

**Bainisha<sup>®</sup>**

**High Definition Condition Monitoring  
For Respiratory Patients**

**Patrick Van De Vyver - CEO**

# Acute needs now & in the future

## THE WALL STREET JOURNAL.

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PRO VC INDUSTRY NEWS

### Remote-Care Companies Scale Up to Combat Coronavirus Threat

Rising use of virtual care in crisis could give companies a long-term boost

By *Brian Gormley*

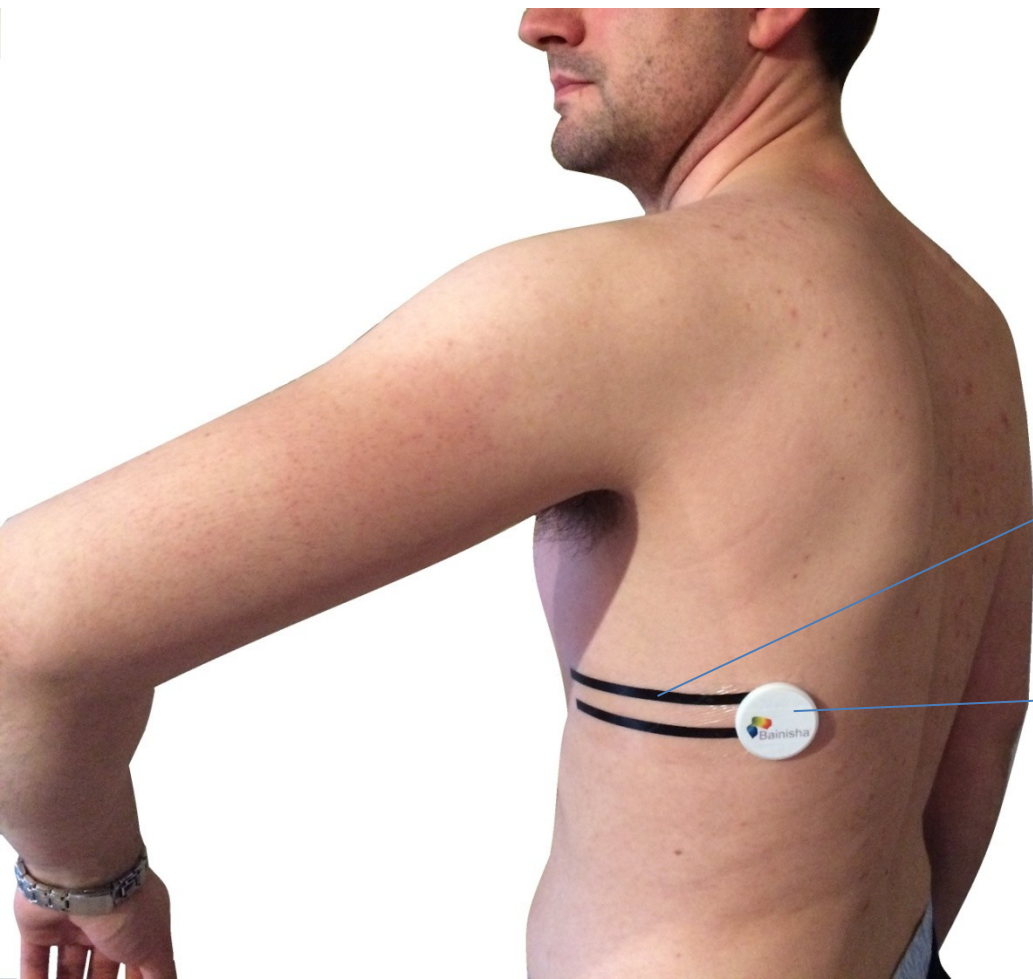
Updated March 20, 2020 8:24 am ET

**Soaring demand for telehealth and remote-care tools is prompting digital-health startups to ramp up quickly and could propel wider use of their technologies well after the new coronavirus is contained.**

Financial and other constraints previously limited use of tools enabling doctors to treat and monitor patients remotely. But the new coronavirus is spurring many of them to seek out remote-care and monitoring systems that could help them reduce crowding, protect staff and decide which patients need to be hospitalized.



# Why is the Bainisha Remote Care Tool unique?

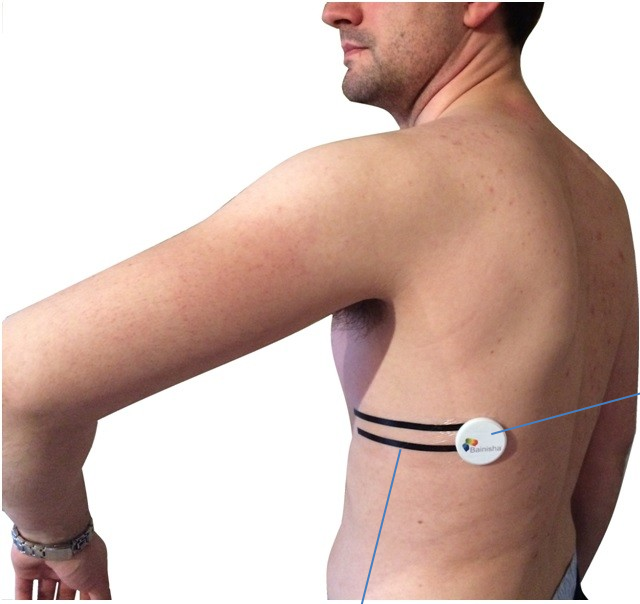


It combines two different sensor technologies into one “Sensor Fusion System”. Hence **it solves all problems in relation to insufficiency of data** which inevitably arise when using only a single sensor technology.

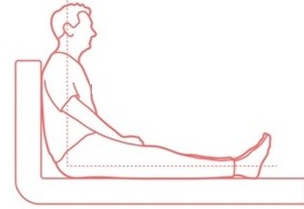
The displacement sensors capture Thorax expansion

The accelerometer captures movements in space

# Integrated Sensor Fusion

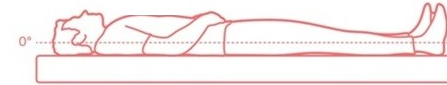


Integrated 6 DoF MEMS IMU  
Capturing 3D position of the trunk which strongly influences breathing

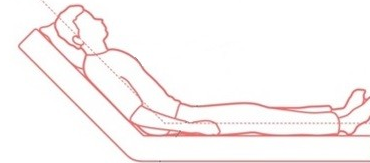


Controller in water tight housing with Medical Grade Adhesive Fixation

IoT connected



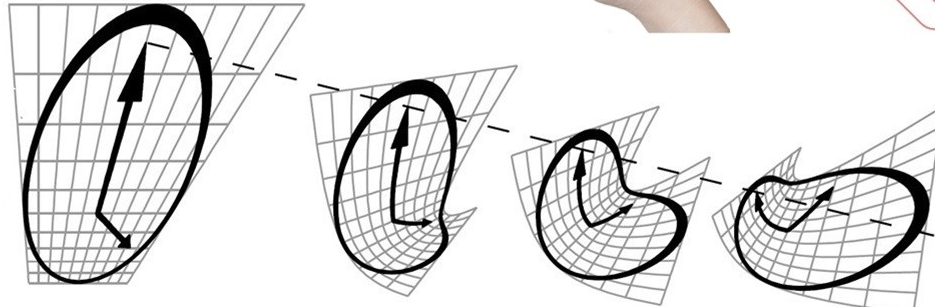
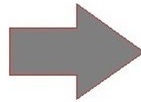
30°-45°



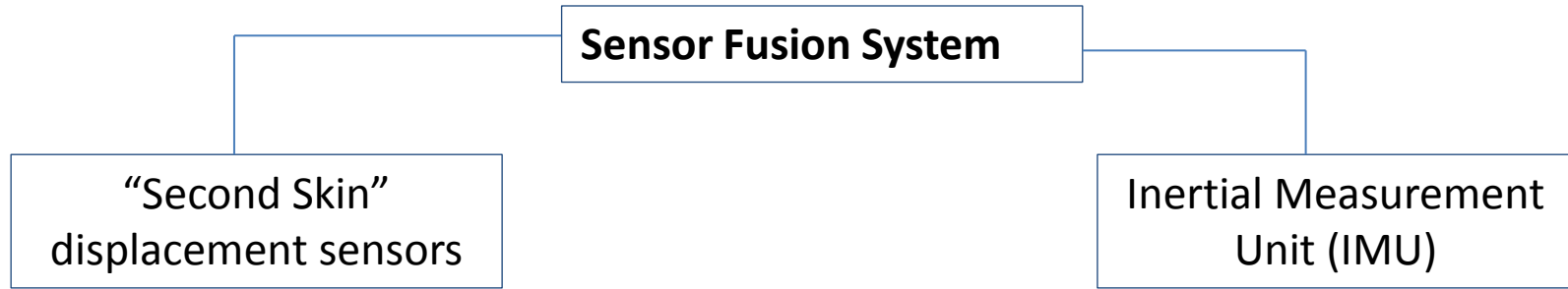
“Second Skin”-type Hyper Resolution Displacement Sensor

Sensor “morphs” with complex dynamic topology changes =

SUPER COMPLIANCE



# Sensor Fusion capabilities



- Respiratory Frequency (rF)
- Balance Thoracic/Diaphragm
- Thorax expansion
- Upper/lower lobe filling
- Left/right lung function

- 3D movement of trunk
  - position e.g. lay down, sit, stand ...
  - dynamics e.g. rocking, swaying, exercise, walk
- Step count
- Heart rate (HR)

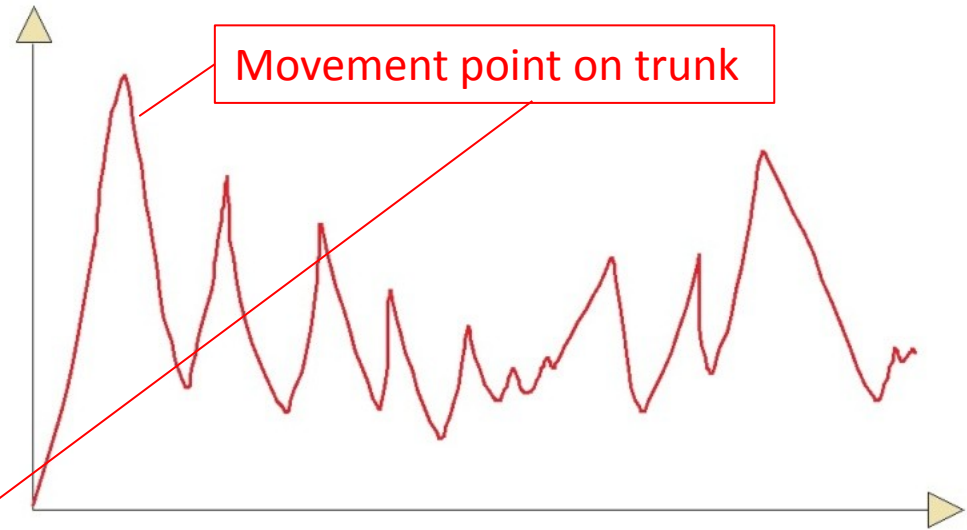
Uninterrupted 24/7 monitoring both  
in hospital settings as in real world  
day-to-day circumstances

# Coughing



## Example I

Single sensor technology e.g. ONLY Accelerometer



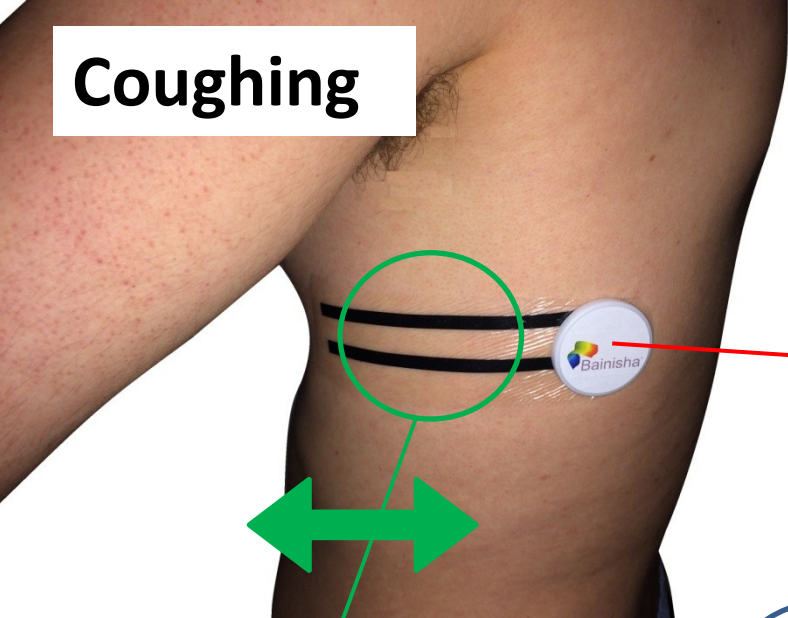
Accelerometer sensor on the trunk registers erratic moves while coughing.

However, without confirmation from other respiratory parameters this movement can just as well be caused by e.g. a bumpy bike ride !

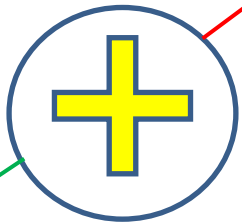
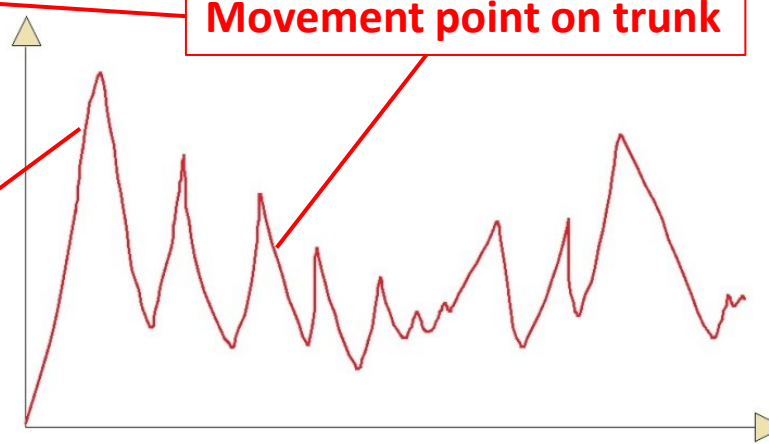
# Coughing

## Example I

Bainisha Sensor Fusion =  
Displacements Sensors + Accelerometer



Movement point on trunk

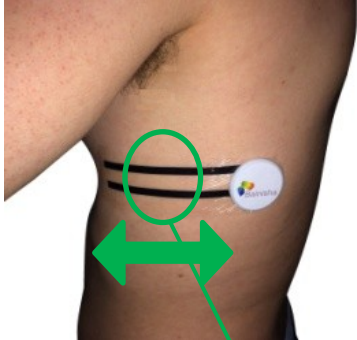
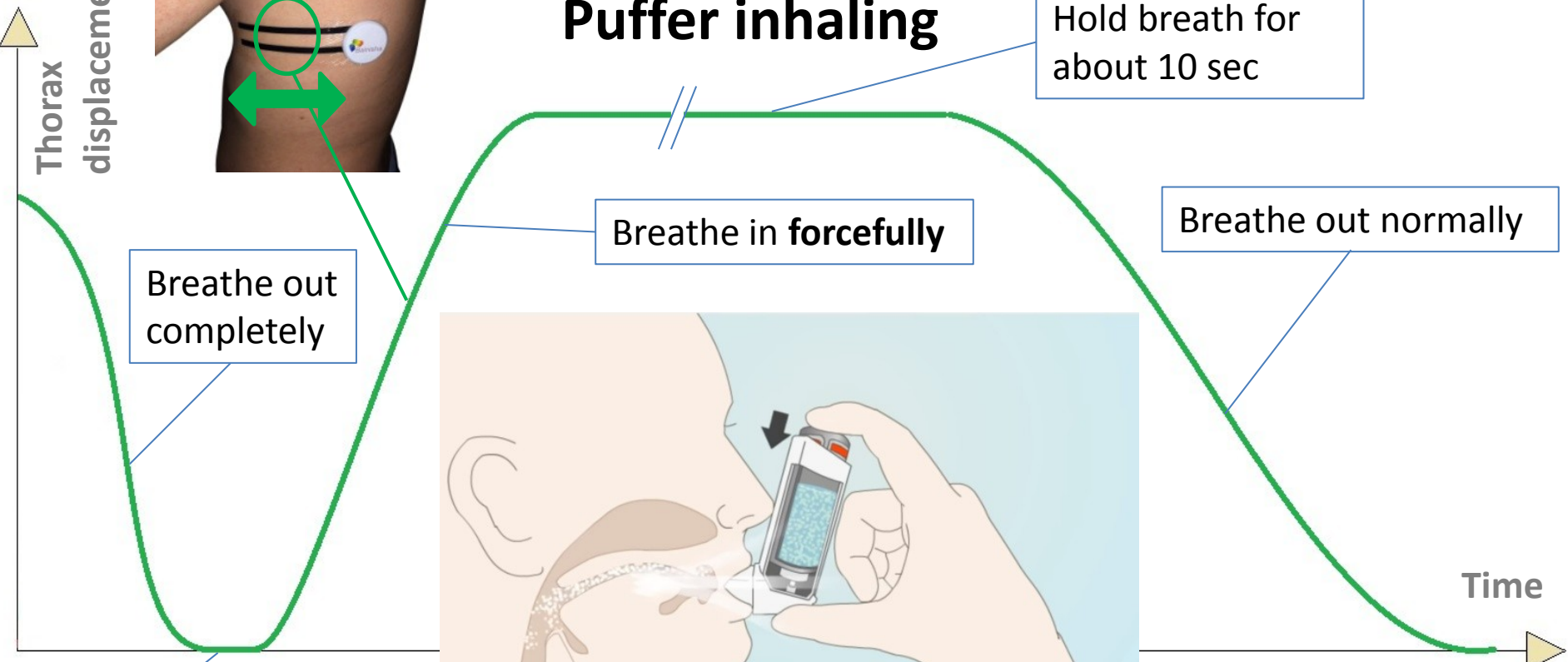


Thorax displacement →  
inhaling and step-like release

Combined signal = 100%  
confirmation coughing is captured =  
type, frequency, intensity ...

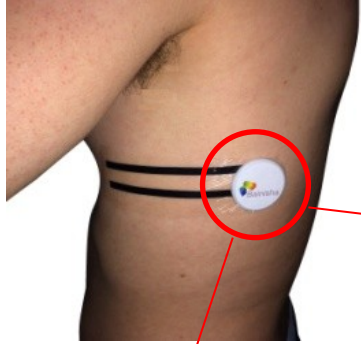
# Example II

## Puffer inhaling



Seal puffer with lips



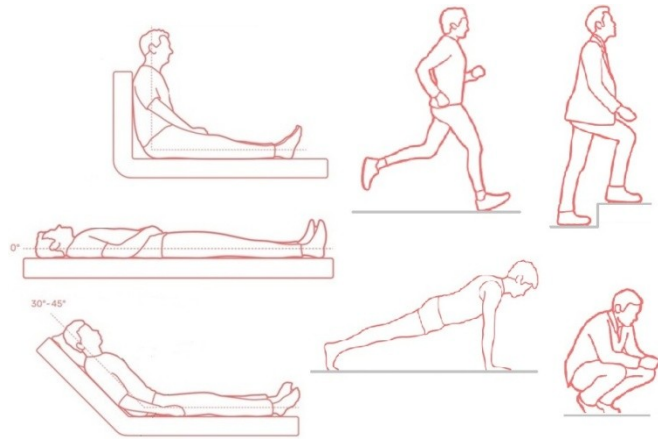
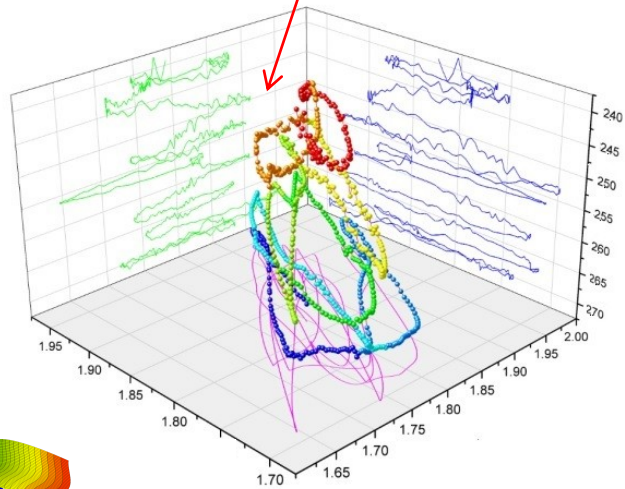


# Example II

## Puffer inhaling

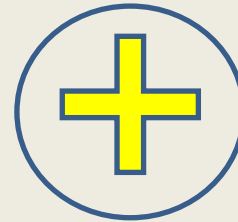
Body position x,y,z

Movement point on trunk - 3D



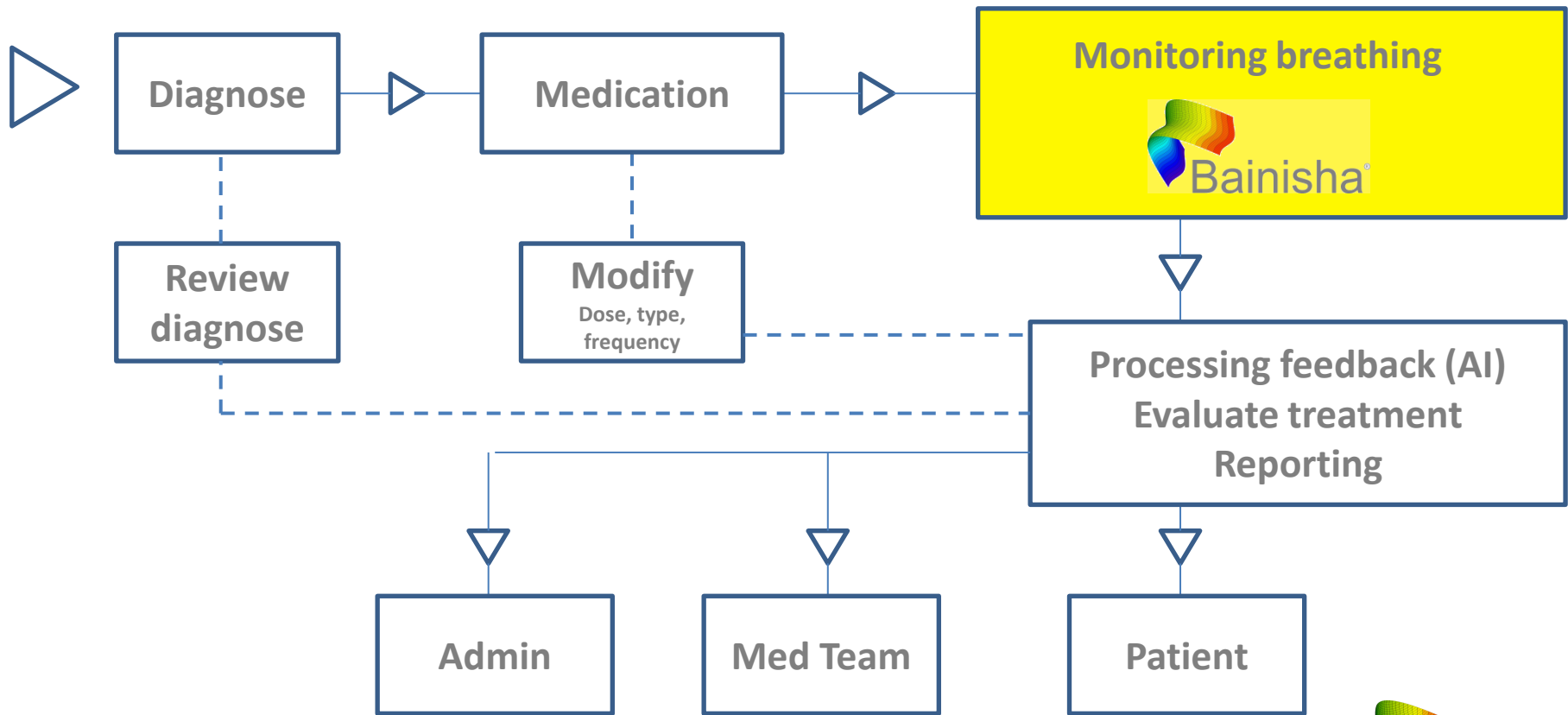
Combined signal = 100% confirmation of capturing correct usage of puffer:

**Displacement sensor: Breathing pattern in/out holding, slow release ...**



**Body position and dynamic aspects (... standing still & upright and heart rate when applying puffer...)**

# Holistic view – where does it fit ?



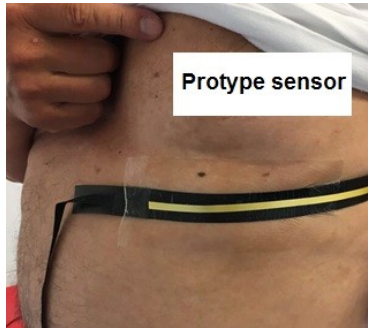
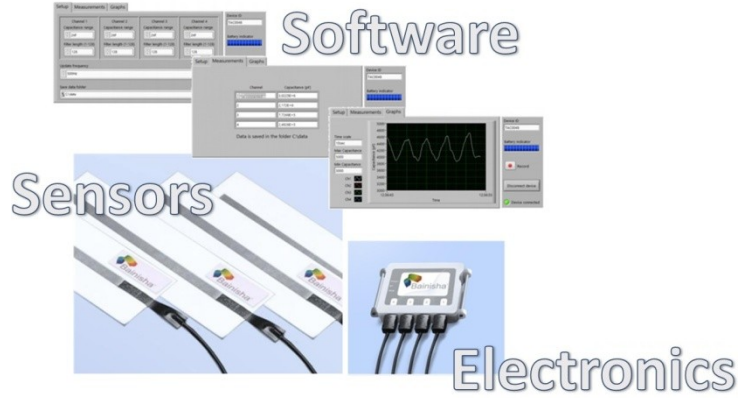
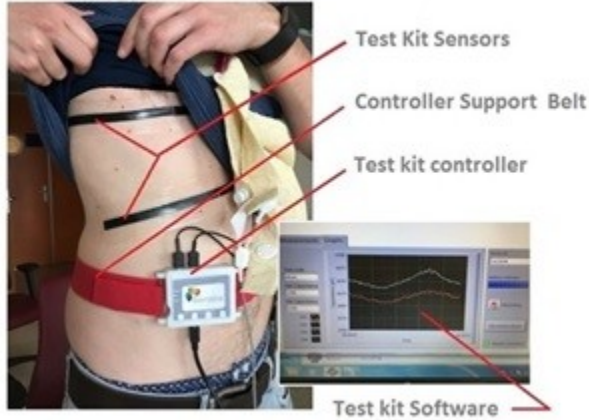
# Wider field of respiratory applications

**“Body Integrated” high definition respiratory measurements have many other applications:**

- Condition monitoring in Intensive Care Units.
- 24/7 tele-monitoring of outbound patients
- Establishing "Normal/Natural Breathing Rate" in preparation of Radio therapy
- Respiratory Motion Management for Proton and Photon Radiotherapy of Lung Cancer
- Managing “breathing intentions” in function of forced breathing support (mechanical ventilation)
- Advanced sports analytics
- Sleep analytics
- Stress management programs based on breathing exercises
- Smokers cessation programs

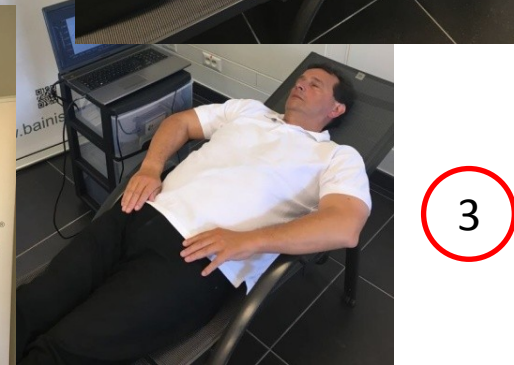
# Status – TRL4 - 5

Informal test @ UMCG Groningen (NL) with the current standard Bainisha TEST KIT.



Tests @ Bainisha with prototype sensor(s).

- 1 - Standing up exercising in different modes of excitation
- 2 - Sitting up with inclined bed. Simulating total relaxation versus heretic breathing
- 3 - Sleeping – back/side

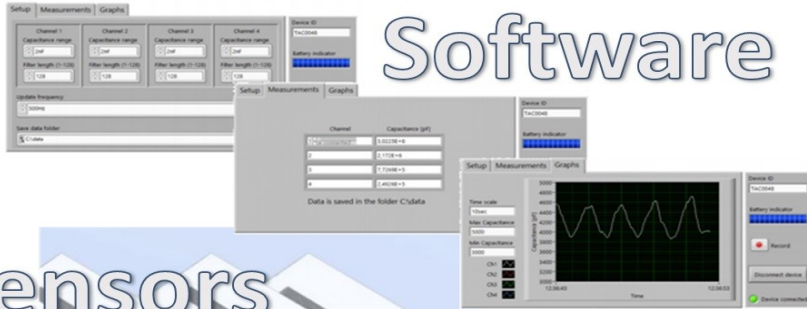


# Summary

## Powerful Patented Platform:

*Enabling technology with huge market potential in many different domains. The patent structure allows to derive IP sub-sets, increasing the commercial value of the basic scheme of royalties & licences.*

**Status:** *Many operational prototypes build & tested. Test kit available via web-shop:*



## Software

## Sensors



### Bainisha Stick & Measure Test Kit

measures all displacement and sticks to almost anything.

Discover our first test Kit. It is a powerhouse, with a PU that can process up to 4 sensor stickers at the same time for an advanced multi-area set-up.

The innovative measuring concept brings data acquisition to an unprecedented level.

Movements, processes and materials that have never been tested before, can now be unveiled.

**Order now**

Test Kit contains processor with Bluetooth data transmission, four sensor stickers and software to read out raw data – 1.280,00 EURO VAT Excl.

## Electronics

# Company Fact Sheet



## Founded

June 2014 by Patrick Van De Vyver & Karina Haemelinck

## Employees

1 FTE's + 3 Free Lance + 2 Part Time Consultants

## Experienced team

Multi-disciplinary across a variety of industrial fields



Founder – CEO



Applied Physics  
Systems Engineer



Mechatronics  
Embedded Syst.



Mechatronics  
Software Dev



Strategic &  
Mfg Consultant



Strategic &  
Financial Advisor

## Investments

From 2014 - € 340 k (FFF, bank loan & state support) – no equity. Seed for equity in 2017 € 266 k (BA's) + € 183 k state support (1 Belgian + 1 EU) + bridge loan € 25k - **Total: € 814 k**

## Location

Lokeren, Belgium – head office and test-lab

## Award

IDTechEx “Best New Wearable Technology Device” Berlin 2015

## Patent I

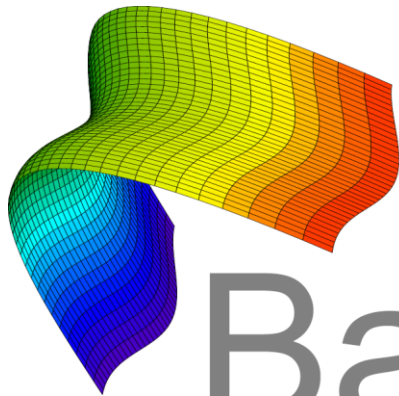
Multi-directional integration of stretch sensors in an elastic self-adhesive substrate (awarded)

## Patent II

“Sensor Fusion” concept i.e. coupling MEMS-IMU's with Displacement Measurement (pending - filed in 2015)

## Structure

Patrick VDV	50 shares	42,02%
Karina H	49	41,18%
Wim V	9	7,56%
Next Ventures	9	7,56%
Kaat VDV	1	0,84%
Gerard S	1	0,84%
Total	119	100%



# Bainisha<sup>®</sup>

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