



Innovation 4 Health

**Scienze della Vita tra pubblico e privato: l'importanza del tech transfer
per l'innovative health ai tempi del Covid-19**

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EVENTO DIGITALE 30 OTTOBRE 2020

ST STANDARD PRODUCT OFFERING FOR HEALTHCARE

ST is a trusted provider of high-quality technical solutions enabling the development of breakthrough medical systems

Acquiring data

- Sensors for Imaging
- MEMS & measurement ICs
- Electronic interfacing



Processing data

- Powerful microcontrollers
- Artificial Intelligence at the Edge
- Specially developed devices



Security

- Secure element for medial data integrity
- M2M-SIM for authentication and confidentiality
- Enabling Blockchain transactions



Connectivity

- Short-range low-power BLE, NFC
- Long range IoT (Sigfox, LoRa)
- Cellular Broadband, narrowband



Targeting a broad range of applications

- Medical Imaging
- Focused ultrasound
- Energy harvesting and neurostimulators
- Non-destructive testing
- Electrocardiography (ECG)
- Photoplethysmography (PPG)
- Galvanic Skin Resistance (GSR)
- Bio Impedance functionalities
- Oxygen saturation
- Respiratory rate
- Skin temperature

MEMS = Micro-Electro-Mechanical Systems fabricated at Silicon level

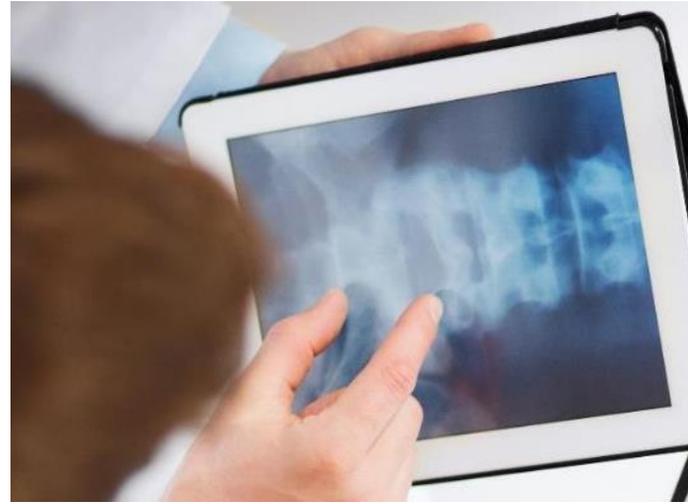
X-RAY AND ENDOSCOPY

Endoscopy



- Advanced imaging technology enabling small pixel pitch
- Scalable supply chain for low volume

X-Ray



- Optimized technologies for X-Ray
- Radiation hardening expertise
- Stitching for extra-large dies
- Scalable supply chain for low volume

Ultrasound



- Ultrasonic transmitters, receivers
- Ultrasound piezoelectric actuators
- >15 years experience
- Close cooperation with top stakeholders
- 30 patents granted on Ultrasound imaging

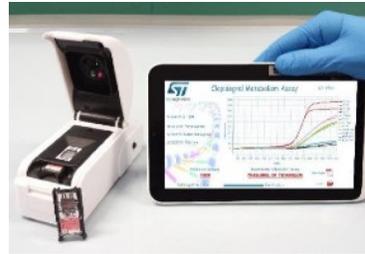
STMicroelectronics works with all the key players in medical electronics, and we are accelerating development in a highly innovative solutions but less-known branch of our business. Let's see which.

INTRODUCTION TO SPECIFIC INNOVATIONS IN HEALTHCARE

ST, in partnership with various stakeholders, develops reference platforms to help implement electronic components effectively, with technical and marketing support for selected partners with innovative solutions.

Below are some examples where ST enabled its customers to benefit from semiconductor technology in medical field.

- Biomolecular Diagnostic: Real-time PCR platform
Bringing Lab know-how to remote patients



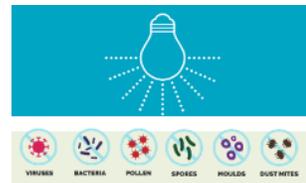
- For Telemedicine: ECG system integrating sensors, microcontroller and radio
Bringing data from remote patients to Doctors



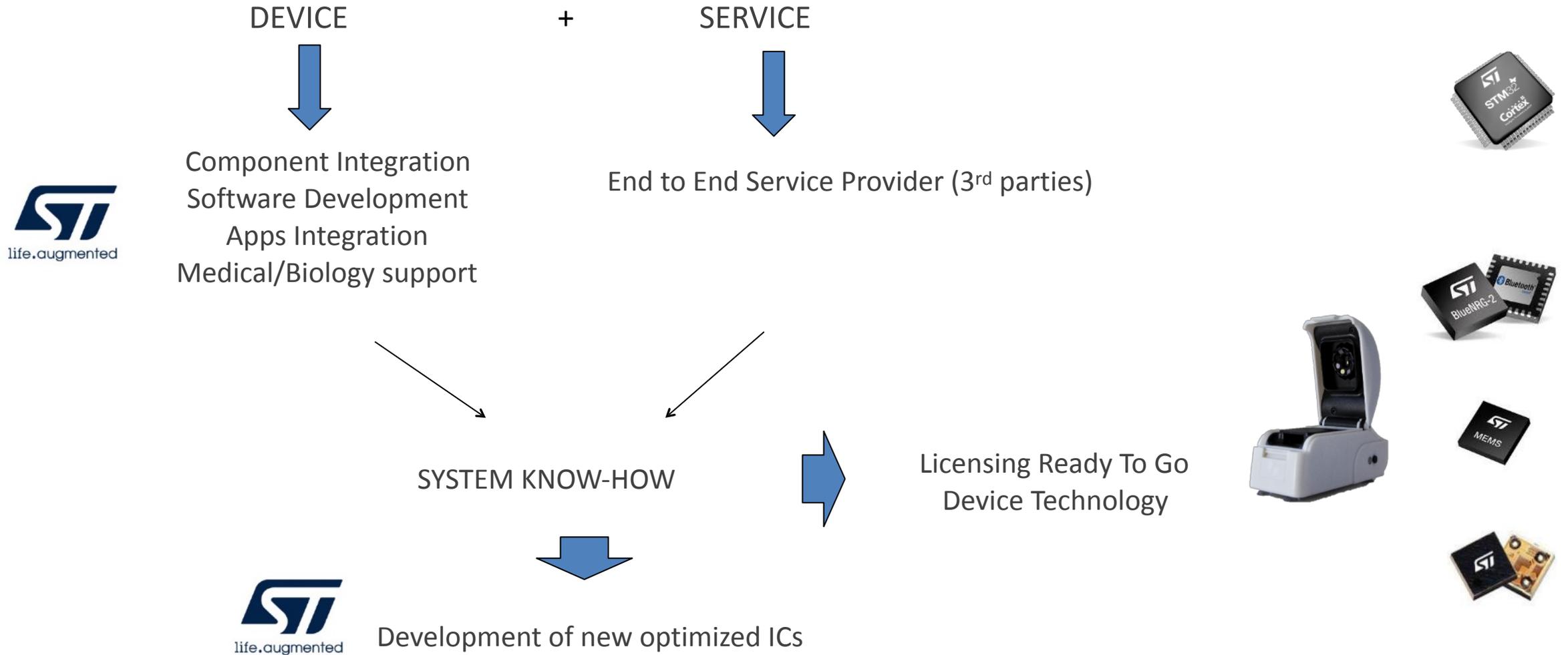
- Social distancing: Wearable device collecting contacts (precise measurements <2m)



- Sanitizing lighting solutions



MEDICAL DEVELOPMENT & LICENSING PATH





BODY GATEWAY TECHNOLOGY - HI FEATURES

The Hi device is a wearable electronic, coin battery operated device that is worn on the chest with standard patches for the acquisition and transmission of physiological parameters to external devices, which can analyze or forward the data to additional storage elements or systems.

Key Features

- One- or three-lead ECG acquisition and transmission
- Heart rate monitoring
- Activity level estimation
- Body position detection
- Long Lasting recording time up to 3 days depending on use cases
- Use of standard ECG patch
- Flexible structure to adapt to body shape
- IP67
- BTLE 4.2
- Protocol compatibility with previous device V3
- On-board remote programmable features:
 - 4 functioning modes
 - 6 operating modes



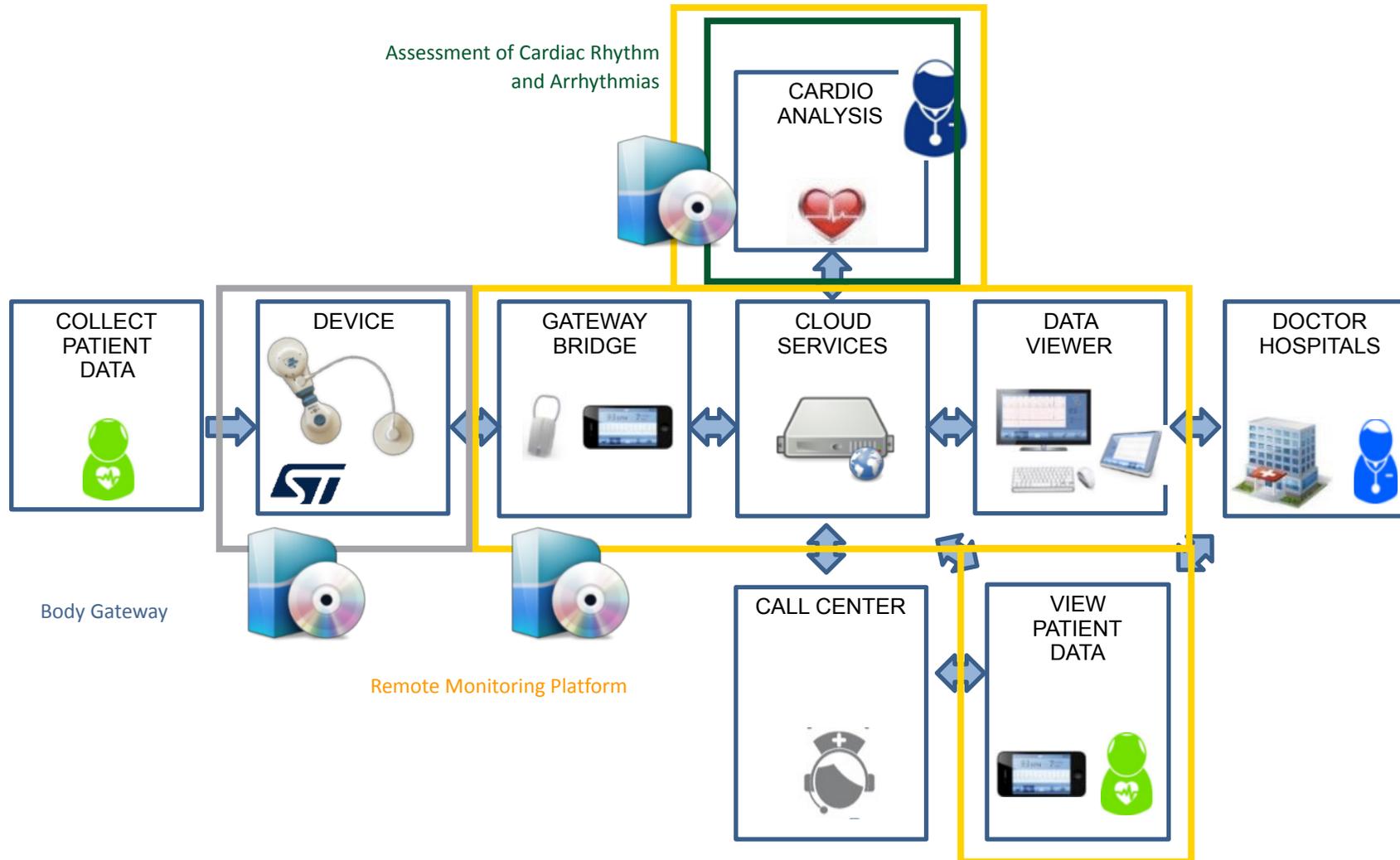
• Applications

- Chronic cardiac disease monitoring
- Elderly people home monitoring
- Event monitoring
- Cardiac Rhythm disturbances detection by:
 - Event monitoring
 - 1-3 leads ECG Holter monitoring

• Options

- Rechargeable battery
- One-lead only version

REMOTE MONITORING SCENARIO

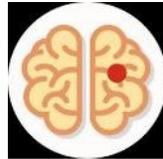




HI BODY GATEWAY TECHNOLOGY ADDRESSING:



CARDIOLOGY



STROKE PREVENTION



SCREENING FOR
IMPLANTABLE



ONCOLOGY
TREATMENT



NEUROLOGY
TREATMENT



DRUG
TOXICITY

Adding to the platform of specialized medical devices offering more solutions for various pathologies



Body Gateway Hi



Sphygmomanometer



Glucometer



Oximeter



Scale

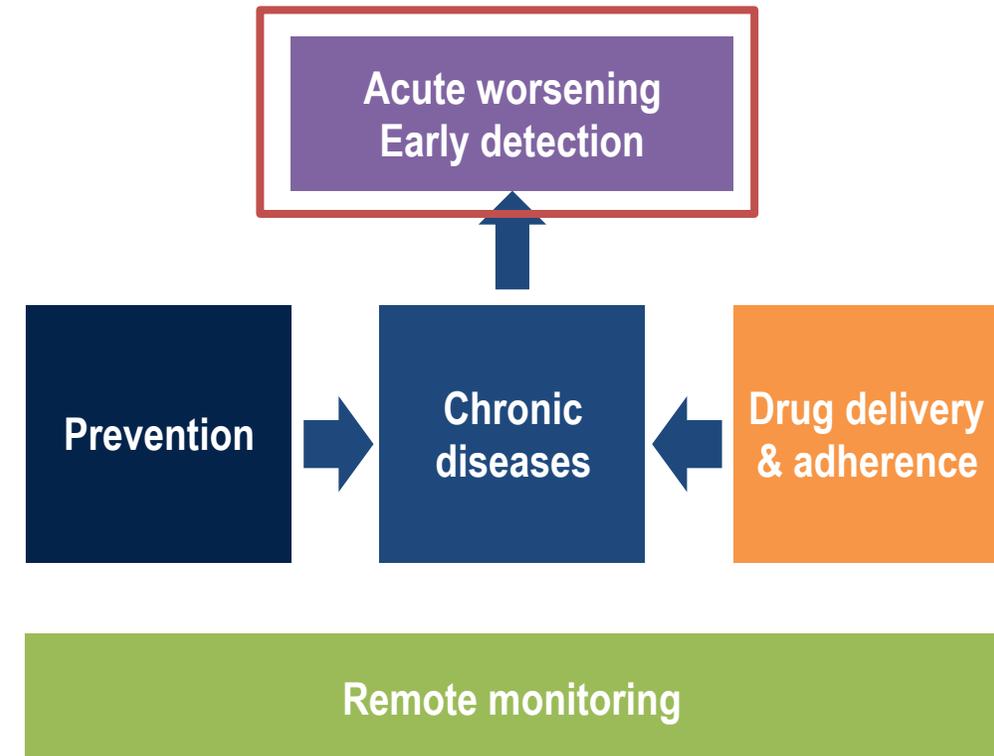


and more...

TELEMEDICINE IN A PANDEMIC SCENARIO

Advantages

- Optimize resources, often insufficient during a pandemic
- Remote interaction with the population to maintain a functional health care system
- Reduce contagion in doctors, caregivers, in-home nurses
- help a medical systems under stress
- Improve continuity of patient care after discharge from hospital
- Emergency Dispatcher support
- Support Acute Worsening Early Detection
- Post discharge patient monitoring: RISK OF RECURRENCE



INOCESS ST PARTNERSHIP SOCIAL DISTANCING - TURNKEY SOLUTIONS





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QPCR PORTABLE SYSTEM FOR MOLECULAR DIAGNOSTICS

Developed entirely by the **SRA Silicon Biotech team**, the **Q3 qPCR system** can perform **molecular tests** with the following advantages:

- **Easier** to use than standard qPCR platforms → suitable for **non-professional people**
- **Small, light** and **fast** → portable and usable in **PoC** scenarios
- **Open** platform → customers can develop their own tests

3 main elements:

1. Single use **Disposable Cartridge**
2. Portable **Instrument**
3. Highly professional **Software Suite + reagents from ST customers**

MULTIDISCIPLINARY COMPETENCE & LABS

- Multidisciplinary team to master all the application-specific aspects and facilitate dialogue with ST's customers and early adopters
- Biological, Optical, Mechanical, Electronics and Software professionalism with laboratories and prototyping facilities to allow ideas to develop into proofs-of-concept
- Understanding of the Medical certification requirements (CE, FDA, CFDA) to be considered in the design choices for faster and effective Technology Transfer to partners/customers



QPCR PLATFORM ELEMENTS

Instrument



14 x 7 x 8.5 cm, 300 g

Modular system that thermally drives the disposable cartridge and houses illumination and optical detection components

Disposable Cartridge



4.7 x 2.2 x 0.6 cm

Electrically active microsystem that accurately controls the temperature profile cycling

6 triplex reactions performed simultaneously, each in a 5 μ L reaction volume

Software



General-purpose software

Full protocol flexibility and user-friendliness

Up to 6 instruments controlled in one software session, with random-access approach

QPCR SOLUTION & VALUE CHAIN

The solution



- ST:
- Instrument design
 - Disposable Cartridge manufacturing

- Diagnostic Partner:
- Instrument manufacturing, Certifications and territory specialization
 - Final product sales & support

Diagnostic Partner



Biochemical reagents to specialize disposable cartridge for different applications



Rapid and easy-to-use solution for diagnostic responses

Buccal swab



Sample prep



PCR-ready sample



Pre-functionalized Cartridge



qPCR



Answer



DIAGNOSTIC APPLICATION SECTORS

Infectious Diseases

COVID-19,
Sepsis,
Malaria ⁽¹⁾,
Ebola ⁽²⁾



Cardiology

Antiplatelet drug
metabolism ^(3,4)



Pediatrics

Meningitis,
Pertussis ⁽⁵⁾



Gynecology

HPV,
Thrombophilia



Oncology

Pharmaco-
genetics



Agro-food

Parasites in
mollusks ⁽⁶⁾,
meat
identification



(1) <http://dx.doi.org/10.1016/j.jmoldx.2019.04.008>

(2) <http://dx.doi.org/10.1016/j.jviromet.2017.11.009>

(3) <http://dx.doi.org/10.1016/j.jacc.2018.02.029>

(4) <http://dx.doi.org/10.1016/j.cca.2015.10.003>

(5) <http://dx.doi.org/10.1109/SBMicro.2016.7731331>

(6) <https://doi.org/10.1007/s13197-019-03972-7>



Press release
Communiqué de presse
Comunicato stampa
新闻稿 / 新聞稿
プレスリリース
보노사료

STMicroelectronics Works with Alifax on Rapid, Cost-Efficient Point-of-Care Medical Testing

- *Alifax, a diagnostic-test producer, has customized biological content and reagents to detect pandemic-related genetic material and other viral (and bacterial) pathogens*
- *ST Real-Time PCR molecular-diagnostics technology, using disposable cartridges, can be adapted to detect any genetic material*

Geneva, Switzerland, and Padova, Italy, October 29, 2020 – STMicroelectronics (NYSE: STM), a global semiconductor leader serving customers across the spectrum of electronics applications, and Alifax S.r.l. a producer of clinical diagnostic instrumentation, have worked together on a rapid, cost-efficient portable solution that will be available from Alifax, for point-of-care molecular diagnostic detection using highly reliable real-time Polymerase Chain Reactions (PCR) to amplify genetic material (RNA and DNA¹) in patient samples.

.....CONTINUE

“One crucial lesson from the current global pandemic is the importance of rapid, cost-efficient point-of-care testing that allows immediate remote diagnosis, and then, if necessary, patient isolation,” said Alessandro Cremonesi, Chief Innovation Officer, STMicroelectronics. *“ST has been investing in its Real-Time PCR platform convinced that innovative semiconductor-based diagnostic solutions can positively impact our lives.”*

“Leveraging our high-volume semiconductor-manufacturing technology and long-term leadership in microfluidics, we’ve developed a rapidly customizable, highly flexible cartridge and instrumentation platform that delivers rapid and precise point-of-care diagnostic results, which Alifax has used to respond almost immediately to present pandemic and future diagnostic needs,” added Benedetto Vigna, President Analog MEMS, and Sensors Group, STMicroelectronics.

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*“Building on our passion for research and excellence in innovation, Alifax has established its strength in hematology and bacteriology for diagnostic purposes. By working closely with ST and combining its foundational microfluidic and other technology in the **Molecular Mouse and our pathogen-specific assays, starting from a COVID-19 test**, we’re ready to contribute to rapidly diagnosing, isolating, and ultimately stopping the spread of pathogens,”* said Paolo Galiano, President Alifax.

Certified to CE-IVD the Molecular Mouse, disposable test cartridges, and assays are available now from Alifax.

THANK YOU