Gaze Controlled Telepresence System
(SB6-14)

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Introduction
Telepresence system is developed to help users feel present in a remote environment. By various control methods and interface designs, users will be able to naturally see, walk, talk, even manipulate objects remotely through a remote telepresence robot. In this project, we implemented a new system integrating gaze control strategy with conventional manual control, which enables the remote robot to walk and look around simultaneously. By this system, users can stay at home, controlling a robot in the office to move and see around simply by pressing a keyboard and looking at different positions on the screen.

Our Goals
- Smooth Gaze Control: Users feel intuitive enough when controlling the remote eyes
- Middleware Control: Integrating gaze control with manual control
- Remote Control: Users set up the connection without geographic distance limitations
- Real-time Scene: Transmitting the video stream with shortest delay

Potential Applications
- Smart home robot with gaze control
- Tele-manipulation system for surgery
- Telepresence system for disabled individuals
- Tele-conference system for organizations

Methodology

Implementation

Camera Control Strategy: After obtaining the real-time gaze location, we clamp the coordinates inside the screen and locate its control region. It is used to determine the rotation offset of the remote eyes and command sending.

Command Coding: Three types of commands are encoded and multiplexed. They are gaze control, robot movement, and lock command. We use eyes’ rotation offset calculated and keyboard pressing data to form these commands.

Joint Development: For the overall system, we set up the AnyChat instant messaging channel and customize the servers with clients. Joint development centers on solving the delay and synchronization problems.

Result

Robot Clients
Gazebot robot can be properly controlled to move on different directions. At the same time, the Pan/Tilt Unit mounted on the robot can smoothly rotate while the robot is moving.