PROGRAMME INSTITUTS ET INITIATIVES

Appel à projet – campagne 2021

Proposition de projet de recherche doctoral (PRD)

IUIS - Institut univ d'ingénierie en santé

Intitulé du projet de recherche doctoral (PRD): Interactive Surgical Telementoring

Directrice ou directeur de thèse porteuse ou porteur du projet (titulaire d'une HDR) :

NOM : **Vitrani** Prénom : **Marie-Aude**
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Unité de Recherche :
Intitulé : ISIR - Institut des Systèmes Intelligents et de Robotique
Code *(ex. UMR xxxx)* : UMR 7222

École Doctorale de rattachement de l'équipe (future école doctorale de la doctorante ou du doctorant) : **ED391-SMAER**

Doctorantes et doctorants actuellement encadrés par la directrice ou le directeur de thèse (préciser le nombre de doctorantes ou doctorants, leur année de 1e inscription et la quotité d'encadrement) : Nombre: 3,
inscription octobre 2018 - quotié d'encadrement 50%
inscription février 2019 - quotié d'encadrement 70%
inscription octobre 2020 - quotié d'encadrement 20%

Co-encadrante ou co-encadrant :

NOM : **Avellino** Prénom : **Ignacio**
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Unité de Recherche :
Intitulé : ISIR - Institut des Systèmes Intelligents et de Robotique
Code *(ex. UMR xxxx)* : UMR 7222

École Doctorale de rattachement : **ED391-SMAER**
Ou si ED non Alliance SU :

Doctorantes et doctorants actuellement encadrés par la directrice ou le directeur de thèse (préciser le nombre de doctorantes ou doctorants, leur année de 1e inscription et la quotité d'encadrement) : 0

Co-encadrante ou co-encadrant :

NOM : **Canlorbe** Prénom : **Géoffroy**
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Unité de Recherche :
Intitulé :
Code *(ex. UMR xxxx)* : INSERM UMR_S_938

École Doctorale de rattachement : **ED394-Physiologie,Physiopathologie Thérapeutique**
Ou si ED non Alliance SU :

Doctorantes et doctorants actuellement encadrés par la directrice ou le directeur de thèse (préciser le nombre de doctorantes ou doctorants, leur année de 1e inscription et la quotité d'encadrement) :Nombre: 1. inscription 2021 - quotié d'encadrement 50%

Cotutelle internationale : ☒ Non ☐ Oui, précisez Pays et Université :

Selon vous, ce projet est-il susceptible d'intéresser une autre Initiative ou un autre Institut ?
☒ Non ☐ Oui, précisez Choisissez l'institut ou l'initiative :

Description du projet de recherche doctoral *(en français ou en anglais) :*

Ce texte sera diffusé en ligne : il ne doit pas excéder 3 pages et est écrit en interligne simple.

Détailler le contexte, l'objectif scientifique, la justification de l'approche scientifique ainsi que l'adéquation à l'initiative/l'Institut.

Le cas échéant, préciser le rôle de chaque encadrant ainsi que les compétences scientifiques apportées. Indiquer les publications/productions des encadrants en lien avec le projet.
Préciser le profil d'étudiant(e) recherché.

This thesis subject has secured half of its funding from the Labex CAMI (ANR-11-LABX-0004), and thus we ask for half the funding in this though this call.

As a thesis funded by the Labex CAMI, it will be also co-supervised by researchers at the Laboratoire TIMC-IMAG, équipe GMCAO, Université Grenoble-Alpes

Context
Surgery is a fundamental part of illness treatment in healthcare, however, access to specialized surgeons is a pressing concern: the number of surgeons per population is constantly declining (Sheldon et al., 2008), largely because the difficulty of learning surgery results in students dropping out of surgical school (Berman et al., 2008). Having surgeons travel to teach specialized procedures is not cost effective, and as the global COVID-19 pandemic has shown, many times simply not possible. It is thus important to develop technologies through which surgeons can teach surgery remotely. This project studies interactive systems for surgical telementoring from the perspective of the mentee, a surgeon that is guided in real-time while performing surgery by a mentor, a remote expert surgeon.

Project goals
1. Study the surgical mentoring model in a co-located setting (two surgeons side by side) to understand the challenges in collaboration when being guided by a surgeon. This will involve both literature review as well as field studies involving observing and interviewing surgeons.
2. Design interaction mechanisms to support telementoring: mentoring at a distance.
3. Implement these mechanisms, and evaluate them with surgeons

Contributions
Empirical: through empirical studies, this thesis will contribute to the growing literature on the practice of surgical mentoring (Feng et al., 2019; Feng & Mentis, 2018; Mentis et al., 2014, 2016).
Conceptual: through this thesis, we will conceptualize novel interaction mechanisms to support remote collaboration with a remote mentor, while grounded on the constraints of the operating

room, such the need for touchless interaction given the need for sterility (Mentis et al., 2015; O'Hara et al., 2014).
Technological: the implementation of these interaction mechanisms will benefit from a unique opportunity to use the equipment and knowledge of the Labex CAMI, in particular the Surgical Cockpit platform at ISIR and Augmented Endoscopy at TIMIC-IMAG. This includes for example instrument tracking through kinematics (Avellino et al., 2020) or image-based (Zhao et al., 2019) approaches. We encourage the candidate to further explore novel technologies such as Augmented Reality and Virtual Reality (Weibel et al., 2020).

Thesis and Environment
This thesis will be co-supervised in two labs: ISIR, Sorbonne Université and TIMC-IMAG, Université Grenoble Alpes. The student will integrate and work in both labs, spending half of the thesis time in each one, although this is highly flexible especially given the uncertainties of the COVI-19 pandemic.

The PhD candidate will integrate a multi-disciplinary environment that provides a unique and healthy research environment, with many other fellow PhD students working in a wide variety of topics, including: robotics, HCI, machine learning, perception, cognitive science, haptics and social interaction. We strive for providing fertile ground for personal and academic growth through regular team and individual meetings, giving students the chance to explore their own interests and exchange freely with fellow students. The development and the success of our students from bachelor to PhD is our highest priority at both labs. Through regular and personal guidance, we ensure that students lead successful research projects and are prepared for a future academic or industrial job.

Profile
The candidate needs to have a strong academic record in at least one of the following topic areas: Cognitive Science, Human–Computer Interaction (HCI) or Computer Supported Cooperative Work (CSCW). A master in one of the mentioned fields is required. The applicant must have an interest in healthcare and surgery.

References

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Fichier envoyer simultanément par e-mail à l'ED de rattachement et au programme :
cd_instituts_et_initiatives@listes.upmc.fr avant le 20 février.