

Telewheelchair: A Demonstration of the Intelligent Electric Wheelchair System towards Human-Machine

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CCS CONCEPTS

• Human-centered computing → Virtual reality;

KEYWORDS

Telepresence, virtual reality, nursing.

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1 INTRODUCTION

We present demonstration of a telepresence system [Suzuki et al. 2017] that is able to provide care from a remote location by implementing functions such as object recognition on a wheelchair. In conventional remote control method for wheelchair, the operator controls the system while receiving feedback from cameras mounted on the robot [Gundersen et al. 1996]. However, this operating method cannot capture the full environment around the system, even if we use wide FOV cameras, such as omnidirectional cameras. In order to utilize the telepresence system safely, it is necessary to solve the problem of the blind spot of the user. Further, human operators are limited by their attention span. The reaction time of the computer is greater than that of humans.

Telewheelchair is a telepresence system for an electric wheelchair. It uses the control by the head mounted display (HMD), human recognition by YOLO, and environment recognition by SLAM. This system allows the detection of the condition around the wheelchair and the presence of pedestrians close to the wheelchair. It is also possible for the remote operator to communicate with the person(s) near the wheelchair via a camera, microphone, and speaker mounted on it.

* Three joint first authorship.

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Figure 1: Demonstration in the nursing home for the aged.

2 DEMONSTRATION

The user can experience the Telewheelchair as a caregiver or a care recipient (Figure 1). The user of caregiver side wears the HMD and operates the wheelchair based on the omnidirectional image from the remote wheelchair. The user of care recipient side ride on the wheelchair. The wheelchair is operated by the user of caregiver side. At the same time, the user of care recipient side can also operate the wheelchair himself. Whether remote control or direct operation, the wheelchair automatically stops when an obstacle such as a person or a wall is detected in front of the wheelchair by YOLO or SLAM.

We demonstrate the Telewheelchair running in a wide space. Obstacles such as walls and mannequins are placed in the demo space. The user on the side of the care recipient remotely controls the wheelchair while avoiding obstacles. Our demo can be experienced safely because the wheelchair automatically stops due to obstacle detection even if the operator can not avoid obstacles. The presenter is always near the wheelchair and the presenter makes an emergency stop when the wheelchair becomes uncontrollable.

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