

Medical Tele-diagnosis robot (MTR) - internet based communication & navigation system

Abstract

Medical Tele-diagnosis Robot (MTR) is a cost effective telemedicine mobile robot that provides tele-presence capability for the specialist on a remote location to virtually meet the patient, perform diagnostics and consult the resident doctor regarding the patient via internet. This paper highlights on the development of a doctor-robot interface where the doctor or user can control the robot reliably via regular internet connection from a different location, a distributed secured network for MTR's communication, an audiovisual communication system for tele-diagnosis and a navigation safety system called Danger Monitoring System (DMS) as part of MTR's assistive internet based navigation remote control system. The overall setup and maintenance cost of MTR is reduced by adopting a decentralized network via hybrid P2P technology. With this, the network load is distributed among the users. As for the audiovisual system, the timeliness of the video transmission from the robot to the operator can be attained by CUDA H.264 video encoding to reduce the size of the video stream and by taking advantage of the highly-parallel processors in the graphics processing unit. Combinations of sensors are placed around the robot to provide data on the robot's surrounding during operation. The sensors data are fed into the DMS algorithm which is equipped with fuzzy logic based artificial intelligence system to process the data from all the sensors and user input to decide preventative measures to avoid any danger to humans and the robot in terms of obstacle avoidance and robot tilt angle safety. The overall system is tested by a set of experiments and found to be demonstrating an acceptable performance. This system proved to be suitable to be used in MTR.