Retraction

Retraction: Tele-Presence Robot for Medical Assistance in Hospitals (*J. Phys.: Conf. Ser.* 1916 012096)

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This article (and all articles in the proceedings volume relating to the same conference) has been retracted by IOP Publishing following an extensive investigation in line with the COPE guidelines. This investigation has uncovered evidence of systematic manipulation of the publication process and considerable citation manipulation.

IOP Publishing respectfully requests that readers consider all work within this volume potentially unreliable, as the volume has not been through a credible peer review process.

IOP Publishing regrets that our usual quality checks did not identify these issues before publication, and have since put additional measures in place to try to prevent these issues from reoccurring. IOP Publishing wishes to credit anonymous whistleblowers and the Problematic Paper Screener [1] for bringing some of the above issues to our attention, prompting us to investigate further.

[1] Cabanac G, Labbé C and Magazinov A 2021 arXiv:2107.06751v1

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Tele-Presence Robot for Medical Assistance in Hospitals

V Seethalakshmi 1, V S Kaviyaa Varshani 1, R Madhumitha 1, L. Mukunthan 1, B Pooja Kumari 1
1Department of Electronics and Communication Engineering, KPR Institute of Engineering and Technology, Coimbatore, Tamil Nadu, India.
1seethav@kpriet.ac.in, 17ec078@kpriet.ac.in, 17ec090@kpriet.ac.in, 17ec102@kpriet.ac.in, 17ec116@kpriet.ac.in

Abstract. The visual interactive Tele-presence robot is used to take care of COVID-19 patients remotely in order to avoid the pandemic. This aims to monitor the body temperature, to deliver medicines to the patients as per doctor’s instruction and to disinfect floors and bed in isolation wards without manual intervention. This prototype consists of various parts including raspberry-pi processor, ultrasonic sensor, webcam and tablet. The key idea of this prototype is to perform visual communication through video conferencing with the help tablet computer. The movement of the robot can be controlled by sending commands through computer. As per given command, the robot will move freely in barrier-free environment. However, in the event of a barrier environment, the robot is properly guided by an ultrasonic sensor mounted on the robot. The Raspberry Pi processor is used to keep track of the robotics.

Keywords: body temperature sensing, disinfecting, video conferencing, obstacle detection, medicines, remotely controlled.

1. Introduction
Nurses, physicians, and other healthcare professionals are on the front lines of the COVID-19 battle, and they are at a higher risk of infection. Nurses, physicians, and other healthcare professionals are on the front lines of the COVID-19 battle, and they are at a higher risk of infection [1]. In the COVID-19 outbreak, thousands of doctors and nurses have fallen ill, and hundreds have died. The use of robotic technology and telemedicine to assist in the battle against the COVID-19 outbreak has gotten a lot of coverage. In the sector, more machines and interactive meetings mean fewer one-on-one touch, lowering the risk of infection for healthcare staff [2]. Using robots can also reduce community transmission and Personal Protective Equipment consumption. So a Tele-presence robot is suggested to overcome the above problem. The proposed model, the Tele-presence robot is essentially computer on wheels. Their "faces" are often screens to display data or to serve as a video conduit for a physician to remotely talk with the patients [3]. In the hospital settings, Tele-presence robots move freely and independently. They can help patients at their bedsides, aid in rehab, transport medicines and disinfect rooms. Tele-presence robot video screens can also serve an advanced Skype-like service and a doctor is in remote place, but wants to take a detailed, real-time look at a patient to see if they're physically stronger. The patient can appear on the robot's screen and talk to the doctor so that progress can be evaluated the same way it would be with in-person rounds [4].
2. Literature Survey

TeCaRob: Telecare using telepresence and robotic technology for assisting people with special needs. [5]. This paper examines a novel approach to home care delivery that benefits frail people with special needs. It's an evolution of the Smart House(SH) idea, which is put to the test when PwSN residents need physical assistance.

Telemonitoring Robot for Home Care By [6] Assistive technologies for Telemonitoring in homes constitute a very promising avenue to decrease load on the health care system, reduce hospitalization period and improve quality of life.

Telerehabilitation for fingers and wrist using a hand rehabilitation support system and robot hand [7]. Therapists design recovery services for patients in order to help them regain lost skills. This paper suggests a new telerehabilitation method for the hands.

People's attitudes toward robots are influenced by their society and previous encounters with [8]. A cross-cultural analysis of people's negative attitudes toward robots is presented in this paper.

UVD Robots, Blue Ocean Robotics and Odense University Hospital OUH in partnership with other hospitals in Denmark. This robot is working on a solution to the critical problem of disinfecting hospital rooms and their contents. Instead of sprays and soaps, it kills germs with ultraviolet radiation, according to 2016.

RP-VITA, iRobot corp. and InTouch Health, BEDFORD, Mass, U.S, RP-VITA incorporates autonomous navigation which allow a remote clinician or bedside nurse to send the RP-VITA to a target destination with a single click. It is fitted with the ability to communicate with diagnostic instruments such as otoscopes and ultrasounds, as well as live patient data from the electronic medical record. It comes with the most up-to-date electronic stethoscope from 2012.

3. Existing System

1. Robots for home care delivery benefiting frailty people.
2. Monitoring robots for hospitalization

4. Proposed System

The Tele-presence system is achieved by a tablet computer attached to the front of the Tele-operated robot for efficient visual communication between healthcare staff and patients remotely. The patient’s temperature is checked in real-time using highly-accurate infrared technology. The proposed model employs non-contact efficient temperature screening process using IR Temperature sensor and thereby avoid the usage of protective personal equipment. This sensor senses the temperature of the patient by emitting IR rays.

A Tele-presence robot is fitted with a video conferencing screen (e.g., tablet) mounted on a wheeled base that can be operated from afar, allowing for a more physical virtual presence. Secure visual communication is established via tablet or smart phone between the robot and the patient. Tablet or smart phone can be mounted on the robot easily to enable video calling features.

The robot can be controlled in both manual and autonomous modes. Manual control of the robot can be carried out from a PC or a smartphone [9]. The doctor sitting in his room can monitor and talk to the patients using PC or a smartphone.

This autonomous robot's primary requirement is obstacle detection. Through installed sensors on the robot, the robot obtains information from its surroundings. The ultrasonic sensor is perfect for obstacle detection because it is inexpensive and has a long range Table1.

| Item   | Specification |
|--------|---------------|
| Size   | 117x52x47 cm  |
Weight | 10 kg
---|---
Input | AC 100-40V, 50 Hz
Temperature | 0°C to +35°C
Humidity | 10% to 90%
Battery capacity | 10Ah, 12V
Average battery life | 8 hours

Obstacle avoidance is important. The movements of the robotic vehicle are powered by ultrasonic sensors. The procedure is carried out using a Raspberry Pi. The motors are attached to the Raspberry Pi through the motor driver IC. The ultrasonic sensor is mounted on the robot's front. Whenever the robot follows the desired path, the ultrasonic sensor continuously transmits ultrasonic waves from its sensor head. If an obstacle appears in front of it, ultrasonic waves are reflected from the object and transmitted to the Raspberry Pi. Based on ultrasonic signals, the Raspberry Pi controls the motors on the left, right, back, and front. Pulse width modulation is used to adjust the speed of each motor (PWM). The short and high-frequency signal is emitted by the ultrasonic sensor. These fly at the speed of sound through the air. If they collide with something, they give an echo signal to the sensor. A multivibrator is mounted to the base of the ultrasonic sensor. A multivibrator is a resonator and a vibrator rolled into one. The vibration generates an ultrasonic wave, which is delivered by the resonator. The ultrasonic sensor is made up of two parts: an emitter that emits a 40 kHz sound wave and a detector that detects the sound wave and sends an electrical signal back to the Raspberry Pi. The robot can use the ultrasonic sensor to digitally see and recognize an object, avoid obstacles, and measure distance. The ultrasonic sensor's operating range is 10 cm to 30 cm [10].

When a high-voltage electrical pulse is applied to an ultrasonic transducer, it vibrates around a specific frequency range and creates a burst of sound waves. When an object comes in front of the ultrasonic sensor, the sound waves will reflect in the form of an echo, causing an electric pulse to be produced. It measures the time it takes for sound waves to be transmitted and for an echo to be received. To evaluate the state of the sensed signal, the echo patterns will be compared to sound wave patterns. Its battery is operated with 8 hours battery backup with recharge options. The block diagram is shown as below in Figure 1

![Figure 1. Block Diagram](image-url)

Robot is equipped with powerful motors and can be driven with higher speed with good stability. Robot is equipped with racks to carry objects and medicines which can be delivered to the required patients. Design is sleek and weightless because of that it is easier to carry and troubleshoot. The robot's arms hold a fixed tray in which food items that could be delivered to the designated spot is kept and the equipment is remotely controlled [11]. The medicines are stored in 3 trays. After having visual communication with the patients and measured their temperature, doctor can give medication by
insisting the patient. The disinfecting solenoid mounted near the temperature sensor is used to sanitize the patient’s hands before taking the medicines. Arrangements are made to disinfect floors and bed by spraying sanitizers. The entire structure of the Tele-presence robot is shown in Figure 2 as below.

**Figure 2.** Structure of Robot

### 4.1. Hardware Components

1. **IR Temperature Sensor**

![Image of IR Temperature Sensor]

**Figure 3.** IR Temperature Sensor

A temperature sensor is an electronic system that tracks, monitors, or signals temperature changes by measuring the temperature of its surroundings and translating the input data into electronic data Figure 3. Temperature sensors come in a range of shapes and sizes. Some temperature sensors (contact temperature sensors) involve direct contact with the physical object being measured, while others (indirect temperature sensors) calculate the temperature of an object indirectly (non-contact temperature sensors).

Infrared (IR) sensors are commonly used as non-contact temperature sensors. They detect the IR energy emitted by an object from a distance and send a signal to a calibrated electronic circuit that calculates the temperature of the object.
2. Ultrasonic Sensor

An ultrasonic sensor is an electronic system that uses ultrasonic sound waves to determine the distance between a target object and transforms the reflected sound into an electrical signal. The ultrasonic sensor is shown in Figure 4.

![Ultrasonic Sensor](image)

Figure 4. Ultrasonic Sensor

Ultrasonic sensors operate by emitting a sound wave that is beyond the human hearing range. The sensor's transducer serves as a microphone, receiving and transmitting ultrasonic sound. To transmit a pulse and receive the echo, the ultrasonic sensor, like many others, uses a single transducer. The sensor tests the time between sending and receiving an ultrasonic pulse to calculate the distance to a target. It emits a 40 kHz ultrasonic pulse that passes through the air and bounces back to the sensor if it encounters an obstacle or object. The distance can be determined by multiplying the travel time and the sound speed.

Ultrasonic sensors are an excellent alternative for detecting transparent objects. Because of the target translucence, applications that use infrared sensors, for example, struggle with this use case for liquid level measurement. Ultrasonic sensors detect objects regardless of colour, surface, or substance for presence detection.

3. Raspberry Pi

The Raspberry Pi is a low-cost machine that runs Linux and can be used to perform specific tasks. The Raspberry Pi board is a small and inexpensive computer. A programme memory (RAM), processor and graphics chip, CPU, GPU, Ethernet port, GPIO pins, Xbee socket, UART, power source connector, and various interfaces for other external devices are all included on the Raspberry Pi board. It also necessitates mass storage, which is provided by an SD flash memory card. As a result, the Raspberry Pi board will boot from this SD card in the same way that a PC does from its hard disc figure 5.

![Raspberry Pi](image)

Figure 5. Raspberry Pi

SD card with Linux OS, US keyboard, display, power supply, and video cable are the most significant hardware requirements for the Raspberry Pi board. USB mouse, powered USB hub, case, internet connection, Model A or B: USB Wi-Fi adaptor is used, and internet connection to Model B is via LAN cable are all optional hardware requirements. Linux is the operating system used for all Raspberry Pi devices. Linux is an open-source operating system that connects the hardware and software on a device.
Python is the programming language that Raspberry Pi uses. Python is a general-purpose and high-level programming language that is used to build GUI programs, websites, and web applications. Raspberry Pi boards are used in a range of applications, including video players, arcade machines, tablet computers, home automation, Internet radio, controlling robots, interstellar computers, and coffee, as well as raspberry pi-based ventures.

4. **Stepper Motor Driver**

A stepper motor is a type of motor with very high precision. It uses magnetism introduced by electrical coils to move an inner gear a discrete number of steps. Stepper motors require a driver. There are usually 200 steps per revolution or 1.8 degrees per step (but they also can be “micro-stepped”). In general, you use an H-driver to reverse a DC motor. By designing the inner gear so that it only fits one coil at a time the gear can be rotated a fixed number of steps by energizing the coils in sequence. Model is shown in Figure 6 as below.

![Figure 6. Stepper Motor](image)

The top coil is active which makes the inner gear to move so that it is as close as possible to the gear Figure 7. By continuously changing which coil that is active, the gear can be rotated with a very precise velocity. Because one coil always is activated, the stepper motor will consume electricity even while standing still. However a stepper motor has its maximum torque at low speeds which make them ideal for applications requiring high precision at low speed like a robot moving in walking speed.

![Figure 7. Motor driver](image)

5. **Conclusion**

The findings ensured that the developed robots through telemedicine and robotic technology helps to treat the patients without human intervention. Most robots are working for people in industries, factories, warehouses, laboratories and hospitals. Therefore, it is found that having this Tele-presence robots in hospitals help doctors and nurses to prevent themselves from the contagious diseases. Because robots can do jobs better and faster than humans can, and thus they reduce the spread of diseases. This can be used as a substitute for doctors on the daily basis. However, the development of new technologies is essential and is needed effectively due to this pandemic situation.

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