WEARABLE PHYSIOLOGY SENSORS

by HEXOSKIN™
WEARABLE BODY METRICS

The cutting edge of connected performance
HOW IT WORKS?

Integrated Activity Sensor

Integrated Respiration Sensor

Integrated Heart Sensor
HOW IT WORKS?

2 RESPIRATION LOOPS
(thoracic and abdominal)

3 CARDIAC DRY & TEXTILE ELECTRODES
HOW IT WORKS?

HEXOSKIN DEVICE
- Weight: 40g
- 41 x 73 x 13 mm

REDUCED SETUP TIME
- Easy to use, easy to connect
- Get data quickly
CARDIAC ACTIVITY

CARDIAC SENSORS
• ECG
  - 1 channel, 256Hz
• Heart rate
  - 30-220 BPM, 1Hz
• QRS event detection: 4ms resolution
• RR intervals: 4ms resolution
• HRV analysis

QUALITY ASSESSMENT CHANNELS
• Disconnection detection
• 50-60Hz noise detection
• Saturated ECG signal detection
• Movement artifact detection
• RR intervals reliability detection
**BREATHING ACTIVITY**

**BREATHING SENSORS**
- Breathing
  - 2 channels, 128Hz
- Breathing Rate
  - 3-80 RPM, 1Hz
- Tidal Volume (last inspiration)
  - 80-10000 mL, 1Hz
- Minute Ventilation (inductance plethysmography)
  - 2-150 L/min, 1Hz
- Inspiration and Expiration Events: 8ms resolution

**QUALITY ASSESSMENT CHANNELS**
- Disconnection detection
- Noise detection
- Baseline change detection
ACTIGRAPHY and ENERGY EXPENDITURE

MOVEMENT SENSORS
• Acceleration (g)
  - 3 channels, 64Hz each
  - +/-16g range, 0.004g resolution
• Activity level
  - 0.004g resolution
• Step counting
  - Reported every step
• Cadence
  - 1Hz (30-240 SPM)

ENERGY EXPENDITURE (KCAL)
• Calories spent during each activity
SLEEP MONITORING

WHAT WE TRACK:
• Total sleep duration
• Sleep position changes
• Time in each position
• Estimation of sleep efficiency (%)

• Resting and average heart rate
• Resting and average breathing rate & ventilation
• Activity (movement)
• Heart Rate Variability (HRV)
DATA TRANSFER

- Secure Bluetooth wireless communication
- Up to 14 hours of battery life; rechargeable
- Data store-and-forward ability (150+ hours)
- Free app & cloud server access
- Free data storage
HIGH QUALITY CLOTHING

OUR KEY FEATURES ARE:
- Lightweight, quick dry, breathable Italian fabric
- Fit optimized for regulation of moisture/heat
- Smooth seams won’t chafe
- Reflective logos for visibility
- Comfortable even under hockey/football gear
- Supports live training or game play
- Machine washable
- Made in Canada
REAL-TIME and REMOTE MONITORING

Real-time access to performance data
Mobile app for iOS and Android
REPORT and TIMELINE
VO₂\text{MAX} ESTIMATION
CARDIO PROFILE

My Profile

John Smith

HRr | HRmax | HRrest | VO2max |
---|---|---|---|
14 | 183 | 60 | 42 |

PERSONAL INFORMATION

Name: John Smith
Title: Basketball player
Date of birth: September 9, 1983
Gender: M
Height: 1.87 m
Weight: 86 kg

Your HRmax is: **183** bpm

HRrest

**53** bpm

SUPERIOR

Get your HRmax

400m Maximal Sprint Test

Your previous HRmax test results

- Sep-03: 183
- Aug-28: 81

Get your HRrest

5 Minute Rest Test

Your previous HRrest test results

- Sep-03: 57
- Sep-03: 53
DATA ANALYSIS
Get valid and reliable data

Heart Rate

Breathing Rate & Minute Ventilation

Activity (g) & Cadence

Timeline

Zoom on graph

Access data sec by sec

Export data

Saturday, Apr 12, 13:56:37
Heart Rate: 169 bpm
Breathing Rate: 48 rpm
Minute Ventilation: 109.70 l/min
Activity: 1.67 g
Cadence: 242 steps/min

Get valid and reliable data
Get raw data and analyze it with your favorite software

ECG (256Hz)

Respiration (2 loops 128Hz)

Actigraphy (3-axis 64Hz)
CARDIORESPIRATORY EVALUATIONS

Use non invasive tools to monitor health and fitness conditions

Choose a test on the list or do your own test and enter the value
BIOFEEDBACK (REAL-TIME MONITORING)

Use unique and high level technology for new research areas

APPLICATIONS
- Sport Physiology
  ✓ Athletic performance
  ✓ Injury prevention
  ✓ Rehabilitation
- Occupational Physiology
  ✓ Work performance
  ✓ Energy expenditure
  ✓ Fatigue and stress
  ✓ Injury prevention
  ✓ Rehabilitation
- Psychiatrist / Psychology
  ✓ Physiological response to stimuli
  ✓ Training for mental issues
HEXOSKIN: A PORTABLE LAB

Analyze performance outside of the lab

DATA AT SPECIFIC TIME POINTS
HRmax: 198 bpm
BRmax: 75 rpm
MVmax: 98.46L/min

Look at breathing patterns
Look at total acceleration (3 axis) and cadence

APPLICATIONS
• Sport Physiology
• Occupational Physiology
• Aging
• Psychiatry / Psychology
• Respiratory and Cardiac Health
• Extreme Environment
SLEEP ANALYSIS

Physiological monitoring of sleep in real life environment

Sleep efficiency: 70.49%
Sleep duration: 6:58 hours

- Cardiac and breathing activities
- Changes in positions: 131 times during the night
- Did not stand up during the night
- Sleep positions
- Timeline

APPLICATIONS
- Sleep Physiology
- Sport Physiology
- Aging
- Psychiatry / Psychology
- Respiratory and Cardiac Health
- Extreme Environment
BREATHING ANALYSIS

Track breathing patterns outside of the lab

APPLICATIONS
- Sport Physiology
- Sleep Physiology
- Respiratory health
- Psychiatry / Psychology
- Extreme Environment
MONITOR DAILY LIFE ACTIVITIES

Measure multiple components of health and fitness at the same time

APPLICATIONS

- Sport Physiology
- Aging
- Respiratory and Cardiac Health
- Psychiatry / Psychology
- Extreme Environment
- Ambulatory Health

Sedentary behavior
MONITOR PERFORMANCE REMOTELY

Track live performance

APPLICATIONS

- Sport Physiology
- Aging
- Respiratory and Cardiac Health
- Psychiatry / Psychology
- Ambulatory Health
- Remote Medicine (extreme environment)
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