SpineGuard announces a new partnership with Sorbonne, CNRS and Inserm to associate its DSG® technology with ultrasound and serve surgical robots

PARIS and BOULDER (CO), June 7, 2022 – **18:00 CEST** - **SpineGuard** (FR0011464452 – ALSGD), an innovative company that deploys its DSG (Dynamic Surgical Guidance) sensing technology to secure and streamline the placement of bone implants, announces the launch of a new three-year collaboration program with two labs of Sorbonne University CNRS and Inserm: the ISIR (Institute for intelligent systems and robotics) and LIB (Laboratory for biomedical imaging).

DSG is based on the local measurement of electrical conductivity of tissues in real time without X-ray imaging, with a sensor located at the tip of the drilling instrument. Its efficacy was proven by more than 90,000 surgeries across the globe and 19 scientific publications. SpineGuard has entered in 2017 a collaboration with ISIR for the application of DSG to surgical robots and the enhancement of their safety, accuracy, and autonomy.

SpineGuard and ISIR capitalize on first order outcomes published so far…

At the close of a first collaboration phase, SpineGuard announced sub-millimetric accuracy experimental outcomes in bone boundary detection and automatic stop of a vertebral drilling performed by a robot using the DSG technology. These impressive outcomes were presented as they were produced successively at the Hamlyn medical robotics conference in London in May 2019, receiving the first price for best scientific paper, then in plenary session at the SMISS minimally invasive spine surgery (SMISS) in Las Vegas in November 2021, and lastly during the CRAS conference in Naples in April 2022.

… and join forces with the LIB laboratory in order to add ultrasound to the project.

Encouraged by this success, the research and development teams wish to go even further in surgical robots advancement: the guidance technologies that allow the robot to position itself properly relative to the patient to find the drilling entry point rely today on X-Ray imaging, dangerous for health, in combination with space-consuming optical registration. SpineGuard has long explored the possibility to use ultrasound complementarily to DSG for this preliminary step, before the tool is penetrating bone, and was granted two families of international patents on that topic. The LIB laboratory, who features an international level expertise in the field of ultrasound imaging, answered with enthusiasm the invitation to join the project. SpineGuard, ISIR and LIB thus start a new 3-year collaboration that is expected to produce breakthrough results in the field.

Stéphane Bette, co-founder and Deputy CEO of SpineGuard, said: *"We are happy to launch this partnership that will allow us to go even further in improving surgical robots in orthopedics. This new phase of the project aims at enabling robots to perform bone drilling and cutting, as well as implant placement, in a secured and more autonomous manner in the human skeleton. Our goal is to implement first-class collaboration between French Research and Industry and trigger commercial ventures in the orthopedic field via strategic agreements with industry partners."*

Guillaume Morel, Professor at Sorbonne University and ISIR Director, and Brahim Tamadazte, Researcher at CNRS and member of ISIR, added: *"We are delighted to continue the close and dynamic collaboration initiated in 2017 with SpineGuard. The entry of robotics and associated new technologies in operating room is no doubt one of the biggest medical advances of the last twenty years. Robotic approaches often allow the surgical gesture to be less invasive, more accurate, safe and intuitive in numerous surgical procedures. The first outcomes from the previous collaboration gave us more visibility on the clinical added value that a robot with original and effective sensors can bring to Orthopedic Surgery in general and Spine in particular. This new collaboration will be about ultrasonic sensors coupled with robotics. This original and promising association will allow the surgeon to define the entry point and the pedicle screw trajectory accurately and non-invasively, without relying on ionizing or costly preoperative imaging (scanner, MRI). The association of two prestigious labs of Sorbonne University (ISIR and LIB), whose competencies are highly complementary to SpineGuard's industrial vision constitute a stimulating work environment favorable to innovation. The journey with SpineGuard goes on for three more years with a target of several technologic and scientific innovations to serve patients and care providers."*

Quentin Grimal, Professor at Sorbonne University and Manager of the team "Ultrasound and imaging for bone quality characterization" at LIB, concludes: *"Using ultrasound to position a surgical tool is particularly relevant. Ultrasounds are danger free and provide real time information about interfaces, bone anatomy, even bone mechanical quality. The use of an ultrasound probe should allow to position the robotic arm in an optimal manner to place pedicle screws. In general, echography does not allow to see beyond the bone surfaces because ultrasounds are strongly reflected at the surface and strongly attenuated when propagating in bone. Low amplitude signals coming from inside bone can however be exploited through specific treatments which are a specialty of our team. Our team, pioneer in ultrasound utilization to probe bone, has introduced several approaches that offer an alternative to X-Rays for characterization of trabecular or cortical bone health. For our team, this partnership with SpineGuard and ISIR is a great fit: it will accelerate methodology and instrument developments for a broader utilization of ultrasound in orthopedic surgery. We are very happy to participate in this innovation rich project."*

About SpineGuard®

Founded in 2009 in France and the USA by Pierre Jérôme and Stéphane Bette, SpineGuard is an innovative company deploying its proprietary radiation-free real time sensing technology DSG® (Dynamic Surgical Guidance) to secure and streamline the placement of implants in the skeleton. SpineGuard designs, develops and markets medical devices that have been used in over 90,000 surgical procedures worldwide. Nineteen studies published in peer-reviewed scientific journals have demonstrated the multiple benefits DSG® offers to patients, surgeons, surgical staff and hospitals. Building on these strong fundamentals and several strategic partnerships, SpineGuard has expanded the scope of its DSG® technology in innovative applications such as the « smart » pedicle screw, the DSG Connect visualization and registration interface, dental implantology and surgical robotics. DSG® was co-invented by Maurice Bourlion, Ph.D., Ciaran Bolger, M.D., Ph.D., and Alain Vanquaethem, Biomedical Engineer. SpineGuard has engaged in multiple ESG initiatives.

For further information, visit www.spineguard.com

About ISIR

ISIR is one of the largest French Research institutions in robotics and intelligent systems, reporting mainly to Sorbonne University, CNRS (National Center for Scientific Research) and Inserm (National institute for health and medical research). It regroups more than 50 teaching researchers and permanent researchers and approximately 80 PhD ad post-doc students. ISIR is structured around 6 research teams focused on artificial intelligence and machine learning, mobile robotics, small scale robotics, assistance robotics (physical therapy and mobility support), human-robot interaction and surgical gesture assistance. ISIR has a rich expertise in the design of innovative robotic architectures, simulation and control, clinical validation and transfer of high industrial potential results. Over the last 5 past years, 10 pre-clinical or clinical studies were conducted at ISIR. 8 patents were granted, and 2 start-up companies created.

About LIB

The Laboratory for biomedical imaging (LIB) is specialized in Fundamental and Applied Research for biomedical morphologic imaging methods, functional and molecular on small animal and human. It reports to Sorbonne University, CNRS and INSERM. It regroups 35 permanent researchers and teaching researchers, of whom half are also hospital practitioners, approximately 10 engineers and technicians and more than 30 PhD students and post-docs. LIB is structured around 6 teams whose focuses correspond to key priorities of 21st century Public Health: cancer, cardiovascular and neurologic diseases, bone quality. LIB develops new diagnostic and treatments methods exploiting various modalities: ultrasound, MRI, CT, SPECT-PET, etc. LIB has a strong commitment to technology transfer. Over the last 5 years, 6 patents were granted, 7 software were filed, and 5 startup companies launched.

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