Research and applications of human bot interaction

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Abstract?

This review paper is describing the research and applications of telerobotic operation and areas covered by it . The advantage of the system and some limitations are well discussed with examples . So , basically this paper will describe the uses of human bot and the possibility in future. And the problems faced

Keywords: human − bot interfacing , telerobotic system , virtual environment , sensors / transducers roles.

Introduction

Teleoperation literally means "operation from a distance", whereby the human operator is physically separated from the location where the work is to be done.

Since the time when the robot word was first introduced from that time technical society starts questioning regarding the impact of the robots in this world such as will these robots kill humans or they will rule this world and will make humans their slaves . But nowadays robots are being everywhere in our life they are performing all those task which are not convenient to humans for making the task easier and performing the task in less time and with safety . Their demands are increasing continuously in various areas like in wars , space exploration, industries etc. A new term TELEROBOTIC OPERATION is introduced in robotic world which is related to the interaction of bot with human . Interfacing / communication the only aspect by which any living being or any other thing share information with other living beings or thing. It is the property of all the bodies present in this universe to interact and share their data with other bodies as in today′s world humans are interacting with everything around it for making every work easier and to be completed in less time. In this scenario the sensor and transducer attached to the bot can help to share the data and give feedback of the environment in which it is present.

Literature review

Robot as a virtual human . As meant by telerobotic system, it is a method by which a human can be present at 2 different places at one time while connected with a robot . This method can be carried out by drawing a connection between a human and a robot or any other electromechanical machine and the connection is done with some special equipments an operator is given some devices which he / she can wear. Those devices are used for the robot to copy the motion of the human . Traditionally different sensing modalities were used for providing the feedback to the operator some modalities are live video imagery , acoustic signals and force reflection and so on . With the help of these methods a human

can be present at two different places at one time like the person is physically present at the places where his body is and mentally present at some other places and all his senses can be present at both places .

R. Oboe, et al. (1997) describe about [1], The efficiency of the communication channels plays a vital role in the quality of a telerobotic system. Recent efforts have been made to control complex robotic devices remotely via the Internet .

Ning Xi And Tj (2000) Tarn have described [2] the major difference between transferring information and performing action via the Internet is that the latter requires action synchronization, which is crucial for the success of execution of the actions. While a human operator or an autonomous controller controls a remote robotic system via the Internet in real time, the synchronization of the human or autonomous controller with the remote robot local controller will affect the stability as well as the dynamic performance of the system. This type of synchronization will be directly related to the properties of the Internet communications.

This operation has large number advantages in variety of fields . This operation cover lot of areas but , the main advantage of this operation is that the application of these manually operated robots which can copy operator′s action is flexible which meant that they don′t require much programming . Therefore , anyone can use these robots any way they want just by performing those typically action This type of operation can also be used in programming of realistic games for instance in game characters they are designed to mimic the moves or action inside the game. They are used in the situation where a human can not do well.

Rice et al. (1986) introduced in their paper that , [3] they found some factors in space teleoperations limiting human integration with the system. Included were the provision of adequate visual feedback from the work sight, the development and selection of control devices, and the effect of communication time delays on performance.

In industries using those traditional robots which are not designed to perform such flexible tasks , they just repeat the same task for which they are created , decrease the efficiency of the work but the robots which can copy the motion of a human operator can do the same task in less time and with high safety and in general all the robots present in the industry are not mobile so , their uses are very limited .

As described by the Vertut et al. (1984) in his research paper that [4], In the nuclear industry it is often necessary to work remotely, since radiation and the risk of contamination often impede hands-on work. Since no equipment for teleoperation existed at the dawn of nuclear industry, this industry had to develop its own equipment almost from scratch.

In wars also using this type of tele operated humanoid robots can help in saving lives as they work the same as humans and the most advantageous situation is that when this bot (which is controlled by an operator from some distance)and a human both can work together at the site to protect lives . These bots will help the soldiers and assist them efficiently because they are controlled by a human operator not any computer program .

This field has the greatest scope of all other fields regarding the telerobotic operation . As the environmental conditions of outer space is not much friendly and reliable for humans to survive there . Therefore , in such situations telerobotic operation is considered very convenient for the space exploration and it also reduces the chance of losing lives but this operation has some disadvantages like astronauts will face some problems of taking data less acurately and have some visual problems .

Bernard J Schorer (1988) describes that [5] And the space station are evolving and reaching to maturity, automation - robotics and intelligent systems must be applied in increasing levels of sophistication to satisfy and these above goals have to applied with cost effectiveness and system safety . Automation, robotics and machine intelligence will be a significant contributor to various experiments, space manufacturing, and crew usage and performance, and consequently, to overall space station productivity .

This concept of virtual human can also be used in the lectures , meetings or some conferencing . As sometimes it is important to be present at somewhere but it is difficult to reach there on time , so , in that case the person can be present there with the help of such bots to fulfil the purpose . It also helps in the situation when the health conditions of the person is not good but it is important to deliver the seminar or to attend such conferences . There can be some other ways like to use methods of videoconferencing and to go through those seminar videos But in those cases the interaction is not efficient as in the former case.

It includes the cases like in emergency situations like in atomic bomb attack / terrorist attack , in the industries where the environment is covered with nuclear radiations and during some fire emergency .

There are some problems come ahead in this system. But the main hurdle is of communication between the operator and the bot . Internet is the only source considered for the exchange of information and feedback but sometimes the response is not transferred at the desired rate . Sometimes the hardware of the bots can not withstand

But at the same time there are some cases where it is convenient to use like in Robonaut teleoperation session (RTS) used by NASA in space exploration .

Sensors / transducer have a vital role as it helps the operator to provide all the details sensed by that bot so that the operator can interact with the environment after getting the information around it

Jan De geetter et. Al. (1999) have talked about interfacing [6]. In Human - bot interfacing is providing the operator with the correct information regarding the process at the right time in the correct format, and in other words , giving the operator the right means to control a process at the right time. Human – bot interfacing is about making a complex process appear simple to the operator. We believe there are two fundamentally different and complementary ways of supporting the operator. Firstly get the operator out of the main control loop In contrast to this, the second way is to keep him in the control loop, but to make the communication channels context-sensitive .The best solution is a combination of both

Conclusion

After reviewing all the facts and figures regarding the telerobotic operation a conclusion can be drawn that the growth of the telerobotic session is slow because of the presence of the lack of communication between the bot and the operator and the problems in the delay of the feedback and lack of visual imagery data . Also This method is very expensive and it is sometimes creates problems like the data may not be achieved at the run time .

Bradely nelson (2001) have described many [7] telerobotic manipulation from within virtual environments, there is an inherent problem in integrating feedback from disparate sensors such as force and vision. This is because the virtual environment rather than the human operator must integrate the feedback, so the virtual environment must have the capability of integrating feedback from various sensors and sensing and modalities

T.J. Tarn. (1997) they have been seen in their paper [8] , through which the problem of time delay can be solved by introducing a new type of clock which is based upon non-time and as an action reference, action reference- non time is based on the event-

based planning and control theory. Yet this methods is very helpful and convenient to use but at the same time its disadvantages can not be ignored .

When the communication and interaction between the two gets improved and become more powerful and less expensive then the application of this system in the future can become more advanced. In future the telerobotic system will be used everywhere like in school , college and   different educational organization . It can be used in workplaces and in companies also

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