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TELEPRESENCE ROBOT USING WSN FOR ACADEMICS

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Abstract - Telepresence robotic is a sophisticated form of robotic remote control in which a human operator has a sense of being on location. Telepresence system that mainly based on 'see and talk' between remote user. Till date an active display robot for telecommunication system which is manually controlled by touch input has been introduced. A mobile telepresence robot is being currently developed for use in surveillance application. We introduce a telepresence robot using WSN to reduce man work in academic. We designing a robotic system to follow the instructions given by the user with the help of DOT-NET as well as interfacing the robot with microcontroller for controlling its operation. We will incorporated the RF module to control the Robotic module.

We are also trying to design an android app for operating the robot. We propose the telepresence communication system, to reduce the distance between user and remote location by providing a particular path, and the path will be followed by robot with the help of human tracking. To make an easy interaction between user and remote location by providing the movable display.

Key Words: Telepresence, Video conferencing, RF Module, Human tracking

I. INTRODUCTION

The planning for a new telepresence robot began in February, 1991. The system consists of two major sections, the "base unit" and the "mobile robot". These are connected via wireless communication systems making the robot entirely self-contained. The base unit consists of a boom-suspended stereoscopic viewer and PC-based control computers. The mobile robot consists of a mobile platform and a slave telepresence Camera system.

Telepresence robot in the remote site is controlled by the user in the master station and is used to facilitate bidirectional interaction including image, voice, and text.

Telepresence refers to a set of technologies which allow a person to feel as if they were present, to give the appearance of being present, or to have an effect, via telerobotics, at a place other than their true location. Telepresence means to give the appearance of being present at remote location other than their true location. The goal of telepresence technology is to replicate face to face communication.

A telepresence robot is a remote-controlled, wheeled device with a display to enable video chat and video conferencing, among other purposes.

In this case, the user position, movements, actions, voice, etc. may be sense transmitted and duplicate in remote location to bring about this effect. Telepresence robot provides notice in the form of audio, video, text, etc. The information may be travelling in both direction between user and remote location.

II. OBJECTIVE

The Robotic module may be effectively used to monitor a coming situation using the wireless webcam mounted on the robot. The robot control can be made voice responsive, thereby making the control of the robot easy.

III. LITERATURE REVIEW

Development of a Telepresence Controlled Ambidextrous Robot for Space Applications

Larry Lil, Brian Cox2, Myron Diftler3, Susan Shelton3

1 NASA Johnson Space Center

2 Hernandez Engineering Inc.

3 Lockheed Martin Engineering and Sciences

4 LinCom

Summary: The resulting system provides a very flexible capability and is used to perform a range of tasks: grasping and handling tools, manipulating electronics controls, manipulating soft flexible material, and performing planetary geology tasks that involve a varify of manipulation and tool-use skills. Using this system an operator is able to complete most of these tasks in less than 2 minutes.

Attractive Telepresence Communication with Movable and Touchable Display Robot

Masa Ogata, Ryo Teramura, Michita Imai, *Keio University*

Summary: We propose an active display robot for tele-communication system combining 3-axis display arm manually controlled by touch input, and automatically controlled by human tracking. This system is designed to present distance change behavior between user and robot by implementing two types of user interaction during communication; 1) Providing robot's movement to follow the user who is far from or going to pass by the display robot; 2) Providing touchable display to activate and manipulate the direction of display during the user is sited in front of display system.

Control and applications of smart projector based tele-presence robot

Dae-Keun Yooni, Shin-Young Kimi, Jai-Hi Choi, Ji-Yong Leei, Jung-Heum Kwoni, Kwang-Kyu Leei, and Bum-Jae Youl, 2I Center of Human-centered Interaction for Coexistence Korea Institute of Science and Technology.

Summary: This symmetric camera-projector module makes the mutual interactions more interactive and broadens feasible communication space out of the monitor. This paper presents some preliminary results and special features of the system that are differentiated from the conventional tele-presence systems.

IV. Block Diagram

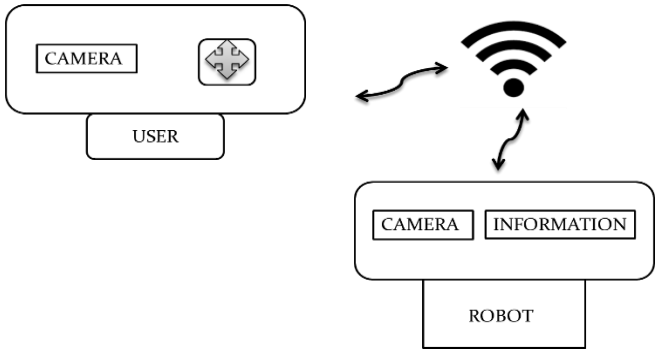


Fig -1: Block diagram for audio,video conversation

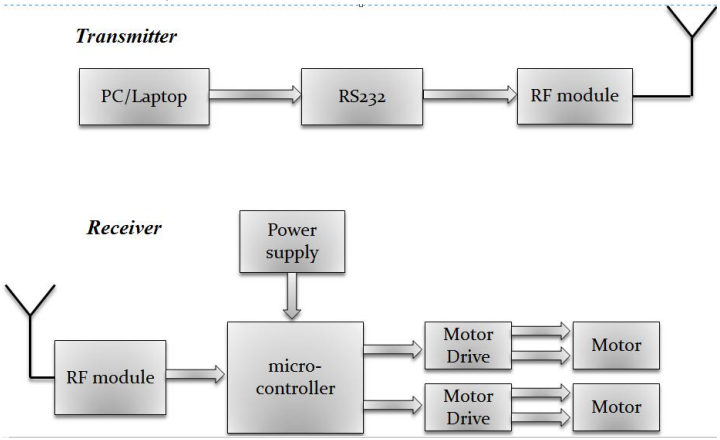
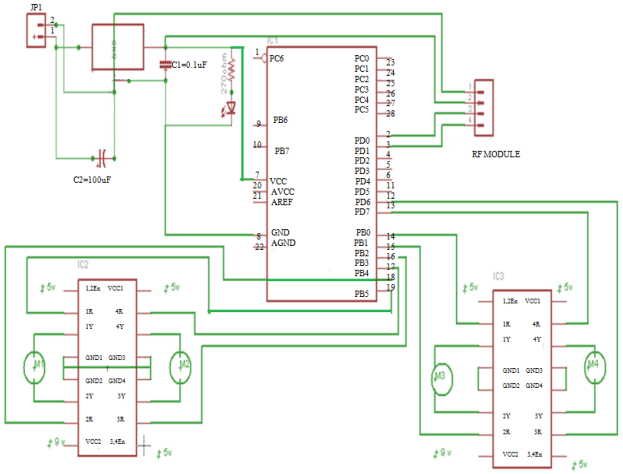


Fig -2: For robot operation

V. CIRCUIT DIAGRAM



VI. HARDWARE DESCRPTION

1. ATmega 8 Microcontroller

It is an 8 bit CMOS built microcontroller from the AVR family (developed by Atmel Corporation in 1996) and is built on the RISC (Reduced Instruction Set Computer)

architecture. Its basic advantage is it dosen't contain any accumulator and the result of any operation can be stored in any register, defined by the instruction.

The Atmel AVR core combines a rich instructions set with 32 general purpose working registers. All the 32 registers are directly connected to the Arithmetic Logic Unit (ALU), allowing two independent registers to be accessed in one single instruction executed in one clock cycle. The resulting architecture is more code efficient while achieving throughputs up to ten times faster than conventional CISC microcontroller.

Pin Descriptions:

VCC: Digital supply voltage.

GND: Ground.

PortB(PB7.....PB0)

XTAL1/XTAL2/TOSC1/TOSC2: Port B is an 8-bit bi-directional I/O port with internal pull-up resistors (selected for each bit). The Port B output buffers have symmetrical drive characteristics with both high sink and source capability. As inputs, Port B pins that are externally pulled low will source current if the pull-up resistors are activated. The Port B pins are tri-stated when a reset condition becomes active, even if the clock is not running.

Depending on the clock selection fuse settings, PB6 can be used as input to the inverting Oscillator amplifier and input to the internal clock operating circuit.

Depending on the clock selection fuse settings, PB7 can be used as output from the inverting Oscillator amplifier. If the Internal Calibrated RC Oscillator is used as chip clock source, PB7..6 is used as TOSC2..1 input for the Asynchronous Timer/Counter2 if the AS2 bit in ASSR is set.

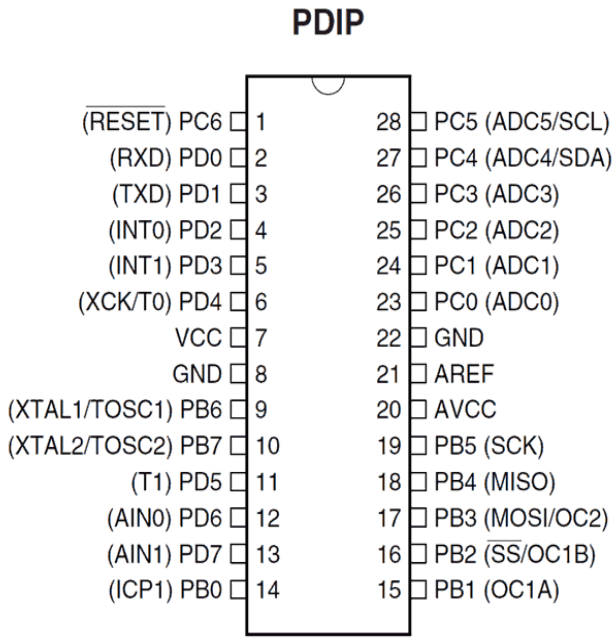


Fig. : ATmega8 Microcontroller

Port C (PC5…..PC0):

Port C is 7-bit bi-directional I/O port with internal pull-up resistors (selected for each bit). The Port C output buffers have symmetrical drive characteristics with both high sink and source capability. As inputs, Port C pins that are externally pulled low will source current if the pull-up resistors are activated. The Port C pins are tri-stated when a reset condition becomes active, even if the clock is not running.

PC6/RESET:

PC6 is used as an I/O pin. Note that the electrical characteristics of PC6 differ from those of the other pins of Port C. If the RSTDISBL Fuse is unprogrammed, PC6 is used as a Reset input. A low level on this pin for longer than the minimum pulse length will generate a Reset, even if the clock is not running.

Port D (PD7. . .PD0):

Port D is an 8-bit bi-directional I/O port with internal pull-up resistors (selected for each bit). The Port D output buffers have symmetrical drive characteristics with both high sink and source capability. As inputs, Port D pins that are externally pulled low will source current if the pull-up resistors are activated. The Port D pins are tri-stated when a reset condition becomes active, even if the clock is not running.

RESET:

Reset input. A low level on this pin for longer than the minimum pulse length will generate a reset, even if the clock is not running. Shorter pulses are not guaranteed to generate a reset.

AVCC:

AVCC is the supply voltage pin for the A/D Converter. It should be externally connected to VCC, even if the ADC is not used. If the ADC is used, it should be connected to VCC through a low-pass filter.

AREF:

AREF is the analog reference pin for the A/D Converter.

2. RF module

An RF module (radio frequency module) is a small electronic device used to transmit and/or receive radio signals between two devices. In an embedded system it is often desirable to communicate with another device wirelessly. This wireless communication may be accomplished through optical communication or through radio frequency communication. For many applications the medium of choice is RF since it does not require line of sight. RF communications incorporates a transmitter and/or receiver.

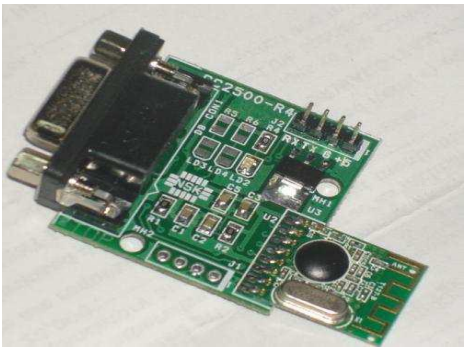


Fig.: RF Module

3. RS232

RS232 is a standard for serial communication transmission of data. It formally defines the signals connecting between a DTE (Data Terminal Equipment) such as a computer terminal, and a DCE (Data circuit-terminating equipment or data communication equipment), such as a modem. The RS232 standard is commonly used in computer serial ports. The standard defines the electrical characteristics and timing of signals, and the physical size and pin-out of connectors.

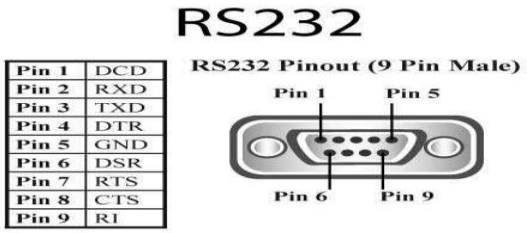


Fig. RS232

4. Motor driver IC

is a typical motor driver IC which allows DC motor to drive on either direction. L293D is a 16-pin IC which can control a set of two DC motors simultaneously in any direction. It means that you can control two DC motors with a single L293D IC. Dual H-bridge Motor Driver integrated circuit.

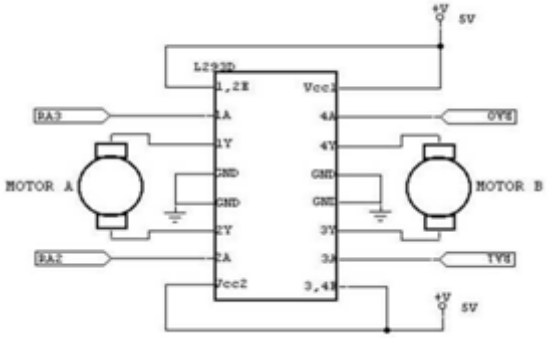


Fig. Motor Driver IC

APPLICATIONS

- Video conferencing
- Education
- Advertising and Sales
- Connecting Communities

ADVANTAGES

- Save time
- Save energy
- Reduce human efforts
- Provide Speed decision making
- Provide two-way interactive video conferencing

- Improve employee productivity

DISADVANTAGES

- Replace normal (face to face) interaction
- Failure over the technology
- Incurs high cost

CONCLUSION

From this project we are introducing a telepresence robot to reduce the human efforts in academics and convey the information from user to remote location by using Wireless Communication System (WSN).

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