Rapid diagnostic device for brain trauma (NanoAnalyzer)

Currently, the diagnosis of traumatic brain injury (TBI) is based on expensive and invasive CT scans, with a 90% negative result.
The NanoAnalyzer detects – through a simple blood test – six specific biomarkers of TBI, providing rapid, non-invasive and accurate results thanks to the use of SAW (surface acoustic wave) technology and artificial intelligence algorithms. The device is especially ideal for pediatric and vulnerable patients, reducing unnecessary examinations and intervention times.
Teoresi Medtech is responsible for the development of the reader, ensuring the integration between the cartridge and the cloud infrastructure, optimizing the efficiency of the system and improving the management of diagnostic data in real time. In particular, Teoresi MedTech has taken care of the HW and SW design for the management of the entire measurement process, the creation of prototypes, as well as obtaining the RED certification.

Laboratory	Teoresi MedTech
Specialization Area	Health and Wellness
Contacts	Guido Comai
Keyword	IVD (in vitro diagnostics), Radiofrequency, Microfluidics, Artificial intelligence

"Portable and accessible in vitro analysis device"



Fig. 1: NanoAnalyzer V2

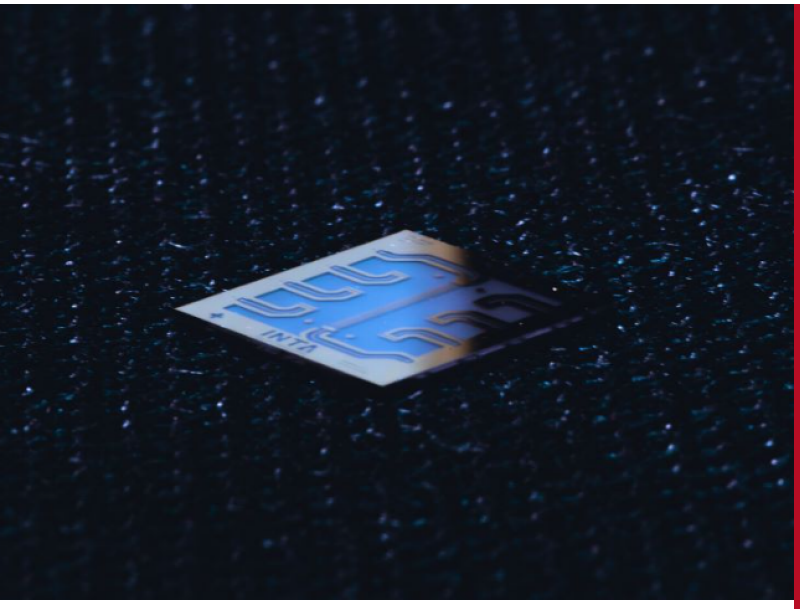


Fig. 2: Sensing Element

Description

The NanoAnalyzer developed by Teoresi MedTech detects - through a simple blood test - six specific biomarkers of TBI, providing rapid, non-invasive and precise results thanks to the use of SAW (surface acoustic waves) technology and artificial intelligence algorithms.
The device has a very complex internal electronic part and user interface composed of:
• display, touch screen and buttons;
• electronic components used for Radio Frequency measurements;
• a part that allows the measurement to be carried out through actuators and sensors such as Pumps and solenoid valves that manage the micro-fluidics;
• stepper motors with optical sensors for mechanical actuations;
• use of an integrated battery to make the device detachable from the electrical network;
• management of a Peltier cell to thermostat the chip area on the cartridge (technique required for an optimal measurement);
• modules for Internet connectivity are also integrated to communicate with the cloud.
Furthermore, Teoresi MedTech has taken care of the mechanical study of interaction between cartridge and reader, considered a crucial aspect for obtaining excellent results.

Innovative aspects

The NanoAnalyzer detects - through a simple blood test - six specific biomarkers of TBI, providing rapid, non-invasive and accurate results thanks to the use of SAW (surface acoustic waves) technology and artificial intelligence algorithms.
The main benefits include an increase in the efficiency of healthcare systems and a reduction in hospital costs, accompanied by a significant improvement in the patient experience, especially for the most vulnerable categories such as children and the elderly, thanks to early and accurate diagnoses. These results will help make the healthcare system more sustainable and overall more effective.
For Teoresi MedTech, which supported INTA in the design and implementation phase, the main challenge was to design and create a device with very high technological and innovation content that could be brought to the market and scaled even on large production quantities.

Potential applications

The device is ideal for ambulances, emergency rooms, laboratories and remote areas, improving access to diagnoses, especially for pediatric and vulnerable patients, reducing unnecessary tests and intervention times.

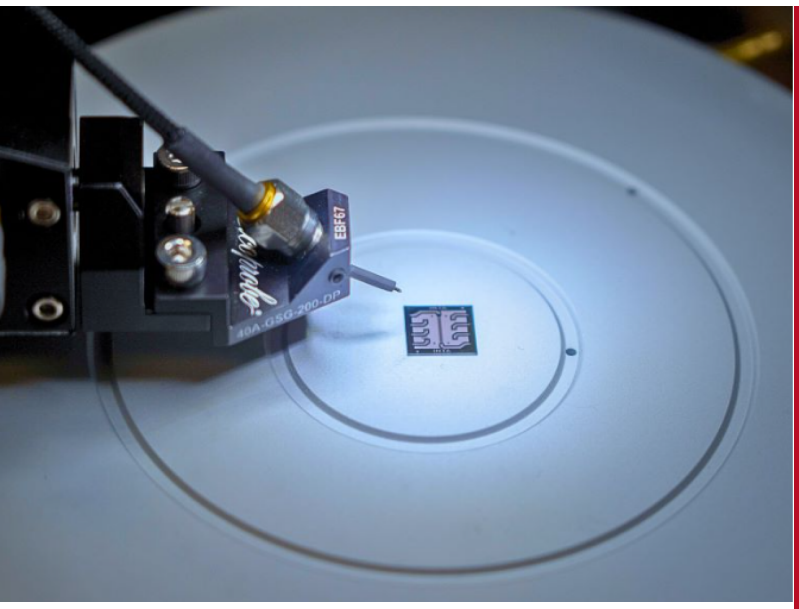


Fig. 3: Chip used for the measure

Involved partners	INTA systems
Implementation Time	12 months/person
Technology Readiness Level	TRL7 - System prototype demonstration in operational environment
Exploitation	Teoresi MedTech's contribution is essential to transform the initial product or idea into a complete and market-ready solution, solving challenges related to hardware, software, mechanical design, data management and compliance with medical standards.

Application example

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Thanks to the collaboration with Teoresi MedTech, the expected results of the NanoAnalyzer project are revolutionary for the diagnosis of traumatic brain injury (TBI) and beyond. Through the ability to detect six specific biomarkers from the blood test, the device will offer a rapid, non-invasive and portable diagnostic solution that will drastically reduce the use of expensive and invasive CT scans.
Thanks to the collaboration with Teoresi MedTech, the expected results of the INTA project with the NanoAnalyzer are revolutionary for the diagnosis of traumatic brain injury (TBI) and beyond. Through the ability to detect six specific biomarkers from the blood test, the device will offer a rapid, non-invasive and portable diagnostic solution that will drastically reduce the use of expensive and invasive CT scans.
The main benefits include an increase in the efficiency of healthcare systems and a reduction in hospital costs, accompanied by a significant improvement in the patient experience, especially for the most vulnerable categories such as children and the elderly, thanks to early and accurate diagnoses. These results will contribute to making the healthcare system more sustainable and more effective overall.

Teoresi MedTech

Teoresi MedTech nasce dal know-how di **Medicon Ingegneria** in oltre vent'anni di esperienza nella ricerca e nella progettazione di soluzioni hardware e software nell'ambito dei dispositivi medici.
L'eredità si fonde con l'innovazione e la visione del **Gruppo Teoresi**, dando vita a una unit di eccellenza nel settore dell'healthcare, aperta a nuovi mercati e in grado di accettare le sfide e cogliere le opportunità offerte dallo sviluppo tecnologico.
Teoresi MedTech continua il cammino tracciato da Medicon Ingegneria nella realizzazione di prodotti all'avanguardia dedicati alla cura e al benessere della persona.
Il fulcro di Teoresi MedTech è rappresentato dalle attività di Ricerca e Sviluppo che garantiscono un'innovazione continua di prodotti e processi, in modo da soddisfare le esigenze più specifiche del mercato dei dispositivi medici.
Dalla progettazione hardware allo sviluppo software, dalla ricerca industriale alle attività di verifica e validazione, fino alla gestione dei rischi e alle procedure di certificazione, siamo orientati a fornire soluzioni affidabili e conformi ai più alti standard di sicurezza.
Teoresi MedTech, garantisce supporto nell'introduzione sul mercato di dispositivi medici e applicazioni sanitarie di alta qualità. Il focus sull'innovazione e lo sviluppo dei prodotti si estende anche alla sicurezza dei sistemi e alla sicurezza funzionale, con l'obiettivo di garantire la massima affidabilità e conformità normativa. Il team di Product Specialist, parte integrante della divisione di Ricerca e Sviluppo, assiste il cliente in tutte le fasi del ciclo di vita del prodotto, dalla specifica dei requisiti all'implementazione, dalla certificazione alla manutenzione.



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Published on 08/04/2025