

European grant for Dutch-Swiss consortium developing smart instrumentation to improve eye surgery

Eindhoven, October 15th 2020 – Preceyes BV, Sensoptic SA, Medical AG and the University of Bern have started a H2020 Eurostars project for the advancement of a smart sensorized instrument for retinal surgery. The instrument measures the distance of the instrument tip to the retina in real time. Enhancing Preceyes' robotic platform with this instrument, promises significant performance and safety benefits for retinal surgery [1]. Moreover, the smart instrument will be a source of data for training and evaluation.

Retinal surgeries are performed by a small group of highly specialized ophthalmologists working at the physiologic limits of motion and vision skills. The smart instrument targets to support these surgeons with real-time, micrometer depth perception principles of physical optics. Distance measurements are fed back to the surgeon through means such as audio signals, much like a car's parking sensor. Exploiting the micrometer precision of the robot, the smart instrument empowers the surgeon to comfortably maintain a fixed distance to the retina or to accurately target retinal structures.

In previous clinical work, in collaboration with Rotterdam Eye Hospital, the technical feasibility of the smart instrument concept was validated [2]. During this study, retinal displacements from 10 to 140µm were identified due to heartbeats and breathing. Researchers at the Rigshospitalet in Denmark studied the benefits of the smart instrument concept in a simulated setting [1]. Building upon these results, this projects aims to further develop the capabilities of the smart sensors as well as develop functional surgical instruments. Image analysis based on machine learning will be developed, as well as robot-control software for specific surgical procedures.

The 30-month project, called 'SMART', is funded by Eurostars, with a total budget of 2.4 M€. The application was ranked high on impact and excellence, with a ranking in the top 8% of applications. The main result of the SMART project will be a fully functional clinical investigation device, so that clinical trials can be initiated shortly after completion of the project.

Prof. Marc de Smet MD, CMO of Preceyes, stated: "Smart instrumentation is a significant milestone. It promises to enhance the surgical skills of ophthalmic surgeons at all levels of training and experience. The robot-sensor combination promises to improve the safety, the outcomes and speed of everyday surgical procedures. Analysis of the data generated and stored during surgery will allow us to optimize surgical steps. Micrometer precision which these sensors provide will extend our abilities as surgeons beyond the limitations of our own physiology."

[1] Forslund Jacobsen, M et al. "Robot-assisted vitreoretinal surgery improves surgical accuracy compared with manual surgery: A Randomized Trial in a Simulated Setting." *Retina* (Philadelphia, Pa.), 10.1097/IAE.0000000000002720. 13 Dec. 2019, doi:10.1097/IAE.0000000000002720

[2] Matteo Giuseppe Cereda, m ET AL. "Characterization of OCT imaging from a robot-controlled instrument for vitreo-retina surgery." *Invest. Ophthalmol. Vis. Sci.* 2020;61(7):3713

Further information

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About Preceyes B.V. Preceyes is a medical robotics company focused on ocular surgery. The company develops, builds and commercializes innovative robotic solutions to assist eye surgeons in performing the most demanding surgical tasks. The company's first target is vitreoretinal surgery. The robot supports the surgeon in improving existing surgery and enables the development of new, high-precision treatments. www.preceyes.nl