



**FIST SA**

# Global vision system for laparoscopic surgery

**Notre référence :**  
05085-01

## Status des brevets

France priority patent application filed on October the 5<sup>th</sup>, 2012 and entitled "Système d'imagerie multi-vision pour chirurgie laparoscopique"



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## Status Commercial

Exclusive or non-exclusive license. Co-development

## Laboratoires

[Techniques de l'Ingénierie Médicale et de la Complexité](#) (TIMC-IMAG, UMR5525),

## CONTEXT

Laparoscopic surgery is a mini-invasive technique to perform surgical interventions of the abdominal cavity. It consists in :

- Creating a workspace by insufflating CO2 gaz inside the abdominal cavity
- Realizing small incisions on the abdominal wall to introduce an endoscope and long and thin surgical instruments

This approach, subject to considerable diffusion since the 1980's, offers numerous advantages compared to open surgery, but is technically more difficult for the surgeon. One difficulty is linked to the reduced field of view of the surgeon, which is limited to the small field of view of the endoscope: the surgeon operates as though he was looking through a keyhole. Due to the increased technical difficulties, the learning curve of laparoscopy is high.

## TECHNICAL DESCRIPTION

In a laparoscopic surgery, the endoscope and instruments are inserted inside the abdominal wall through small hollow cylinders called trocars. The trocars are equipped with seals that maintain the gas inside the abdominal cavity while instruments are introduced through the abdominal wall. The global vision system is an "augmented trocar" comprising two mini-cameras like the ones that can be found on a cellphone. An extraction and housing system permits their deployment around the trocar's cylinder and their folding for an easy and quick extraction. The global vision system cameras' are positioned to provide a wider field of view compared to the endoscope alone (see Figure 1). This field of view enlargement is all the more important that the endoscope is deeply inserted inside the abdominal cavity (this is often the case when the surgeon performs a task requiring precision and detail).

Grenoble, France)

**Mots clés :**

Laparoscopy Surgery  
Global vision

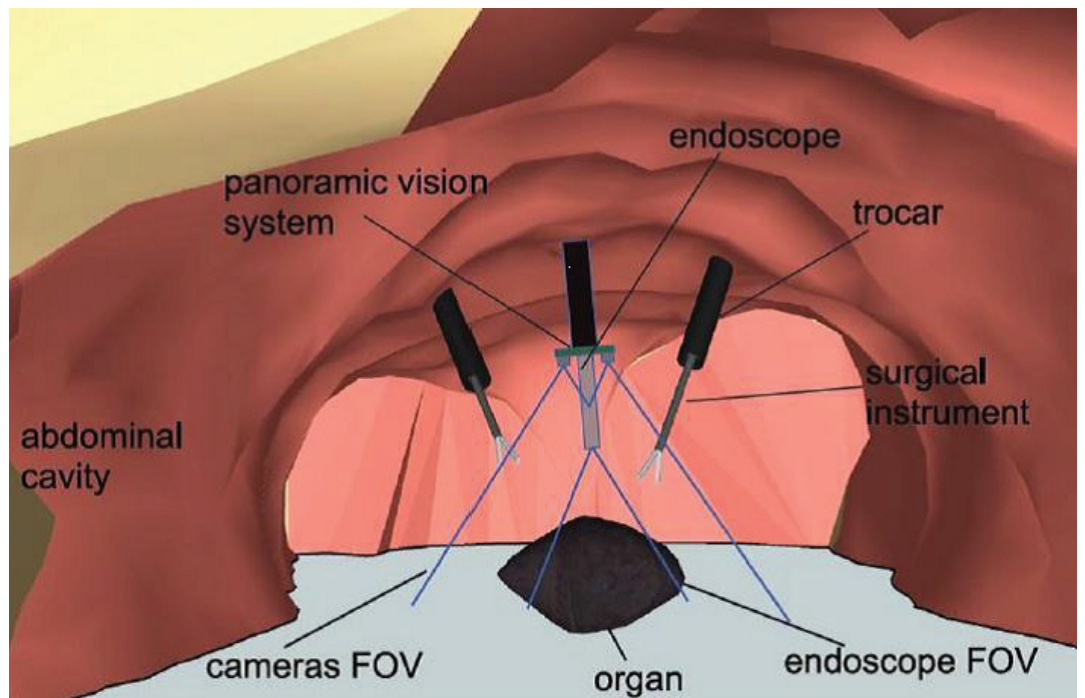


Figure 1: global vision system concept

**DEVELOPMENT STAGE**

We are currently prototyping the augmented trocar (first versions including seals have already been built using rapid prototyping). In parallel, we are subcontracting the development of an electronic board allowing the simultaneous, real-time acquisition of the HD image data flow of miniature cameras. An electronic laboratory prototype based on Raspberry Pi/Compute miniaturized computers is already available, but the cameras used are not optimal. The development of the prototype takes into account the surgical constraints (a risk analysis is ongoing with the project's industrial partner, SurgiQual Institute, to ensure our compatibility with medical norms). Figure 2 illustrates and the relative fields of view of the global vision system's cameras and the endoscope obtained from the Raspberry Pi's mini-cameras.



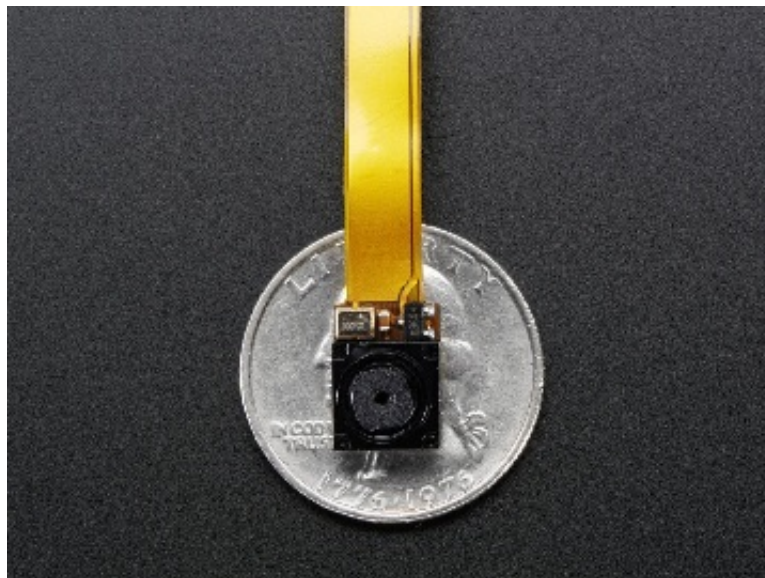


Figure 2: the global vision system prototype and resulting view of a laparoscopic scene. Left: the Raspberry Pi mini-computer with one mini-camera. Right: the viewed scene (red and green: left and right images of the global vision system, blue: endoscope's image)

## BENEFITS

Such a device will provide the surgeon with a wider field of view of the surgical field with several anticipated benefits :

- Less “back-and-forth” movements of the endoscope to recover instruments or objects that are outside the field of view of the endoscope (and potentially fewer endoscope withdrawal to wash the optics)
- Easier mobilization of the endoscope by the assistant (usually the surgeon's assistant is in charge of moving the endoscope while the surgeon manipulates the instruments)
- In the longer term a potential decrease of the surgery duration, fewer stains on the endoscope's optics and a reduction of the learning curve of laparoscopy

## INDUSTRIAL APPLICATIONS

Industrially, such a device could be sold as a laparoscopic equipment or as a laparoscopic accessory. It could be used for classical laparoscopic surgery or in conjunction with Intuitive Surgical's Da Vinci® surgical system.

For further information, please [contact us](#) (Ref 05085-01)

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