

STRIDE LENGTH VARIABILITY

3D PATH LENGTH

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SMART INSOLES FOR
DIGITAL HEALTH, FITNESS
& NAVIGATION

Data Capabilities for Lechal Smart Insoles

GAIT SPEED

LOADING PERCENTAGE

STRIKE ANGLE

CADENCE



Applications

Gait & Balance Analysis

- FALL RISK ASSESSMENT
- GAIT ANALYSIS FOR OLDER ADULTS
- GAIT ANALYSIS FOR ATHLETES
- BALANCE ANALYSIS FOR OLDER ADULTS
- BALANCE ANALYSIS FOR ATHLETES
- PERFORMANCE TRACKING FOR SPORTS & ATHLETICS

Fitness

- ACTIVITY DETECTION
- ACCURATE STEP TRACKING
- HAPTIC MUSCLE TONING & STIMULATION

Navigation & Location

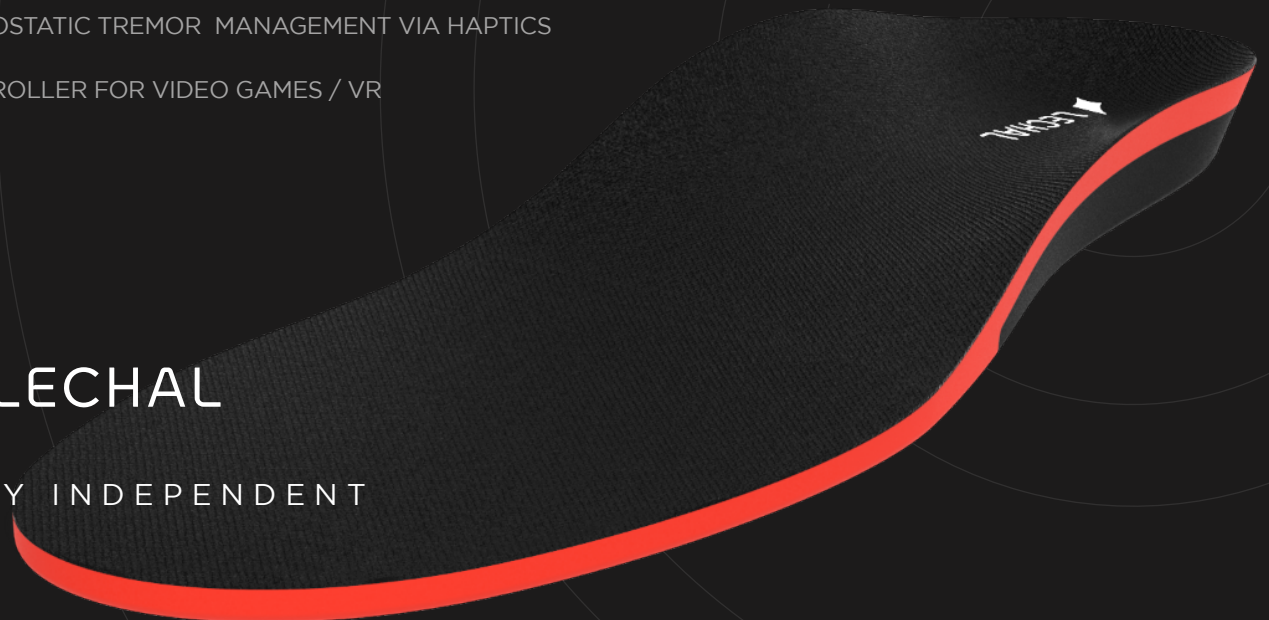
- HAPTIC NAVIGATIONAL FEEDBACK
- RECORD TRAILS
- GEOFENCING
- LOCATION TRACKING

Specialized

- DIABETIC HEAT GENERATING SHOES
- ORTHOSTATIC TREMOR MANAGEMENT VIA HAPTICS
- CONTROLLER FOR VIDEO GAMES / VR

 **LECHAL**

STAY INDEPENDENT



Specifications

SENSORS

Motion & Inertial sensors:

- 3-axis accelerometer,
- 3-axis gyroscope
- 3-axis magnetometer

- Capacitive touch sensors
- Barometer
- Capacitive pressure sensor

- 1) Acceleration range: ± 16 g
- 2) Angular rotation: ± 2500 dps
- 3) Gravitational field: ± 16 Gauss

MEMORY

External EEPROM: 64KB | Internal: 512 KB | RAM: 80KB

Capable of storing upto 45 days of processed user data & daily summaries.

PRESSURE SENSOR

Ducere has developed a custom built capacitive pressure sensor instead of existing Force-sensitive Resistor (FSR) sensors

DUCERE'S CUSTOM MADE SENSOR

- Better repeatability
- Lower hysteresis
- Lower drift
- Linear & high fidelity output
- Lower noise
- Lower power consumption

vs.

OTHER FORCE SENSITIVE RESISTORS

- Not repeatable
- Higher hysteresis
- Higher drift
- Non-linear output with lower fidelity
- Higher noise
- Higher power consumption

PRESSURE SENSOR INFORMATION

Min-max pressure range: Each sensor can handle upto 0-75 kg

Sensor hysteresis: <4%

Sensor displacement: 0.8 mm

Connection to PCB / Assembly: Flex PCB with Snap Connectors

Re-calibration requirement: Once in 10-12 months

Capabilities

RAW OUTPUTS

- > 3-axis (xyz) acceleration signals
- > 3-axis (xyz) gyroscope signals
- > 3-axis (xyz) magnetometer signals
- > Orientation of insole (e.g., yaw, pitch, roll)
- > Barometric pressure
- > Pressure reading from each pressure sensing node (e.g., pressure map)
- > Center of pressure

PROCESSED DATA CAPABILITIES

1. FITNESS OUTPUTS

- > Steps
- > Distance
- > Active time
- > Calories
- > Cadence
- > Pace
- > Altitude

2. ACTIVITY DETECTION

- > Walking
- > Running
- > Stair case
- > Navigation*
- > Exercise detection
- > Gesture detection
- > Idle time
- > Lying*
- > Sitting*
- > Standing*

3. GAIT PARAMETERS

- > Stride time
- > Single support time
- > Double support time
- > Loading time
- > Flat foot time
- > Pushing time
- > Step time
- > Stride length
- > 3d path length
- > Gait speed
- > Peak angle velocity
- > Maximal swing speed
- > Swing width
- > Turning angle
- > Strike angle
- > Lift-off angle
- > Heel clearance
- > Swing time
- > Stance time
- > Sway velocity
- > Body posture*
- > Center of pressure*
- > Pressure map*
- > Changes in contact with surface*
- > Forward lean*
- > Balance*
- > Foot strike patterns*
- > Pronation*

4. GAIT ANALYSIS

- > Loss of symmetry
- > Foot drop
- > Short step length
- > Circumduction
- > Festination
- > Deviations from path
- > Difficulty in maintaining gait

5. BALANCE

- > Sway area
- > Sway velocity
- > Center of pressure

* indicates outputs exclusive to variant 2 with custom-built capacitive pressure sensors.

FOR AN UNTETHERED EXPERIENCE

A pressure sensor insole variant with GPS + GSM is also available, which completely eliminates dependability on phone's location & data network useful for navigation and tracking.



STAY INDEPENDENT

We specialize in custom applications. Contact us for **hardware, software or product development** for your brand.

Alternatively, you can request us for our SDK too.

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