PROJECT ID: IST-2001-32516
Funded under: FP5-IST

MOBILE TELE-ECHOGRAPHY USING AN ULTRA-LIGHT ROBOT

From 2001-09-01 to 2004-09-30 | OTELO Website

Project details

<table>
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<tr>
<th>Total cost:</th>
<th>Topic(s):</th>
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<tr>
<td>EUR 3 340 500</td>
<td>IST-2001-1.1.2 - Intelligent collaborative environments supporting continuity of care</td>
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<th>EU contribution:</th>
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<td>EUR 1 811 924</td>
<td>CSC - Cost-sharing contracts</td>
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<td>France</td>
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Objective

The OTELO project proposes the study and development of a fully integrated end-to-end mobile tele-echography system for population groups that are either temporarily or permanently not served locally by medical experts. The main drawback of current ultrasound techniques is that the quality of the examination highly depends on the operator’s specialised skills, which are lacking in most health centres. OTELO is a portable ultrasound probe holder robotic system, associated with new mobile communications technologies that will reproduce the expert’s hand movements during an ultrasound examination. Although being manipulated by non-specialised staff on the remote site, the slave system will bring, in real time, good image quality back to the expert site where force feedback control will be combined with virtual reality for the rendering of the distant environment.

OBJECTIVES

OTELO project proposes the study and development of a fully integrated end-to-end mobile tele-echography system for population groups that are not served locally, either temporarily or permanently, by medical experts. OTELO project offers an alternative to medical centers that lack ultrasound specialists. It is a portable ultrasound probe holder robotic system, associated with new mobile communications technologies that will reproduce the expert’s hand movements during an ultrasound examination. Although being manipulated by non-specialised staff on the remote site, the slave system will bring, in real time, good image quality back to the expert site where force feedback control will be combined with virtual reality for the rendering of the distant environment.

DESCRIPTION OF WORK

After characterisation of the clinical expert’s hand movement, a 6 dof probe holder robot will be designed according to the clinical needs; it will include rotations and linear displacements. Kinematics, dynamics behaviours and control laws will be developed. Force feedback control for a bilateral tele-operation architecture will be defined. Technique of ultrasound images acquisition via frame grabbing will be developed. Images compression techniques will be tested. Two solutions will be proposed depending on the examination phase: fast compression method when expert researches for a specific organ and an accurate compression method (wavelet) during the pre-diagnosis phase. An audio-video conference system will be used for the environmental data transmission. The project foresees three scenarios for data transmission: terrestrial link (ISDN, GPRS.,) mobile communication system from the field of operation with an omni-directional antenna (the 56 Kbps rate will allow clinical data access or images transfer); A fixed dish terminal (up to 384 Kbps operation for full motion video). At the master station, located at the expert centre, an interface with the communication system and image sequences decoder will be developed to allow high quality visualisation of ultrasound images. This interface will integrate: ultrasound images sequences, a view of the examined area provided by a camera and an audio/video conference. A virtual reality environment associated with a fictive probe will be designed: current technologies will be investigated, the most suitable will be selected for the application. Three slave and masters stations will be made. The slave stations, located in secondary hospitals, will integrate the probe-holder robot, current technologies will be investigated, the most suitable will be selected for the application. They
will be used for the technical and clinical validation of the OTELO project.

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Subjects
Information Processing and Information Systems - Life Sciences - Medicine and Health

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