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TITLE: 3D-image-guided navigation with touchless gesture user interface during minimally invasive head and neck surgery: do we have "biomechanics" of the new era in our personalized contactless hand-gesture non-invasive surgeon-computer interaction?

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ABSTRACT (upto 300 words)

In modern operation rooms, with the innovative application of medical informatics, it is possible to enable many aspects of surgeries that were not able to be addressed before. We started our initial research by applying VR-concepts in our first-Tele-3D-CAS/1998, where we implemented a new framework for the transfer of computer data (images/3D-models) in real-time during the surgery and, in parallel, of the encoded live video signals. We demonstrated this approach with an example of our 3D-computer-assisted-navigation-rhinology/1994, with simulation and planning of the course of a subsequent endoscopic operation per viam VE/VS, which overcomes some difficulties of conventional endoscopies, such as "standard"-FESS or Tele-FESS. In our contactless surgery (CS)-concept (2017-2024), especially based on our latest EU-research "EU-EIT-Health-RIS-Innovation Grant/2020", we were focused: a) on improving the "In the Air" human-computer interaction during surgery in the clinical environment, b) set the problem of navigation through the human body, c) our input modalities for surgeon-computer interaction and motion recognition methods used for controlling the contactless 3D-VE, d) completely new framework for hand and motion detection based on augmented reality, e) we developed a contactless interface for a surgeon to control the visualization options in our DICOM-viewer platform, that uses a stereo camera as a sensor device input that controls hand/finger motions in contactless mode, and

applied it to 3D-VE and 3D-VS, f) our proposal for defining motion parameters in contactless, incisionless surgeries, g) we implemented motion tracking using stereo cameras with depth resolution and precise shutter sensors for depth streaming, h) our CS-provides contactless control with a range up to 2-3 m that definitely enables the application in the OR. However, does our CS really represent the future of smart surgery? Do we really have real technological advances in ENT-surgery in our hands, as the great Professor Heinz Stammberger once said?



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BIOGRAPHY (upto 200 words)

Professor Ivica Klapan has completed his MD at the age of 23, and PHD (Zagreb/Croatia and Pittsburgh at the age of+ 30 years from Zagreb University, Croatia, EU. He is the head of Klapan Medical Group University Polyclinic of Osijek University, Croatia, EU. He has over 160 publications that have been cited over 700 times, and his publication h-index is 27. He has been serving as a member of Collegium Otorhinolaryngologicum Amicitiae Sacrum (CORLAS), American and European Academy of ORL-Head and Neck Surgery, American Society for Laser Medicine and Surgery, European Rhinologic Society, American Telemedicine Association and International Society for Computer Aided Surgery.

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