Smart Solutions
Embroidery ▪ Electronics ▪ Engineering

Smarter Fitness & Rehabilitation:

Intelligent Textile Sensors for Machine Integration

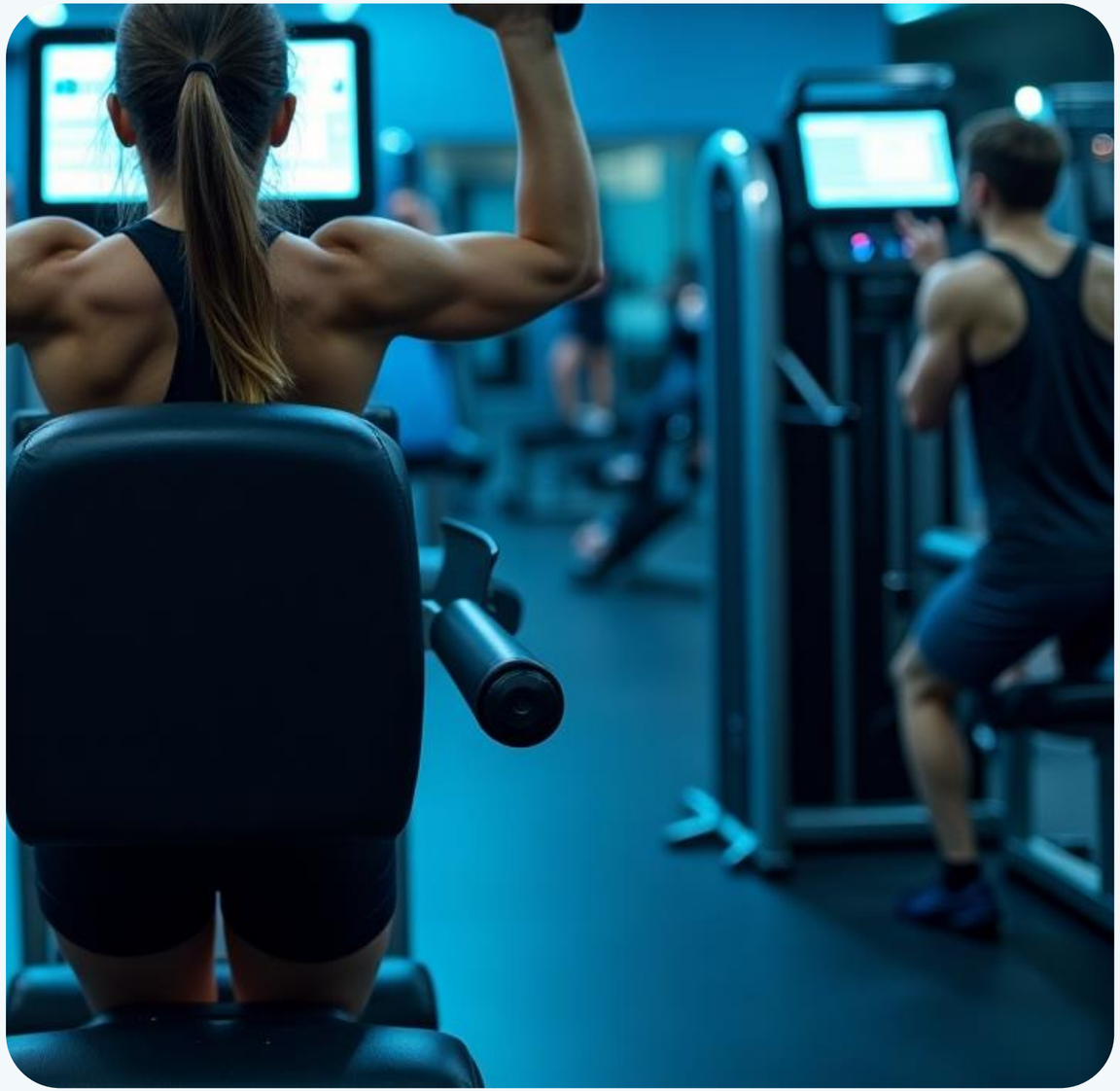
Easy. Efficient. Reliable.

Modern Requirements for Effective Training and Recovery

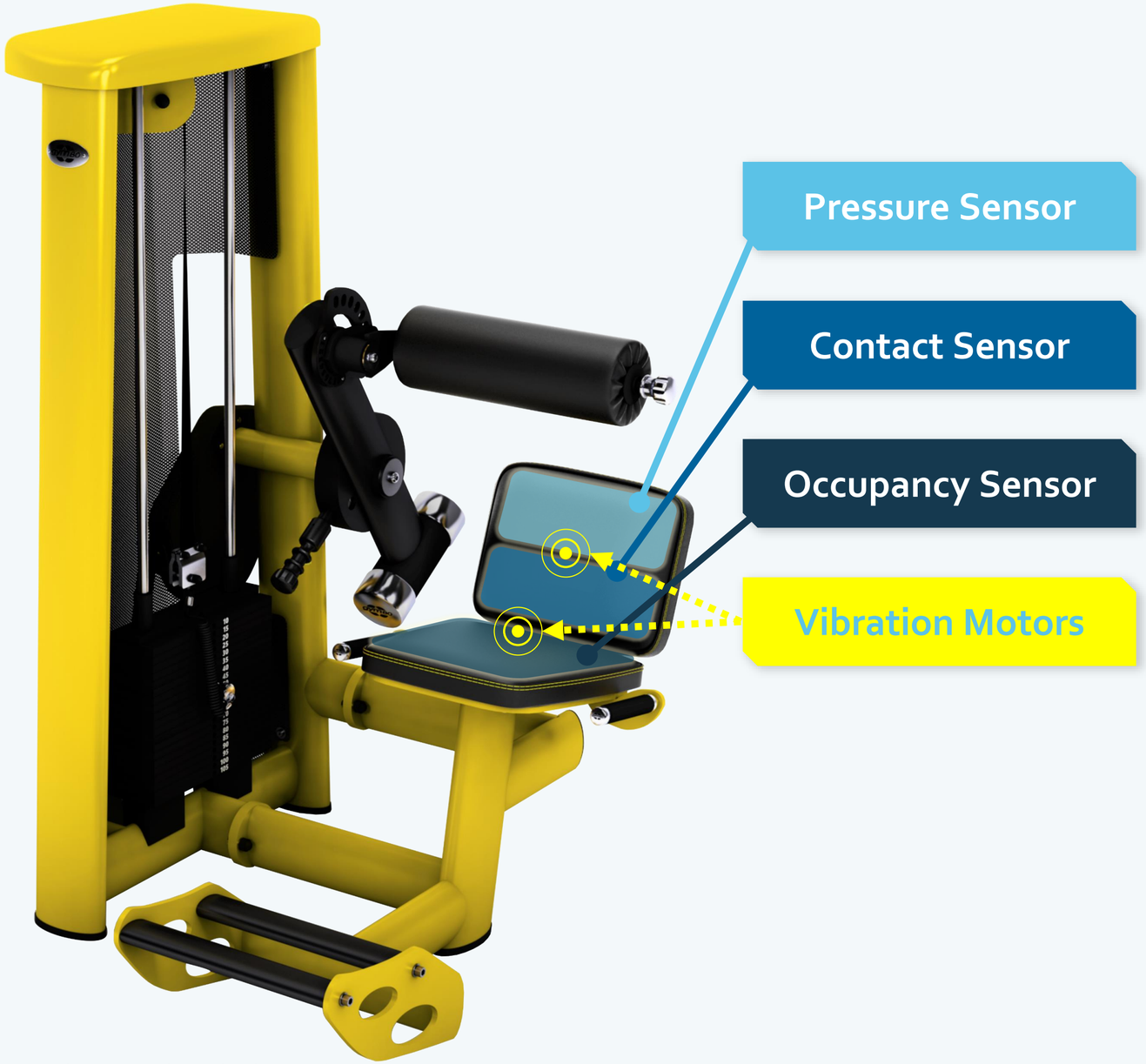
Today's fitness and rehabilitation industries are evolving—no longer are passive machines enough. Users expect:

- **Real-time feedback**
- **Personalized guidance**
- **Quantifiable results**
- **Enhanced engagement**

Facilities aim to **improve safety**, **track performance**, and **optimize machine utilization**.



Rethinking Fitness and Rehabilitation Equipment



Sensor-Integrated Textiles for Smarter Training and Recovery

Integrating intelligent textile-based sensors directly into the soft parts of fitness and rehab machines (such as seats, back leans, and supports) provides **new capabilities**:

- **Posture and alignment detection for correct exercise execution**
- **Real-time movement correction and injury prevention**
- **Performance optimization and enhanced training outcomes**
- **Occupancy and usage monitoring for enhanced machine utilization statistics**

Smart textile integration empowers fitness brands and equipment manufacturers to offer **added value**, differentiate their products, and drive **customer loyalty** through innovation.

Benefits for the User (Athlete, Patient, Client)

Personalized feedback

Real-time insights on posture, effort, or range of motion help users perform exercises correctly and effectively.

Injury prevention

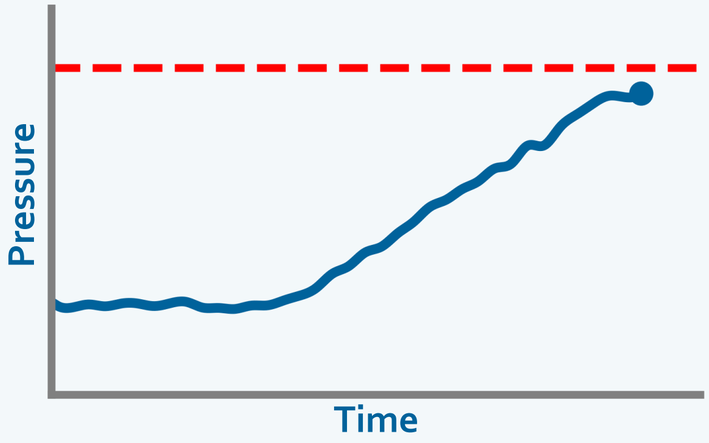
Continuous form monitoring helps detect incorrect movements early—reducing the risk of strain or injury during training or therapy.

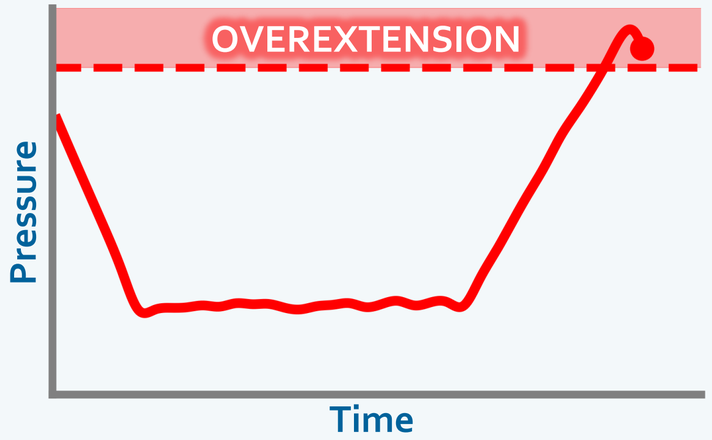
Increased motivation

Immediate biofeedback and visible progress keep users more engaged and committed to their personal goals.

Gamification potential

Interactive features and performance tracking turn workouts or rehab into a motivating and rewarding experience.





Benefits for the Clinic / Gym Owner

Improved machine utilization

Sensor-based occupancy tracking helps optimize scheduling, enabling better use of available equipment.

Stand out from competitors

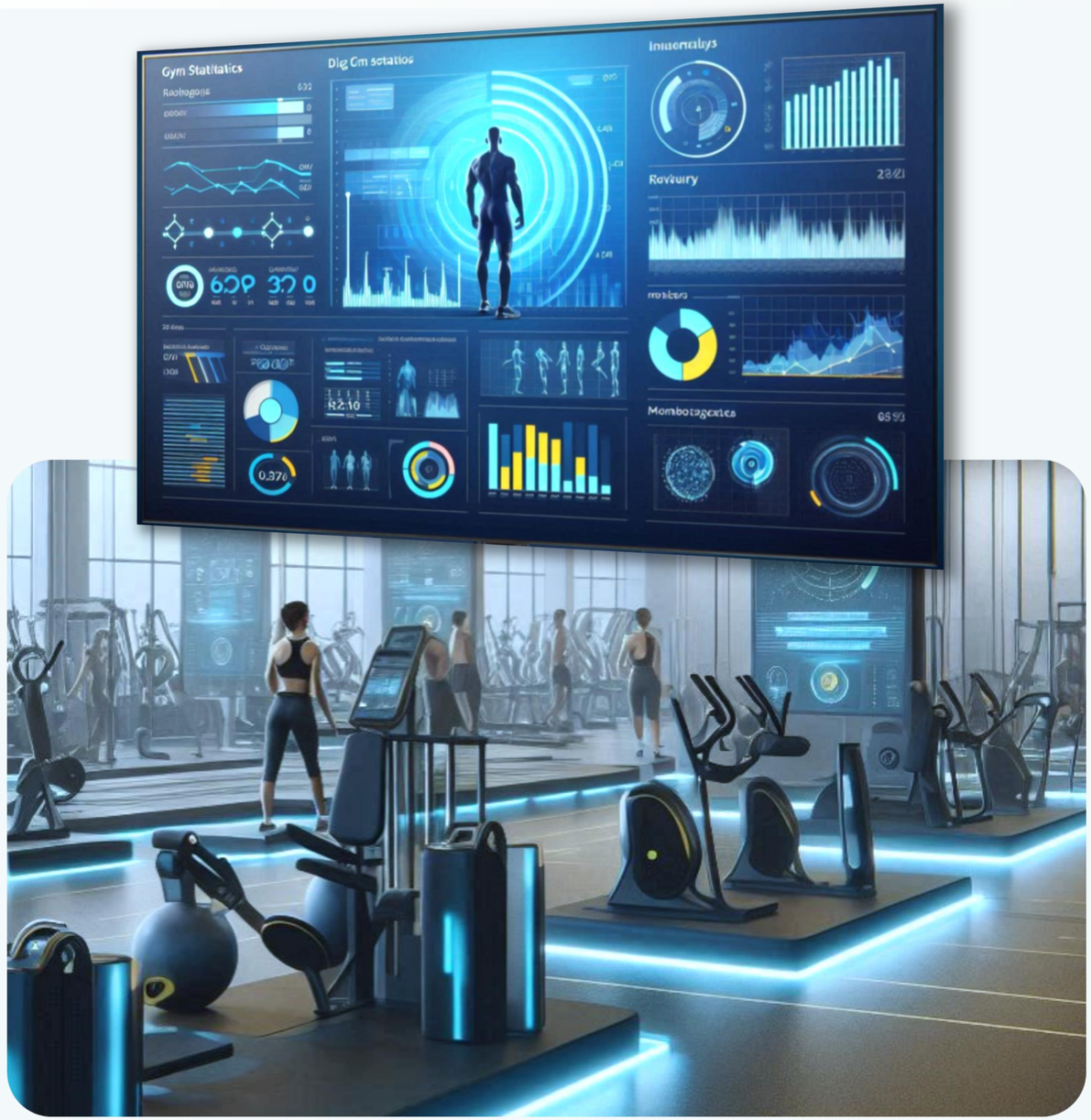
Smart-enabled machines elevate your facility's innovation profile and attract tech-savvy and results-driven clients.

Track client progress

Automatically logged performance and feedback data provide a clear record of client development over time.

Keep clients engaged

Connected experiences and personalized insights increase retention by making workouts and therapy more meaningful and effective.



Sensing Capabilities in Smart Rehabilitation & Fitness

Pressure Sensors

- **Purpose**: Detect force or weight distribution, body contact, posture.
- **Applications**:
  - Check if a user is seated correctly.
  - Monitor pressure under the back during exercises.
  - Detect symmetry in limb loading.

Strain / Stretch Sensors

- **Purpose**: Measure extension, range of motion, or muscle activation.
- **Applications:**
  - Monitor joint angle or movement range.
  - Detect movement symmetry or form issues.

Touch / Contact Sensors

- **Purpose:** Detect touch or proximity to verify correct body posture or form.
- **Applications:**
  - Ensure the back touches the lean.
  - Confirm proper contact during therapeutic movements.

Capacitive Sensors

- **Purpose**: Sense proximity or changes in body position without direct contact.
- **Applications**:
  - Advanced posture tracking.
  - Detect movement initiation or end.

Interactive Feedback & Actuation for Enhanced Training

Vibration Motors

- **Purpose**: Deliver localized vibration as real-time tactile feedback.
- **Applications:**
  - Alert user to posture errors or overextension.
  - Indicate symmetry or effort imbalance.

Heating Elements

- **Purpose:** Add thermal feedback or therapeutic support.
- **Applications:**
  - Warm up muscles prior to activity.
  - Relaxation during post-exercise recovery.

LEDs / Light Indication

- **Purpose**: Provide visual cues about effort, range of motion, or form.
- **Applications**:
  - Red/green LEDs to indicate correct or incorrect posture.
  - Progress tracking during reps.

LCD Screens

- **Purpose**: Sense proximity or changes in body position without direct contact.
- **Applications**:
  - Advanced posture tracking.
  - Detect movement initiation or end.

Lead the Next Wave of Smart Fitness & Wellness

Your Goal:

Whether you are designing a new product or want to upgrade an existing one - we provide development support and production-ready solutions.

Our Know-How:

Product Development

Electrical, Mechanical, and Textile Engineering

Embroidery Technology

Product Idea & Consulting

Concept Development

Product Design

Prototyping

Product Development

Testing

Upscaling & Production

Our Service:

- All-round **product development**, **prototyping,** and **consulting** for **Smart Textiles** and **E-Textiles**

- Customized **workshops** & **trainings**
  - Electrical Engineering
  - Product Development
  - E-Textiles Production
  - Embroidery Machine Operation

Interested?
Let's talk about your use case.

Steliyan Vasilev

Co-Founder & Development Engineer

steliyan@3esmartsolutions.de

linkedin.com/in/steliyan-vasilev-687807126/