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ICOM'08

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Cooperative Robot and User Friendly Robot- New Challenge in Robotics

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ABSTRACT

In the near future many aspect of our life will be encompassed by tasks performing in cooperation with robot. The application of robot in home automation, agriculture production and medical operations etc will indispensable. As a result robot needs to be made human-friendly and to execute tasks in cooperation with human. Researchers proposed many new field of research in Robotics. Cooperative robotics and User friendly robotics are two new area of robotics research. Some researcher is trying to make human like robot. Robots that will be imitate human characteristics in movement, learning etc. Other researchers trying to develop robots which will be entertain human. Another group trying to develop robots and/or control system or robots those will be work cooperatively. In this paper it is tried to gather information regarding these two fields in brief.

1. INTRODUCTION

Human being is the best creature of this universe. In comparison to other creatures, the size and shape of the human body is most favorable in all respect and every movement of the human body is smooth and perfect. From the past, scientists have tried to build mechanism that imitates parts of the human body to perform task for the mankind. Development of robots during the latter half of the twentieth century is its burning example.

Robot is defined as 'any device, which replaces human labor' [1], and up to now most of the robots have been used as industrial robots. These robots have been isolated from human and performed various tasks, which human do not want to do or can not do. The social demand and the technological development of the last decade in robotics, computing and communications have led to envisage the design of robotic and automation systems consisting of networked vehicles, sensors, actuators and communication devices. These developments enable researches and engineers to design new robotic systems that can interact with human beings and other robots in a cooperative and friendly way [2]. These robots should be operated effectively in a human environment i.e., the movements should be smooth, safe and comfortable for the humans use or cooperate with. Control systems for such robots should be designed to work a better context to decipher and imitate the human characteristics.

Human/robot cooperation is an emerging research area in robotics and machine intelligence. A truly intelligent system should be able to work in conjunction with people. However, the key issues are how to define the human and robot functionalities and how to design sensing, planning and control systems such that humans and robots can cooperate in a complementary fashion to perform a task which could be difficult or impossible for a human or a robot working alone. Obviously this could significantly increase the safety, efficiency and effectiveness of robotic operations. In the past the human aspect of machine intelligence in robotics had been focused mainly on human knowledge acquisition and representation [3-6]. Therefore, the research in this area has concentrated on (i) robot programming which deals with the issue of how to pass a human command to a robotic system [7-9]. This process usually happens off-line, i.e. before the task execution. But humans have no real role during a task execution; (ii) teleoperation in which a human operator can pass action commands to a robotic system on-line [10-11]. In a telerobotic system, the human plays the role of a command generator, and the function of a robot is simply to enhance the mechanical power of humans and their ability to work remotely. In the above two cases, the human operator has a deictic role and the robot is a slave system which executes the human program/command received either off-line or on-line. Recently, there is