

Nursing Robot Using Arduino

Jayesh Waghmare, Shashikumar Ram, Suraj Patil, Rohan Nikam

Smt.Indira Gandhi College of Engineering, Navi Mumbai, Maharashtra

Abstract - A nursing robot project can provide a unique learning opportunity for individuals interested in robotics, healthcare, and assistive technology. Through working on such a project, individuals can develop technical skills related to robotics and programming, as well as gain an understanding of healthcare needs and patient care.

Working on a nursing robot project can involve a range of tasks, from designing and building the robot hardware to programming the software and testing the robot in a simulated or real-world environment. As individuals work on these tasks, they will gain technical skills such as programming languages, control systems, and sensor integration.

However, the learning experience of a nursing robot project goes beyond technical skills. Individuals will also gain an understanding of healthcare needs and patient care through working with healthcare professionals and observing patient interactions. This understanding can inform the design and functionality of the robot, ensuring that it meets the needs of patients and healthcare professionals.

KEYWORDS: Nursing Robot, Ultrasonic Sensor, Healthcare, Arduino, ESP32cam

INTRODUCTION

Nowadays, on 11 March 2020, WHO declared the novel coronavirus disease (COVID-19) outbreak as a pandemic and reiterated the call for countries to take immediate action and scale up their response to treat, detect and reduce transmission to save people's lives. As per what we saw back a few months of lockdown in our country 10.5 M cases are detected and 151K peoples are dead. And many places in India doctors can't attempt the patient. That's why we created this trolley, this trolley is working like a nurse. Nurse trolleys follow all commands of the instructor are get and no more people can be affected by this disease and we maintain social distancing. Is controlled by using an Android mobile phone instead of any other method like buttons, gestures, etc. Here only needs to touch the button on an Android phone to control the car in forward, backward, left, and

right directions. So here android phone is used as a transmitting device and a Bluetooth module placed in a car is used as a receiver. Android phones will transmit commands using their in-built Bluetooth to the car so that it can move in the required direction like moving forward, reverse, turning left, turning right, and stop. It has the capability of avoiding the obstacles in Its path. Initially, its movement is by dc motor, controlled Arduino board. It moves normally forward if any obstacles come within 30 cm it will stop and measure the distance by rotating the servomotor and it compares the distance which is far whether right or left it moves towards where there are no obstacles for a long distance.

A nursing robot utilizing Arduino technology is a cutting-edge innovation in the field of healthcare. This advanced technology allows for the creation of robots that can assist nurses in providing care to patients. By utilizing Arduino, these robots can be programmed to perform a variety of tasks, such as monitoring vital signs, administering medication, and even providing emotional support to patients.

LITERATURE SURVEY

The use of nursing robots has become increasingly popular in recent years, to improve patient care and reduce the workload of healthcare professionals. One such technology that has gained attention is the nursing robot utilizing Arduino.

This literature review aims to explore the current state of research on nursing robots utilizing Arduino technology. The review will examine the benefits and limitations of this technology, as well as the challenges that must be addressed for successful implementation.

Through a comprehensive analysis of existing literature, this review will provide valuable insights into the potential of nursing robots utilizing Arduino technology to revolutionize the healthcare industry. It will also highlight the need for further research and development

in this field to ensure the safe and effective use of these robots in clinical settings.

Overall, this literature review serves as a valuable resource for healthcare professionals, researchers, and developers interested in the use of nursing robots utilizing Arduino technology.

The project is to support nursing staff and improve patient care in healthcare settings. Several research studies have investigated the use of nursing robots in healthcare and their potential benefits. For example, a study published in the Journal of Healthcare Engineering examined the use of a nursing robot equipped with Arduino microcontroller boards for medication management. The authors found that the robot was effective in dispensing medication and reducing medication errors, leading to improved patient outcomes. Another study published in the Journal of Medical Systems investigated the use of a nursing robot for patient lifting and transfer tasks. The researchers found that the robot was effective in reducing the workload on nursing staff and improving patient comfort and safety. Customizability is another objective of nursing robots using Arduino. A study published in the Journal of Medical and Biological Engineering investigated the use of a customized nursing robot for patient monitoring and care in a hospital setting. The authors found that the robot was effective in providing personalized care and improving patient outcomes. Cost-effectiveness is also an objective of nursing robots using Arduino. A study published in the Journal of Healthcare Engineering investigated the cost-effectiveness of a nursing robot for medication management in a hospital setting. The authors found that the robot was more cost-effective than traditional medication management methods, such as manual dispensing. Overall, the literature survey reveals that the primary objective of nursing robots using Arduino is to provide additional support to nursing staff and improve patient care in healthcare settings. These projects aim to automate routine tasks, provide assistance with patient care, customize to meet the specific needs of different healthcare settings, and provide a cost-effective solution to the challenges of patient care in healthcare institutions. A humanized design is essential because the nursing robot is a service robot with humans as its primary service targets and operators. The nursing robot can be controlled by voice recognition or gesture manipulation when the patient's activity is inconvenient. The cameras on the nursing automaton enable remote patient surveillance, bridging the gap between patients and caregivers. Using

the principle of humanization, nursing robots can become more effective at assisting patients and caregivers. A humanized design is essential because the nursing robot is a service robot with humans as its primary service targets and operators. The nursing robot can be controlled by voice recognition or gesture manipulation when the patient's activity is inconvenient. The cameras on the nursing automaton enable remote patient surveillance, bridging the gap between patients and caregivers. Using the principle of humanization, nursing robots can become more effective at assisting patients and caregivers. As the field of healthcare continues to evolve, the use of nursing robots has become increasingly prevalent. These robots are designed to assist healthcare professionals in providing high-quality care to patients. In this literature survey, we will explore the various types of nursing robots, their capabilities, and their impact on the healthcare industry.

Firstly, it is important to understand the different types of nursing robots. Some robots are designed to assist with patient care, such as lifting and transferring patients, and robots are designed to perform tasks such as medication dispensing and vital sign monitoring. Additionally, some robots are designed to provide emotional support to patients, such as robotic pets and companions.

Block Diagram

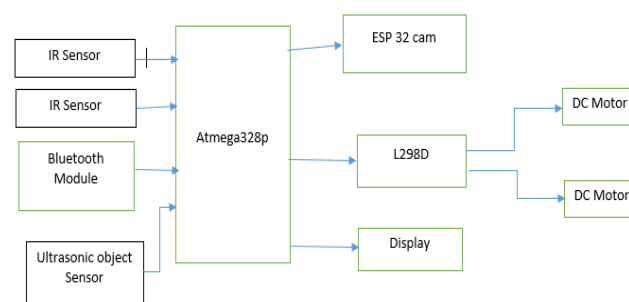


Fig1

In this block diagram, the Arduino microcontroller serves as the central processing unit that communicates with the various sensors and motor control board. The sensors can include IR or ultrasound sensors that allow the robot to detect and avoid obstacles, as well as other sensors such as temperature, humidity, and pressure sensors. The motor control board is responsible for controlling the robot's motors, which are used for movement and other tasks such as medication dispensing. A commonly used motor control board for Arduino-based robots is the L298N. The power management board regulates the power supply to the various components of the robot

overall, this block diagram shows the various components that are needed to build a nursing robot using Arduino and how they are connected to enable the robot to perform various tasks. Arduino UNO is used for the control circuits of the automaton. Forward, left, and right portions of the robot each have a fire sensor that communicates with the control electronics. ESP32-CAM module and perform tasks such as capturing images or streaming video using commands sent over the serial connection from the Arduino board. You can also use the ESP32-CAM's built-in Wi-Fi capability to send captured images or video to a remote server for further processing or storage. Using a Bluetooth module, such as HC-05, can enable wireless communication between the nursing robot and a remote device such as a smartphone or tablet. Here are the steps to use a Bluetooth module in a nursing robot using Arduino with this setup, you can control the nursing robot using a remote device and perform tasks such as movement, medication dispensing, and patient monitoring.

Circuit Diagram

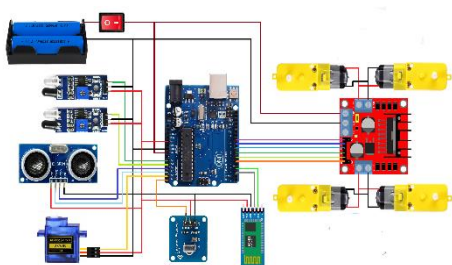


Fig2

Working

This technology allows for precise detection and avoidance of obstacles in real time, enhancing safety and efficiency in various applications. This revised title is more professional and conveys the purpose of the project. It also uses proper grammar and spelling. To make the writing more interesting, additional details about the project could be included, such as the specific sensors and algorithms used for obstacle avoidance, the purpose of the wireless connectivity, and any challenges or unique features of the project. Additionally, the writing could be made more understandable by providing context and background information for readers who may not be familiar with Uno microcontrollers or robotics. The circuit's functionality is straightforward. The infrared (IR) sensors that detect flames are connected to the controller's analog input pins as a voltage divider. The sensor's resistance changes when it is exposed to light from the flames. As the resistance of

the IR receiver changes, the analog voltage swings from ground to VCC. The built-in ADC channel of the controller reads the analog voltage from the analog input pin and converts it to a digital value. Because each Arduino UNO ADC channel is 10 bits wide, the digitized reading can range from 1023 to +1023. The sensors are programmed to detect flames at a distance of one meter. The code adjusts the threshold to an appropriate measurement relative to the calibration point. The identical calibration is applied to all three sensors.

Bluetooth Interface

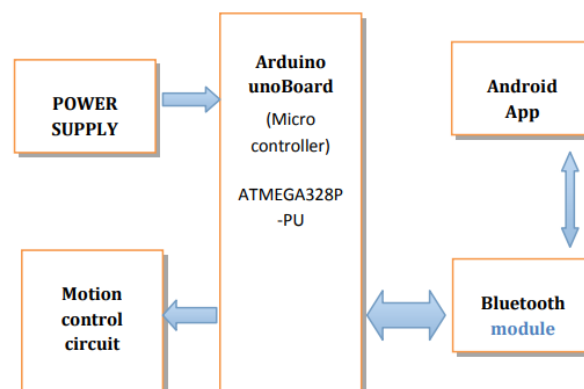


Fig3

As shown in A Block Diagram of the New System, A robot can be controlled with an Android phone and a Bluetooth module HC-05 that is linked to an ATMEGA328P-PU microprocessor. The main working unit of a machine is a microcontroller. The Bluetooth module and the DC motors are both linked to the microcontroller. The information sent by the Android phone through the Bluetooth module is used to tell the driver what to do. The driver makes changes to the DC engine as needed. With the help of an Android phone, the robot can move in any direction. On the robot device, LED lights show which way the robot is going. Embedded C languages are used to make the software that is then put into the driver to do the job. Android phone device that works with Bluetooth

Bluetooth Module VCC 5V	Arduino Uno
VCC	5V
GND	GND
TXD	RX(pin0)
RXD	TX(Pin1)

SOFTWARE IMPLEMENT MIT App Inventor (to build GUI for Android application) App Inventor for Android is a Google-provided, open-source web application that is now maintained by the Massachusetts Institute of Technology (MIT). It permits a computer program to develop Android operating system (OS) software applications. MIT App Inventor is an innovative introduction for beginners to programming and app development that simplifies the language of text-based coding into visual, drag-and-drop building blocks.

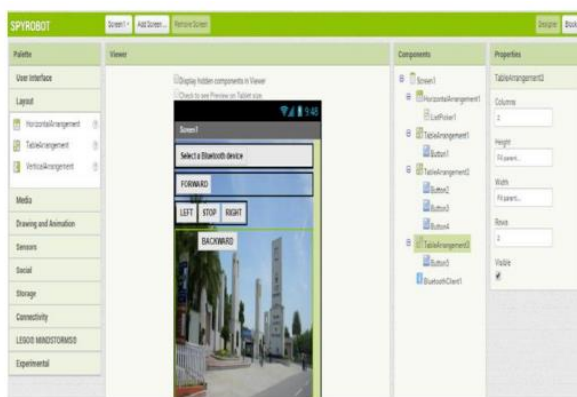


Fig4

An emulator or Android phone

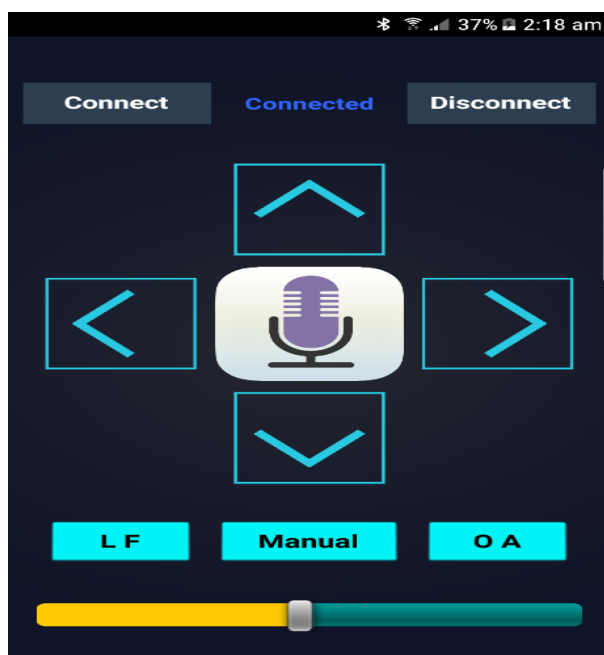


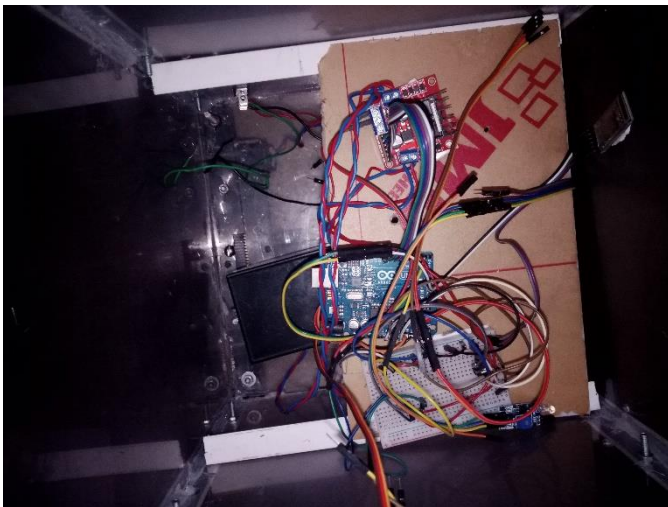
Fig5

Testing the application as a whole is the very last step in the design process. Consequently, for those individuals who do not have access to an Android phone. Users are given the ability to run their applications on a simulator that has many of the same features as their actual device, although with certain restrictions, when they utilize App Inventor. The functionality of the app may be tested in a real-world setting right from the Blocks Editor by connecting it to the emulator with the connect option. This allows for the testing to take place in the virtual environment. The user is able to avoid using the emulator and test the software directly if they connect their real Android smartphone to their personal computer (PC) through a USB connection. Putting an application through its pace in real time is the most effective approach to evaluate the quality of its functionality.

Future Scope

The field of healthcare is continuously undergoing change due to the ongoing development of new technologies. The utilization of nursing robots is one area that has experienced substantial expansion in recent years. These robots are intended to help medical personnel when they are delivering treatment to patients, and the range of uses for them is quite broad. The potential applications of nursing robots in the future are quite encouraging. They have applications in a wide variety of settings, from hospitals and nursing homes to in-home care and even care provided in the patient's own house. These robots can do a variety of jobs, from tracking vital signs to dispensing medication, among other things. They are also able to help with movement, guiding patients from one location to another as needed. The capacity of nursing robots to lessen the amount of labor required by healthcare personnel is one of the most significant advantages offered by these machines. Nursing robots have the potential to ease the workload of nurses and other healthcare professionals, which is especially important given the growing demand for healthcare services. In turn, this can enhance the results for patients and lower the risk of burnout among those working in the healthcare industry.

Result



The purpose of the project was to make use of current technology to carry out the automation of a variety of various equipment. The application of the Internet of Things idea simplifies the entire procedure. Some degrees of functionality, such as making phone calls and sending messages, as well as photographing and recording video, are already incorporated into this system. The benefits that have already been stated, such as assisting physicians and providing assistance in hospitals. As a result, it is clear that there is a demand for nursing robots in today's society. Bluetooth is used to transmit the data from the Internet of Things to the client. Therefore, it is possible to turn on or turn off any appliance or gadget at any moment. Access to a device through its IP address is made possible via a web server, which can be installed on any other device. The requirement for a physical remote can be reduced by utilizing a web server to create a virtual remote control.

Conclusion

The prior discussion makes it abundantly evident that the utilization of a Nursing Robot is regarded as a significant multi-functional vital signs measurement that will assist hospital nurses in doing frequent checks on new patients. The technology that was decided upon will be put into place in the waiting area for patients at the hospital so that there may be a conversation between the patient and NR. The primary reason for this is because non-invasive respiratory monitoring (NR) is generally regarded as a relatively safe method for measuring the vital signs of a patient by making measurements based on electronic sensors that are directly attached to the patient's body. As

a result, Nursing Robot will contribute to the delivery of improved services to both the hospital and its patients. In order to provide a solid foundation for this endeavor, we designed a survey with the intention of collecting responses from individuals on nursing robots. The poll is based on a number of questions that help us determine whether or not users can benefit from Nursing Robots, whether or not they have had past experience with this type of nursing robot, and whether or not they are comfortable utilizing the functions of Nursing Robots.

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