Abstract 88213

Abstract Preview

ESC CONGRESS 2016

Mr Filippo Brizzi (EUD ID : 720873)
Scuola Superiore Sant'anna
Percro Laboratory
Via Alamanni 13
56010 - Ghezzano, San Giuliano Terme Italy
Email : fi.brizzi@sssup.it

Agreement Form sent on 23/05/2016 06:09
The author agrees to transfer copyright to the ESC.

Title : Preliminary usability assessment for a novel robotic interface for remote Doppler-echocardiography

Topic : 09.17 - Remote patient monitoring and telemedicine

Category : Bedside

Option : No Options

Funding Acknowledgements : ReMeDi European Project

A. Filippeschi[1], F. Brizzi[1], J M. Jacinto[1], E. Ruffaldi[1], C A. Avizzano[1], C. Taddei[2], E M. Pasanisi[2], C. Petersen[2], M. Emdin[2], D. Szczesniak-Stanczyk[3], M. Janowski[3], R. Blaszczyk[3], M. Giuliani[4], G. Stollnberger[4], M. Tscheligi[4] - (1) Sant'Anna School of Advanced Studies, Pisa, Italy (2) Gabriele Monasterio Foundation, Pisa, Italy (3) Medical University of Lublin, Lublin, Poland (4) University of Salzburg, Salzburg, Austria

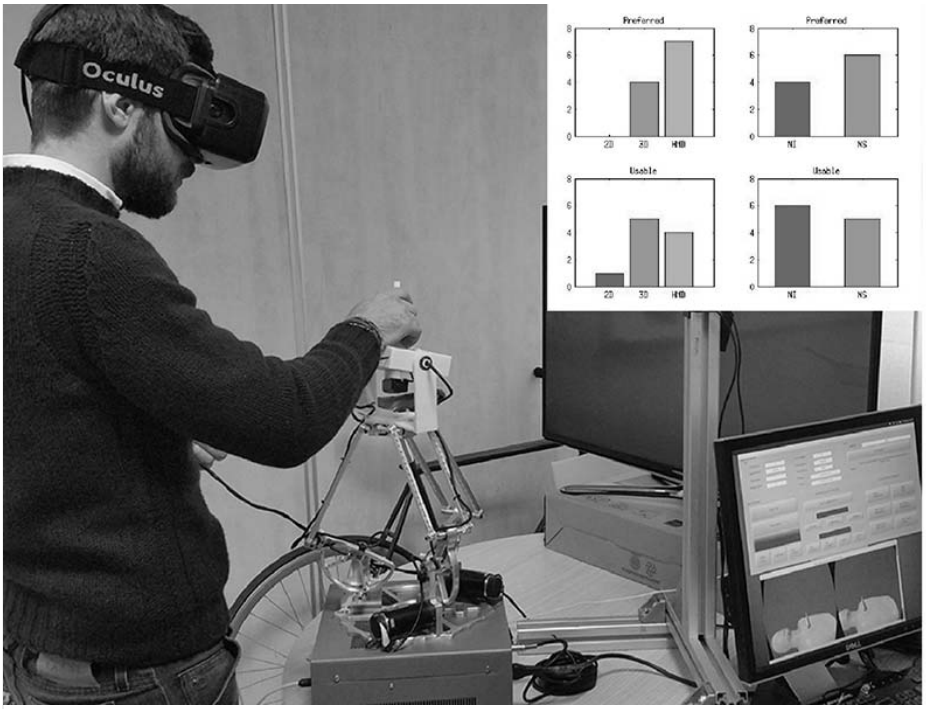
Background: The progressive lack of physicians is leading medicine and robotics researchers to develop systems that allow examinations to be carried out remotely. Echocardiography is one of the most frequent examinations and its remote availability may be crucial for timely and effective diagnosis.

Aim: The ReMeDi project aims at developing a telediagnosis system that allows the doctor to effectively perform ultrasonography remotely. The system is composed of a robot at the patient site that holds the probe and that places and orients the probe on the patient according to the sonographer's commands. At the sonographer site a robotic interface provides the necessary feedback for the examination. This paper shows the preliminary results of the usability study for sonographer's interface. Navigation and force feedback were the main features that we investigated.

Method: Eleven sonographer were asked to carry out two tasks in a Virtual Environment (VE) by using the robotic interface. They interacted with a virtual patient and could perceive his ribs under the skin thanks to the force feedback. They were asked to place the virtual probe on five points placed on the virtual patient. They experienced two navigation modalities, namely indexing (NI) and scaling (NS) used to overcome the difference in workspace between the haptic device (20cm per axis) and the larger patient's thorax. NS consists of a scaling of the device position, while NI provides a way to shift the device virtual workspace by moving on the border of the physical one. The VE was shown either on a LCD screen (in 2D or 3D stereo with glasses) or on a head mounted display (HMD). After each task and at the end of the experiment the sonographers had to answer a questionnaire.

Results: The questionnaires show that the preferred visualization by sonographers was by HMD system with NS modality, although the easier system (patient visualization and probe positioning) was in 3D with NI modality. The effective accuracy of the system was good, the error in the probe positioning was greater for NS system (mean value 0.0165 m) than NI (mean value 0.0076 m). The average error is for all trials about 1 cm, which is a great result considering that is calculated between the center of the probe and the center of the sphere, which has a diameter of 1 cm.

Conclusions: the navigation system is really effective when is used in NI modality and 3D visualization and it is felt as easy to use. Further studies are needed to establish the effectiveness of the interface robot-real patient.



System setup and questionnaries results

QUIT

- ESC Website (http://www.escardio.org)
- Contact us (http://www.escardio.org/pages/contactus.aspx?service=Escol)