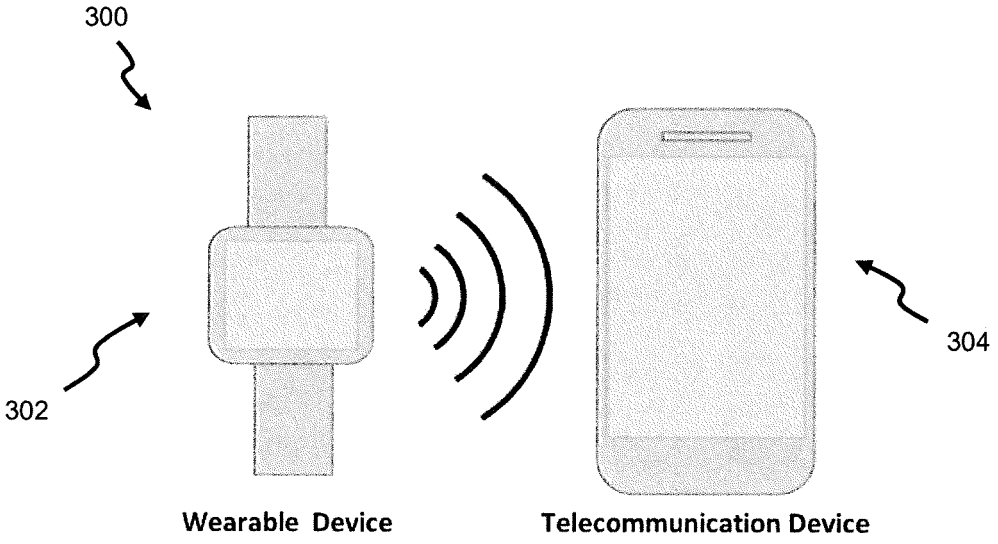

300
302
304
Wearable Device
Telecommunication Device

FIG. 3

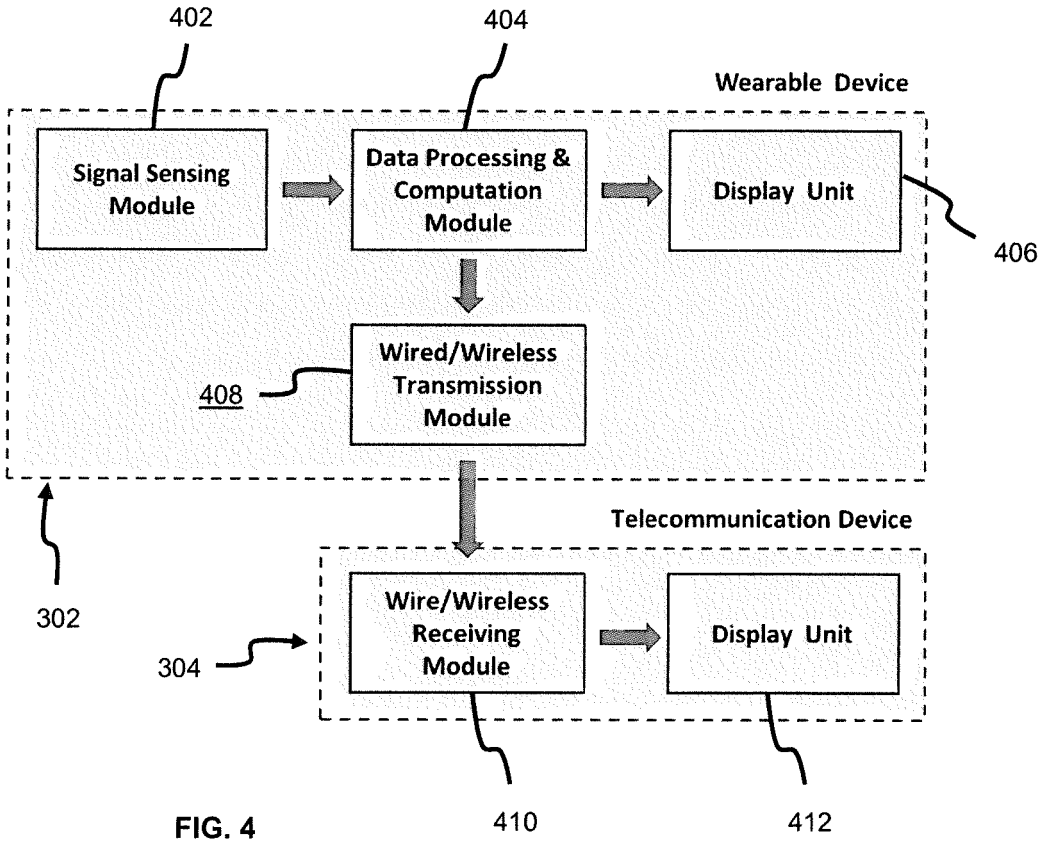

402
404
Wearable Device
Signal Sensing Module
Data Processing & Computation Module
Display Unit
406
Wired/Wireless Transmission Module
408
Telecommunication Device
302
304
Wire/Wireless Receiving Module
Display Unit
410
412

FIG. 4

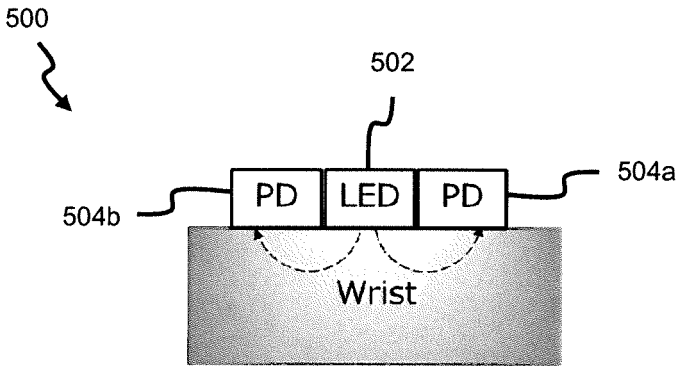

500
502
504a
504b
PD
LED
PD
Wrist

FIG. 5

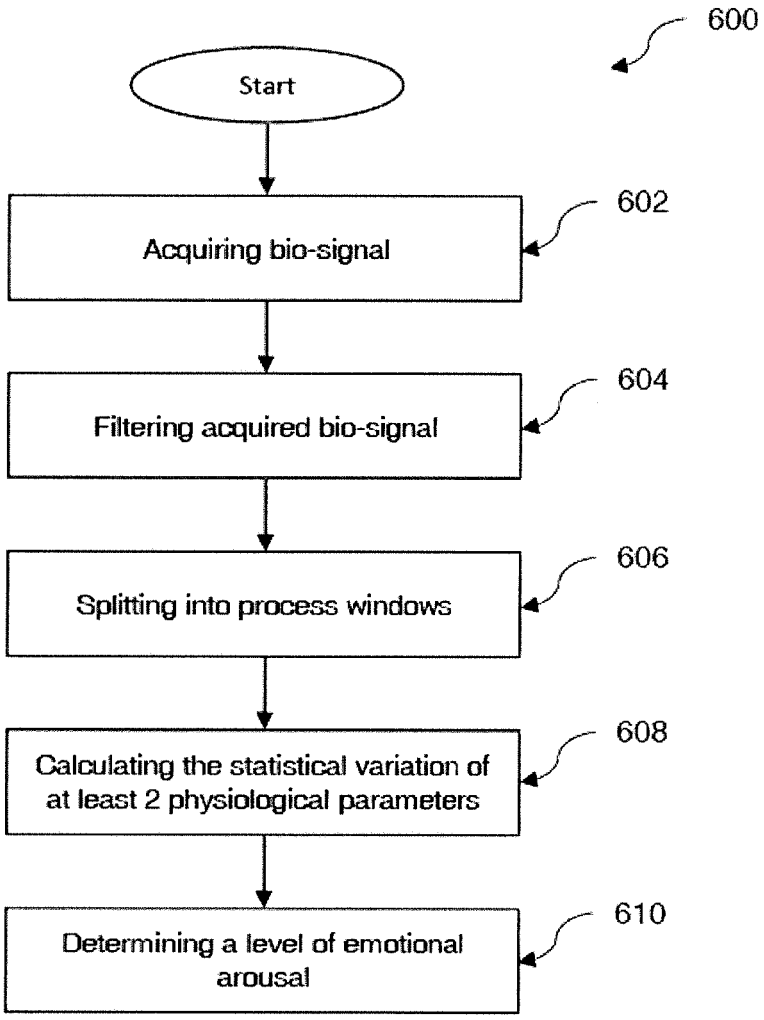

600
Start
Acquiring bio-signal
602
Filtering acquired bio-signal
604
Splitting into process windows
606
Calculating the statistical variation of at least 2 physiological parameters
608
Determining a level of emotional arousal
610

FIG. 6

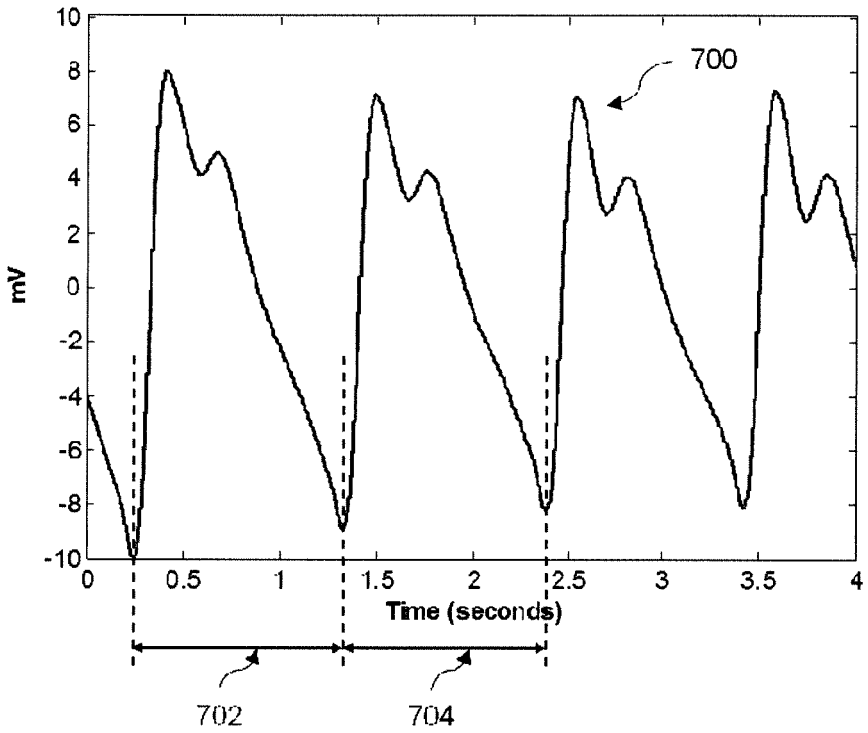


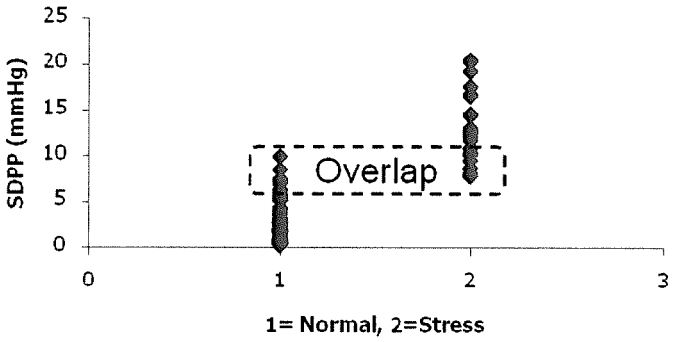
FIG. 7

800

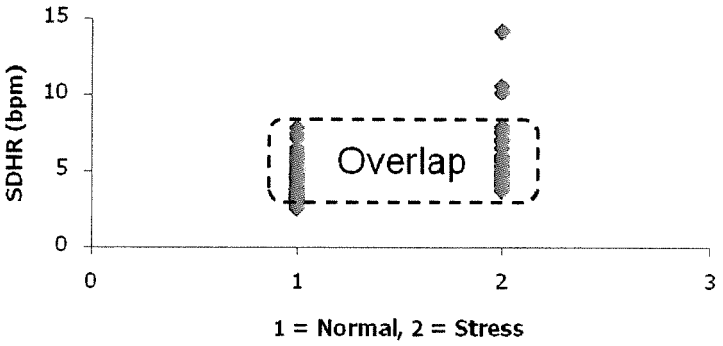
Feature	Normal condition	Stress Condition	P Value
	Mean	Mean	
PP	12.32	35.67	1.81E-08
SDPP	2.86	13.05	1.05E-15
SDHR	4.14	5.94	6.20E-08
SDNN	59.12	57.37	0.578254
pNN50	36.39	18.50	4.13E-11
HRV Corr	48.45	47.04	0.161235
Kurtosis	16.45	14.66	0.202784

FIG. 8

(a)


SDPP (mmHg)
25
20
15
10
5
0
Overlap
0
1
2
3
1= Normal, 2=Stress

(b)


SDHR (bpm)
15
10
5
0
Overlap
0
1
2
3
1 = Normal, 2 = Stress

(c)

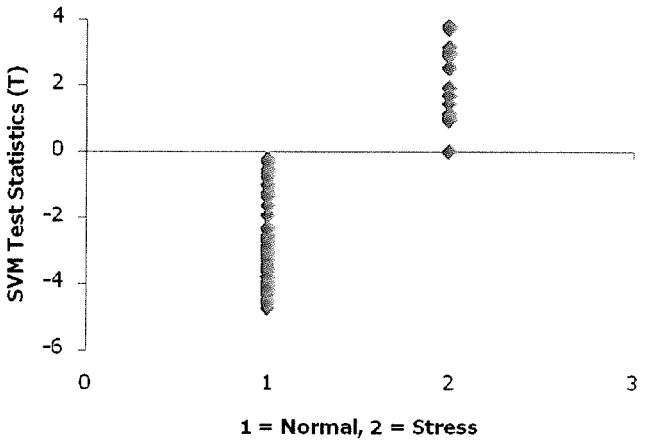

SVM Test Statistics (T)
4
2
0
-2
-4
-6
0
1
2
3
1 = Normal, 2 = Stress

FIG. 9

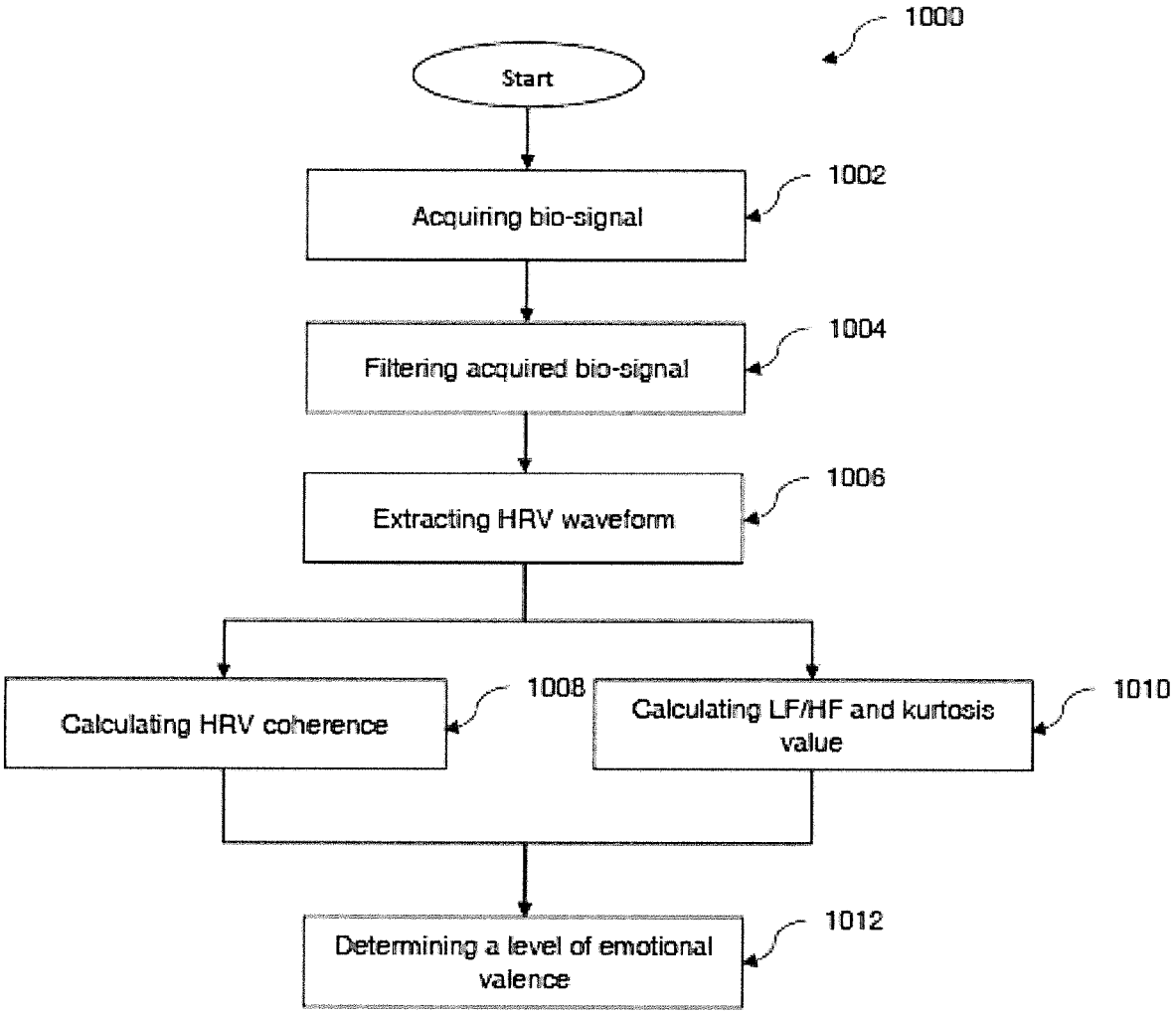
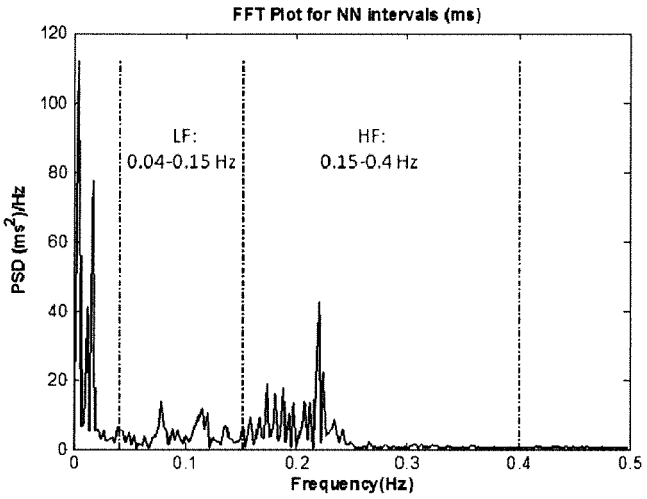

1000
Start
1002
Acquiring bio-signal
1004
Filtering acquired bio-signal
1006
Extracting HRV waveform
1008
Calculating HRV coherence
1010
Calculating LF/HF and kurtosis value
1012
Determining a level of emotional valence

FIG. 10

1100



Frequency Range	Interpretation
Low Frequency (LF: 0.04-0.15 Hz)	Reflect combination of Sympathetic Nervous System (SNS) and Parasympathetic NS (PNS) influence
High Frequency (HF: 0.15 - 0.4 Hz)	Under normal circumstances reflect Parasympathetic activity
LF/HF	Reflect balance of SNS/PNS

FIG. 11

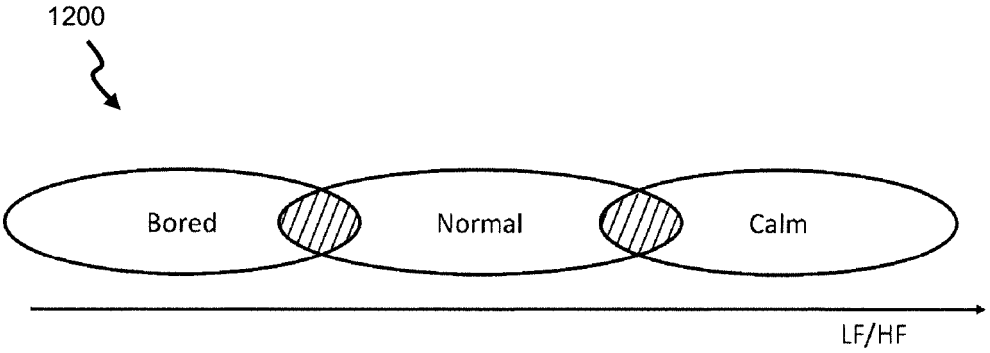
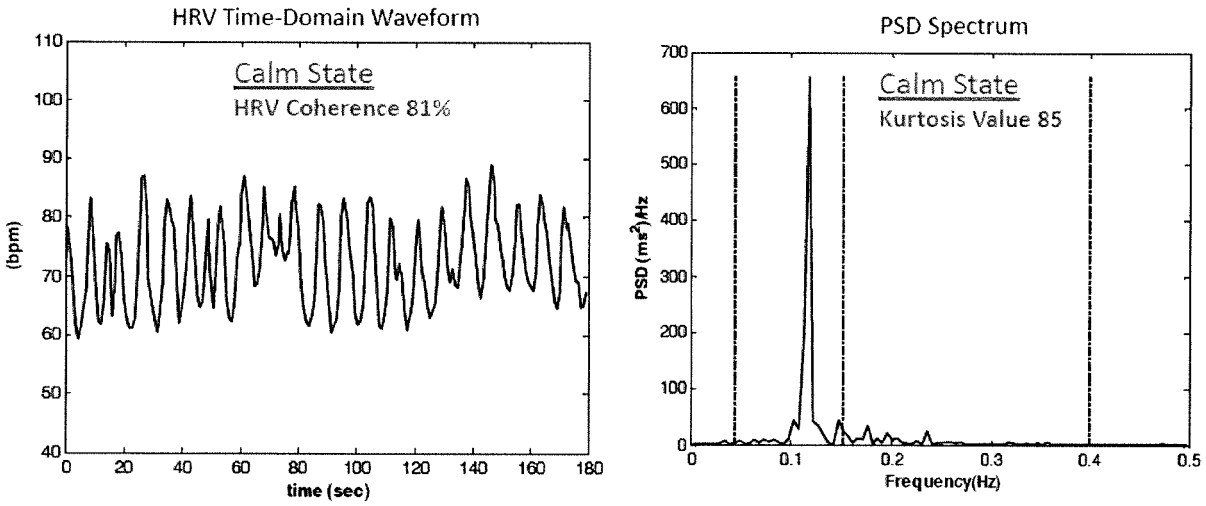
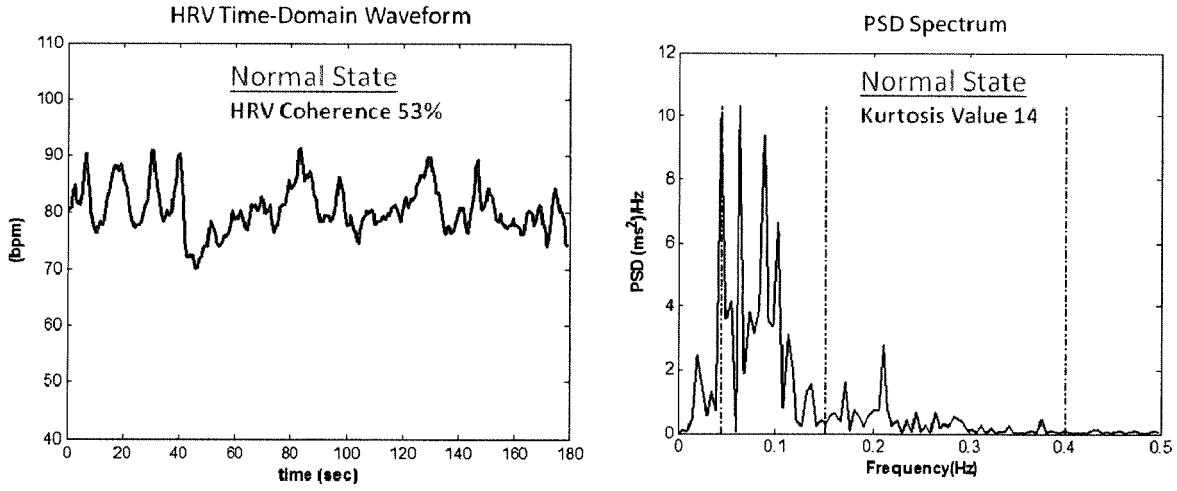


FIG. 12


HRV Time-Domain Waveform
Calm State
HRV Coherence 81%
(bpm)
time (sec)
PSD Spectrum
Calm State
Kurtosis Value 85
PSD (ms²)/Hz
Frequency(Hz)

(a)


HRV Time-Domain Waveform
Normal State
HRV Coherence 53%
(bpm)
time (sec)
PSD Spectrum
Normal State
Kurtosis Value 14
PSD (ms²)/Hz
Frequency(Hz)

(b)

FIG. 13

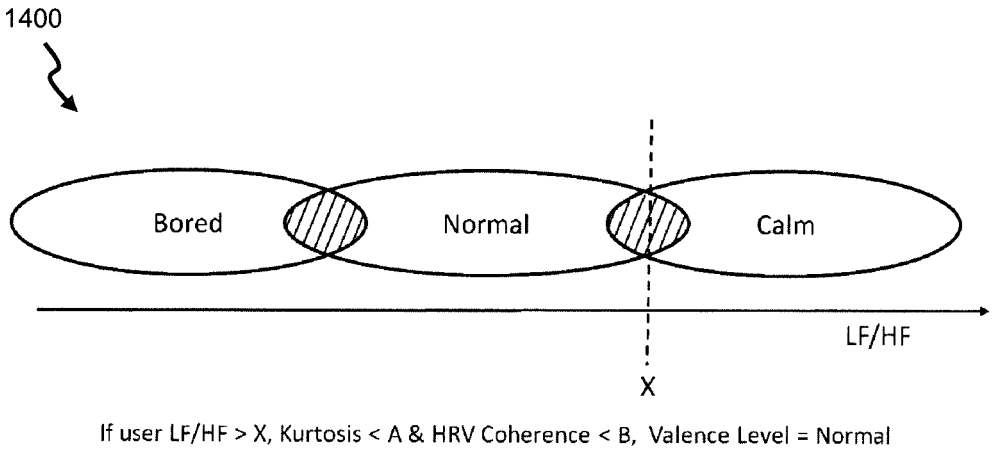

1400
Bored
Normal
Calm
LF/HF
X
If user LF/HF > X, Kurtosis < A & HRV Coherence < B, Valence Level = Normal

FIG. 14

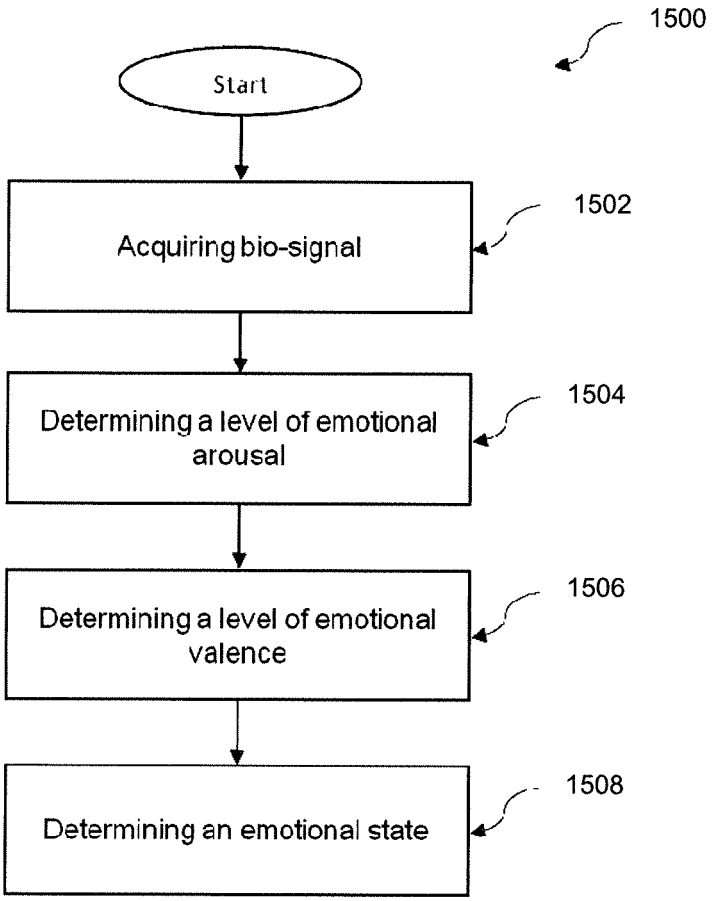

1500
Start
Acquiring bio-signal
1502
Determining a level of emotional arousal
1504
Determining a level of emotional valence
1506
Determining an emotional state
1508

FIG. 15

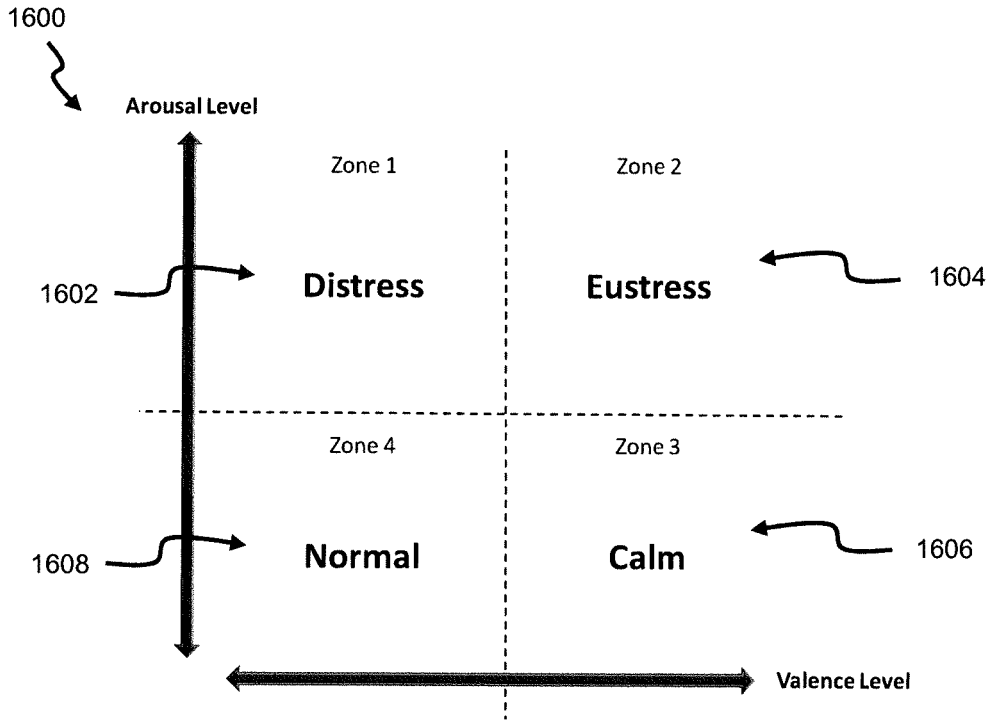

1600
Arousal Level
Zone 1
Zone 2
1602
Distress
Eustress
1604
Zone 4
Zone 3
1608
Normal
Calm
1606
Valence Level

FIG. 16

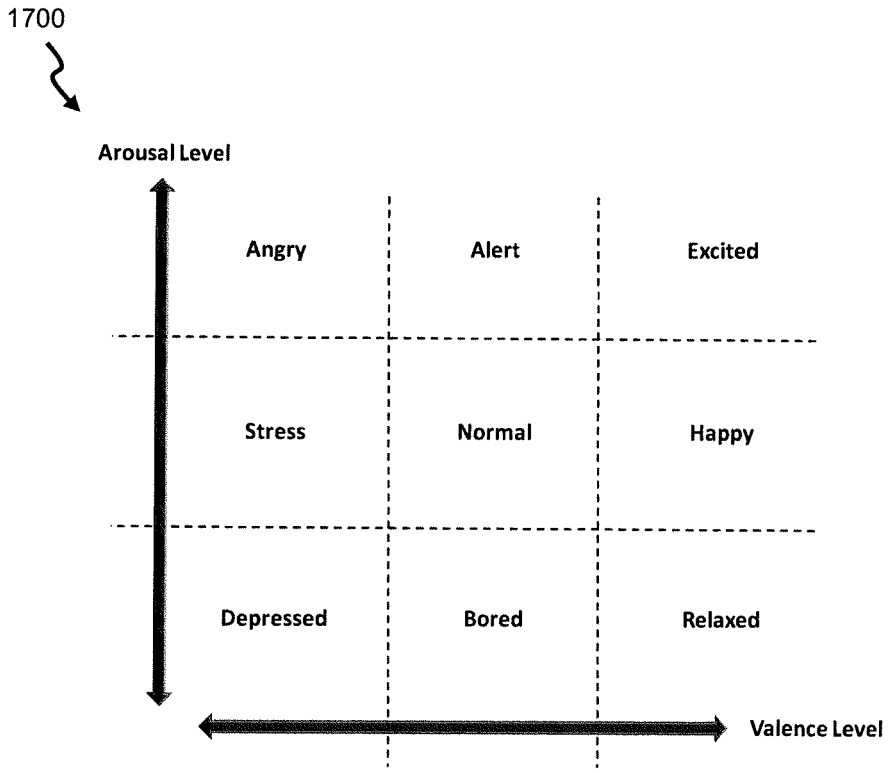

1700
Arousal Level
Angry
Alert
Excited
Stress
Normal
Happy
Depressed
Bored
Relaxed
Valence Level

FIG. 17

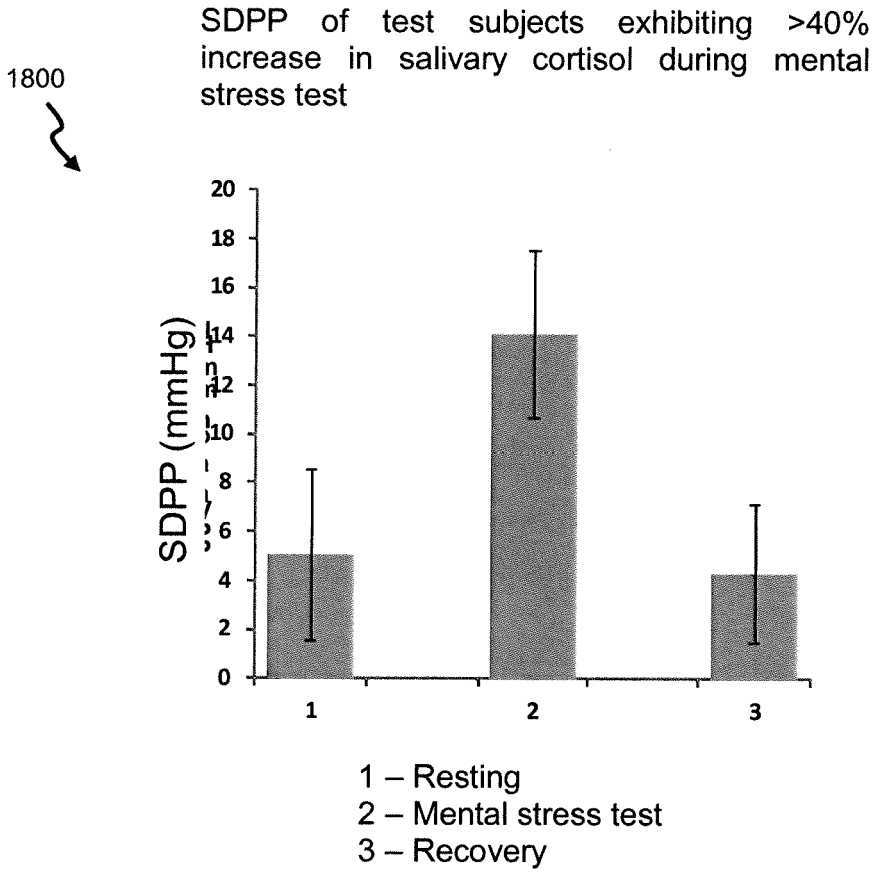

1800
SDPP of test subjects exhibiting >40% increase in salivary cortisol during mental stress test
SDPP (mmHg)
20
18
16
14
12
10
8
6
4
2
0
1
2
3
1 – Resting
2 – Mental stress test
3 – Recovery

FIG. 18