THE INSTITUTE OF INTELLIGENT SYSTEMS AND ROBOTICS*
INTERNSHIP OFFER

Augmented reality for a surgical cockpit

Abstract: Minimally invasive surgery is known for its benefits to the patient. These benefits result mainly from the smaller incisions it requires compared to open surgery. These incisions allow the insertion of an endoscope and instruments into the patient's body through trocars. Despite its advantages, minimally invasive surgery presents several challenges for the surgeon. The trend is increasing with the generalization of minimally invasive access to almost all specialties (catheterization for vascular, flexible endoscopy for gastroenterology, fibroscopy in urology etc...).

Objectives: With this project, we propose to study the contribution of augmented reality in the operating room. Its specificity project is to take advantage of the possible complementarity between comanipulator robotic arms held by the surgeon and an augmented reality device carried by the latter (Hololens/Varjo XR1).

The main objective of this internship will be to integrate the information from tools present in the surgical cockpit project (manipulator arms, endoscopic cameras, tactile interfaces ...) to a Unity 3D environment. The environment will have to be manipulable via the different interaction tools provided by the Head mounted display and devices of the cockpit. It will thus be possible to manipulate the position of several "screens" through the gaze, the voice or the movements of the tip of the laparoscopic instruments held by the comanipulator arms.

The goals are :
- Creation of a 3d scene in Unity allowing the display and manipulation of 3d objects,
- External video (endoscope) streamed in the 3d scene (WebRTC),
- Retrieving manipulator arms pose (orientation/position) and display it in 3D,
- Use of robot information to allow manipulation of 3D objects,
- Creation of a widget to display the status of different sensors that could be added,

- The usability of the developed platform will be studied in the framework of an experimental protocol. The two technologies used (Hololens/varjo) will also be compared.

The developments will all be carried out under Unity XR SDK.

Candidate Profile: Master's student in Computer Science or Engineering, a student engineer, wishing to explore a subject involving the study of the use of information manipulation technologies in augmented reality. The internship requires strong programming skills (specifically C# and/or Unity's visual programming language) and information processing skills in order to extract the user's intention from voice, gesture and eye sensors.

Supervisors: Fabien Vérité

Duration: 6 months starting 01 March 2021

Location: Isir (Institut des Systèmes Intelligents et de Robotique), 4 Place Jussieu 75005, Paris

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Send your application by email, with [Augmented reality for a surgical cockpit] in the subject line, a CV and a covering letter.

The Institute of Intelligent Systems and Robotics (Isir) is a Joint Research Unit (UMR7222) under the supervision of Sorbonne University, The French National Centre for Scientific Research (CNRS) and Inserm (ERL-U1150). This multidisciplinary research laboratory brings together researchers and teacher-researchers from different disciplines of Engineering and Information Sciences as well as Life Sciences.