

OPTICAL SENSING TECHNOLOGIES: who we are and what we do

OST is a startup founded in 2013. Its activity is based on the experience of the two co-founders in fiber optic sensor systems, matured over 20 years spent in R&D.

Many fields of application can benefit of the innovation carried by the photonic technologies: bio-medical, chemical-pharmaceutical industry, food and beverage, oil and gas, aerospace, precision mechanics and many others.

Now we want to share our experience with our customers.

A case study: fiber optic sensors for medical applications

Our objective is to demonstrate that Fiber Optic Sensors offer relevant benefits in terms of performance and versatility of use that can be applied successfully in the medical world.

Other applications have already been developed in which Fiber Optic Sensors are used for structural monitoring in a number of engineering fields, where this technology is used to measure different mechanical parameters with advantages over “traditional” measurement techniques. For example many sensors can be placed in a single fiber, each of which can detect strain, temperature, force, displacement, bending, etc., all with the same interrogation unit.

With the appropriate combination of engineering solutions for both the optical measurement equipment and for the sensing probes, it is possible to transfer these benefits to the medical environment, matching the most demanding requirements in terms of reduced invasiveness, high sensitivity, repeatability and lifetime of the sensing device.

Thanks to their physical properties, fiber optic sensors can be used inside the human body where their reduced invasiveness and high sensitivity allows “distributed sensing probes” performing simultaneous multi-point detection of parameters such as pressure and temperature, measuring rapidly changing gradients and very small variations of patient diagnostic parameters.

Moreover, fiber optic characteristics are suitable for the addition of new functions in medical equipment like catheters and surgical tools where again the combined measurement of several parameters like force or shape could significantly improve the efficiency of the apparatus or the effectiveness of the treatment.

Some experimentation to demonstrate the suitability of fiber optic sensors as pressure and temperature probes has already taken place as a proof of concept. Next step is the interaction with a customer or a partner company for the development of a real application.

Our approach to co-design

Those situations that represent a challenge for “conventional” measurement systems are sometimes the right environment where a novel approach can offer a solution to overcome existing technological limitations, offering a competitive advantage.

Fiber optics allow innovation. We believe that a cooperative approach to a complex problem can be the best way to let ideas evolve into innovative (‘products’ or ‘solutions’?).

Our approach is to listen to the needs of our customer to be able to suggest a possible solution based on fiber optics, with the help of our partner companies who contribute with specific skills in fiber optic production and fiber optic connectors.

Our capabilities

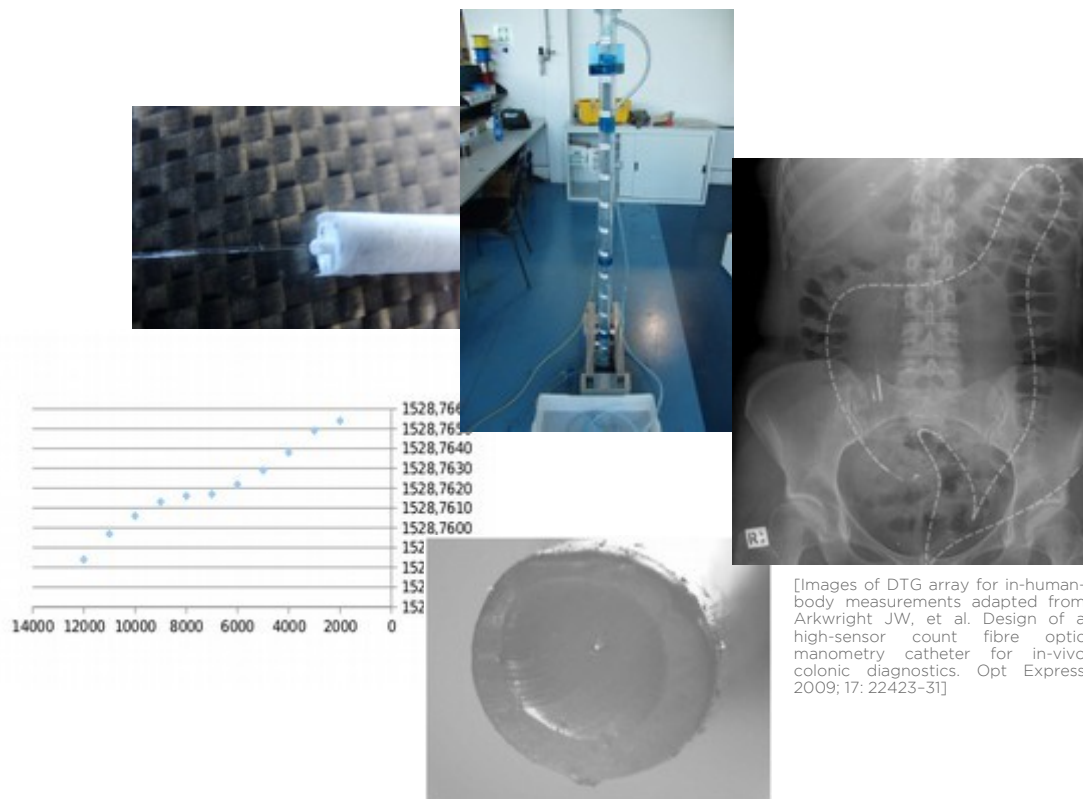


OST specializes in the custom design of OEM sensing equipment and the implementing innovative measurement techniques.

- The development process always starts with a feasibility study: a theoretical approach to the problem that is used to identify benefits and limitations of possible solutions.
- Modeling of the sensors leads to the identification of the most appropriate optical interrogation scheme
- Experimental activity is essential to produce the first functional prototype
- Regular communication with the customer results in a better definition of specifications and objectives, in preparation of series production
- Original sensing solutions can generate PATENTS and technological advantage over competitors

An application example: quasi-distributed pressure sensors

Here is an example of Team Cooperation and competences sharing, with a final application in mind.



Reduced invasiveness and high sensitivity are the main characteristics that make **fiber optic sensor arrays** the most interesting devices for measurement and diagnostic applications inside the human body.

With proper packaging and coating, the optical fiber becomes a very accurate quasi-distributed pressure sensor. The probe characterization has been performed in the University lab, by means of an appropriate experimental test set up.

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Biography

Degree in Electronic Engineering from the *Politecnico di Milano*, with specialization in optoelectronics.

Research activity within Politecnico and CISE (a research center located in Segrate - MI) for the development of fiber optic sensing techniques based on interferometry and Fiber Bragg Gratings.

Consulting activity for private companies and research centers such as ENEA and JRC for the development of optoelectronic systems and fiber optic sensors.

Main projects: development of structural and health monitoring systems for civil, oil&gas, electric power plants, infrastructures and transportation; fiber optic intrusion detection systems (inventor, patent actually owned by the Company who financed the project).

Stable collaboration with the *Politecnico di Milano* as a consultant for the development of smart materials with fiber optic sensors for aerospace applications.

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