Part 1. Smart Pulse?
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1) What's the Smart Pulse?

- Stress Analyzer
- Arterial Health
- Smart Pulse
- Mobile
- Portable
- Easy
- U-Health

2) The Best Mobile Healthcare System

- BLUE TOOTH
- USB
- Bluetooth
- Accelerated Photoplethysmograph

Table: Measurement
- Name: demon
- Value: 71
- STOP
3) Main Functions

1. Stress Test
   - Mental & Physical Stress
   - Stress Resistance
   - ANS (Autonomic Nervous System) Function
   - HRV (Heart Rate Variability)

2. Arterial Health Monitor
   - Blood Circulation & Blood Vessel Aging
   - Elasticity of Artery & Peripheral

3. Breath Training (RSA Training)
   - Improving the ANS Function
   - Controlling Stress

4) Strengths

   Usability
   • Easy USE & Smart Test Report
   • Support 5 Languages (English/ Chinese/ Japanese/ German/ Korean)

   Compatible
   • Support both USB Cable & Bluetooth
   • Android Smart Phone & Tablet
   • iPhone & iPad

   Reliability
   • Build Own Clinical Reference (More than 12,000 cases)
   • CE, CFDA, MHLW, KFDA approved
5-1) Reliability of Smart Pulse

- Patent in Korea
- Patent in Japan

5-2) Reliability of Smart Pulse

- CFDA in China
- CE in Europe
- MHLW in Japan
5-3) Reliability of Smart Pulse

< ASIAN Reference Research >

1. Clinical Research in 8 main hospitals in Korea
   - Busan University Hospital   - Donga University Hospital
   - Inje University Hospital   - Eulji University Hospital
   - Ewha University Hospital   - Dankuk University Hospital
   - Gacheon University Hospital - Hallim University Hospital

2. Clinical research for 2 years (from May 2001 to June 2003)

3. Acquired more than 12,000 cases for the normal people

4. Built ASIAN reference for the 1st in the world

5. There are big difference of normal range between western and asian people

5-4) Reliability of Smart Pulse

Only Smart Pulse provides both ASIAN & Western Reference
1) App Download

Search for the keyword ‘Smart Pulse’ in the App Store or Google Play!
Part 2. Application

2) Start

3) Measurement
4) Test Result

Stress Info.
- Physical Stress: 51 / 100
- Mental Stress: 71 / 100

Good: Normal: Poor
It indicates the status of physical and mental stress. The lower value is better.

Autonomic Nervous Balance
- Sympathetic: Parasympathetic
It indicates the balance degree of (SNS/Parasymp) and PNI (Parasymp). The balanced size means that you are in healthy condition.
- Stress Resistance: 46 / 100
- Low: Normal: Good
It indicates the overall health condition. The higher value is better.

Arterial Health Info.
- Artery Elasticity: 64 / 100
- Peripheral Elasticity: 30 / 100

A healthy blood vessel is flexible and supplies the needed blood to get a higher score of Artery & Peripheral Elasticity.

Overall result:

5) Breathing Training

Breathing
- 26in: 64in: 103in
- 11.9bpm

Next

Score: 86.4
Perfect!!
Part 3. Market Prospect

1) Stress

Pressure → Stress → ANS Disorder → Disease

Disease → Stress → ANS Disorder

ANS Disorder → Stress → Pressure
2) Effects of Stress on the Body

- **Brain and Nerves**: Headaches, feelings of despair, lack of energy, sadness, nervousness, anger, irritability, trouble concentrating, memory problems, difficulty sleeping, mental health disorders (anxiety, panic attacks, depression, etc.)
- **Heart**: Faster heartbeat or palpitations, rise in blood pressure, increased risk of high cholesterol and heart attack
- **Stomach**: Nausea, stomach ache, heartburn, weight gain, increased or decreased appetite
- **Pancreas**: Increased risk of diabetes
- **Intestines**: Diarrhea, constipation and other digestive problems
- **Reproductive Organs**: For women: irregular periods, reduced sexual desire. For men: impotence, low sperm production, reduced sexual desire
- **Other**: Acne and other skin problems, muscle aches and tension, increased risk for low bone density and weakened immune system (making it harder to fight off or recover from illnesses)

3) Cardiovascular Disease

**The 10 leading causes of death in the world (2012)**

<table>
<thead>
<tr>
<th>Cause</th>
<th>Million</th>
</tr>
</thead>
<tbody>
<tr>
<td>Ischaemic Heart Disease</td>
<td>7.4</td>
</tr>
<tr>
<td>Stroke</td>
<td>6.2</td>
</tr>
<tr>
<td>Lower Respiratory Infections</td>
<td>3.1</td>
</tr>
<tr>
<td>COPD</td>
<td>3.1</td>
</tr>
<tr>
<td>Lung Cancer</td>
<td>2.8</td>
</tr>
<tr>
<td>Diabetes mellitus</td>
<td>2.8</td>
</tr>
<tr>
<td>Diarrhoeal Diseases</td>
<td>1.9</td>
</tr>
<tr>
<td>HIV/AIDS</td>
<td>1.8</td>
</tr>
<tr>
<td>Road Injury</td>
<td>1.6</td>
</tr>
<tr>
<td>Hypertensive Heart Disease</td>
<td>1.6</td>
</tr>
</tbody>
</table>

17.1 million people die from **Cardiovascular Disease** every year
4) U-Healthcare

**U-Healthcare Market has Great Potential!**

- **Change in concept of modern medical science**
  - Treatment of Disease
  - Focus in Disease
  - Prevention of Disease
  - Focus in "Quality of Life"

- **Issue (U-health)**
  - Should not have any limit from time and location
  - Simple to use
  - Need the Feedback & DB Management (Connect to the Network)

Diabetes, Cardiovascular Disease, Hypertension, Obesity, Depression, Anxiety Disorders

5) Tele-Healthcare

**The Best Way to start Tele-Healthcare System!**

1. Monitoring By Smart Pulse
2. Send the Data To the Cloud / Web Server
3. The Date Observed At Monitoring Center
4. 1st Online Triage
5. Clinician alerted If appropriate
6) Main Applications

<table>
<thead>
<tr>
<th>1. Office Workers</th>
<th>• Work stress, Chronic Stress, Insomnia, Depression</th>
</tr>
</thead>
<tbody>
<tr>
<td>2. Pediatrics/Teenagers</td>
<td>• Study stress, Low concentration, Mental instability, Addiction to Internet</td>
</tr>
<tr>
<td>3. Seniors</td>
<td>• Depression, Loneliness, Conflict, Blood circulation &amp; Cardiovascular disorder</td>
</tr>
<tr>
<td>4. Maternity</td>
<td>• Management of stress and depression before and after childbirth</td>
</tr>
<tr>
<td>5. Fitness/Beauty/Dietary Supplement</td>
<td>• Continuous monitoring on promotion of health</td>
</tr>
</tbody>
</table>

7) Target Markets

- Health Food & Vitamin/Dietary Supplements Company
- Adult disease or Cardiovascular Disease management (Hypertension, Diabetes, Arteriosclerosis)
- Drugstore Chain, Superstore, Department store
- U-Healthcare / Tele-Healthcare
- Online Market (Amazon, Ebay, Taobao)
- Fitness Center, Obesity Clinic, Beauty shop, Spa, Massage shop
- Stock exchange hall, Educational institutes, Subway driver
- Airlines, Police Station, Fire Station, Military, Bank
8-1) Dietary Supplements Company

Continuous Health Monitoring service for Product Promotion
Compare before & after taking Supplements

8-2) Drugstore Chain

Free Check-up Health at Drugstore or Superstore
= Promote Purchase of related products
8-3) Disease management

Precaution Management of Blood Vessel Health, Cardiovascular Diseases & Adult Diseases

8-4) Online Market

Enter the Online Market = Promote to average consumers & Maximize marketing opportunities
8-5) Fitness/Beauty & Aromatherapy

Systematic Health Management & Differentiated Service
= Growth in Membership

8-6) Military & Police/Fire Station

Check-up & Management of P.T.S.D
Part 4. Background Theory

1) Background Theory

1. Stress assessment
2. Assessment of ANS function
3. Predictor of cardiovascular disorder
4. Arteriosclerosis / Peripheral circulation
4-1. How to measure Stress

1) What’s the HRV

**ECG SIGNAL**

845 → 745 → 812 → 732

Autonomic Nervous System which affects the sinoatrial node, is changed every moment by internal or external environment.

**HRV, heart rate variability** is the degree of fluctuation in the time intervals between heart beats.
2) HRV & ANS

HRV is the Most Reliable Index & Window to the Autonomic Nervous System. More than 18,000 papers on the PubMed !!

3) ANS-Autonomic Nervous System

ANS- Autonomic Nervous System

• Main Function: Maintaining the Homeostasis as a control system of our internal organs

• Branch: SNS (Sympathetic Nervous System) & PNS (Parasympathetic Nervous System)

• Acts: Heart rate control including hormonal, enzymatic, respiratory, pulmonary, urinary and uterine neural control

• Diseases related to ANS dysfunction – Diabetes, Hypertension, Irritable Bowel Syndrome, Headache, Sudden Death after MI, Depression, Anxiety, Sleep disorder
4) The Diagram of HRV

- Emotional Effect
- Thermo-regulation
- Body Posture (BP)
- Illumination
  etc......

- Internal disturbance

- Autonomic Nervous System

- Cardiac Inherent Rhythm (SA node)

- Fluctuation of Heart Rate

- ANS Disorder
- Cardiovascular Diseases
- Neuropathy
- Stress / Aging
  etc.....

5) Correlation between ANS & HRV

- Lowered complexity of heart beats
  = Low Level of HRV

- Improper ANS function

- Weakened coping ability with constant environmental changes

- Easily breakable homeostasis
Proper ANS Function lead to bigger fluctuation of HR

4-2. How to check-up ‘Blood Vessel’
1) PTG (Plethysmograph)

Plethysmograph - the base waveform of APG

The waveform signal that indicates pulsation of chest wall and great arteries followed by heart beat.
- Changes the aortic pressure
- Transmit the pressure change to the peripheral nerve
  (transmission time to the finger tip : 0.16sec)

2) What’s the APG

The Final Analysis Waveform – APG

Plethysmogram(PTG)
- basic wave

Velocity Plethysmogram(VPG)

Acceleration
Plethysmogram(APG)
- To stabilize the baseline
- To make more clearly
### 3) APG Waveform

<table>
<thead>
<tr>
<th>Point</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>a</td>
<td>Basic point to evaluate APG waveform.</td>
</tr>
</tbody>
</table>
| b     | Arterial Elasticity.  
- The deeper (-) value is better.  
- The b/a ratio reflects the arterial stiffness. |
| c     | Reference Value to evaluate b & d wave. |
| d     | Peripheral Elasticity  
- Higher value, smaller (-) value is better  
- The d wave reflects the peripheral stiffness. |

* The gradient of b, d point: Vascular state and Blood Vessel Aging degree

### 4) Level of Blood Vessel

**Classifying the wave type as aging**

<table>
<thead>
<tr>
<th>Level</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>Blood circulation and its vessel are Excellent</td>
</tr>
<tr>
<td>2</td>
<td>Blood circulation and its vessel are Good</td>
</tr>
<tr>
<td>3-4</td>
<td>Start to get aged in the vessel</td>
</tr>
<tr>
<td>5</td>
<td>Not good at the blood circulation and aged state in the vessel</td>
</tr>
<tr>
<td>6-7</td>
<td>Blood circulation Disorder</td>
</tr>
</tbody>
</table>

7 levels by the vascular state
5) Correlation to the Artery

APG is the solution to check your Blood Vessel & Circulation condition.

Normal Blood Vessel
This vessel is located at Level 1 and no any plague around the vessel.

Abnormal Blood Vessel
This vessel has a lot of plague and vessel stiffness is also thick so it is located at Level 5-6.

Thanks for your Attention!