

Design and development of communication and control platform for Medical Tele-diagnosis Robot (MTR)

Abstract

Medical emergencies are happening everyday around the world with varying severity ranging from a common road accident to a distress wounded soldier. The absence of a qualified specialist in hospitals especially in developing countries often leads to misdiagnosis which can be fatal or causing further deterioration to the patient's condition. This often solved by incorporating mobile tele-presence robots into hospitals however the exorbitant cost in maintaining and setting up the system has prevented the developing countries from using them. Medical Tele-diagnosis Robot (MTR) is developed to provide a cost efficient alternative for the developing countries. MTR is a mobile medical tele-diagnosis robot which allows physicians to communicate with the patients, virtually present to give direction in a medical procedure, to diagnose patients and to round at the patients' ward. This research has contributed in 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 audio-visual communication system for tele-diagnosis and a medical data management 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. Medical data management system, provides a decentralized data storage and sharing system to reduce network and server cost. The complete system is tested with a series of experiments to observe its performance and behavior.