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Meher (Medical Help Robo)

Project Guide
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Abstract:-
The main objective of this project is tofabricate a robotic trolley for material handling inindustries. In this project a robotic vehicle is fabricated
which runs like a car by carrying necessary tools from one place toanother. The motor is connected with the wheel.When the trolley is loaded with a tool or some other goodsit can be easily move to the place as per need by means ofwireless remote controller .It can be used in industries,
hospitals etc. This paper describes the evolving role of robotics in healthcare and allied areas with special concerns relating to the management and control of the spread of the viral or contagious diseases. The prime utilization of such robots is to minimize person-to-person contact and to ensure cleaning, sterilization and support in hospitals and similar facilities such as quarantine. This will result in minimizing the life threat to medical staff and doctors taking an active role in the management of such diseases. The intention of the present research is to highlight the importance of medical robotics in general and then to connect its utilization with the perspective of viral disease management so that the hospital management can direct themselves to maximize the use of medical robots for various medical procedures. This is despite the popularity of telemedicine, which is also effective in similar situations.

I. INTRODUCTION

This project aims to protect the people again the spread of disease from the affected person. The case history provided the information that the people who work close to the affected patients also affected by the disease. Many doctors, nurses, etc, were already affected by infectious diseases and some lead to death. To prevent this, autonomous robots are aimed to assist the affected people . The developed robots assist the patient by providing food, medicine, needy items to them based on the requirement. Also they will monitor the health status and report it to the doctors for the action to be taken regarding this.

The aim of this article is to propose some of the most important capabilities and technical achievements of medical and health-care robotics needed to improve human health and well-being. The paper describes application areas, societal drivers, motivating scenarios, desired system capabilities, and fundamental research areas that should be considered in the design of medical and health-care robots.Effective material handling is the most important.

II. LITERATURE REVIEW

The robotic trolley will deliver food and medicines to patients at Poddar Hospital.

From recent pandemic situation one of this research is done and it is launched on 6 july 2020 by brihanmumbai municipal corporation , referenced for The Hindu news paper.

The Brihanmumbai Municipal Corporation (BMC) on Monday launched a robotic trolley to reduce contact between health care workers and COVID-19 patients.

The robotic trolley will deliver food and medicines to patients at Poddar Hospital. Aaditya Thackeray, State's Minister for Tourism and Environment, announced the launch of this robotic trolley on Twitter. He said apart from reducing contact between patients and health care staff, the trolley will also help further reduce the quantity of PPEs used during activities such as food distribution in Covid wards.

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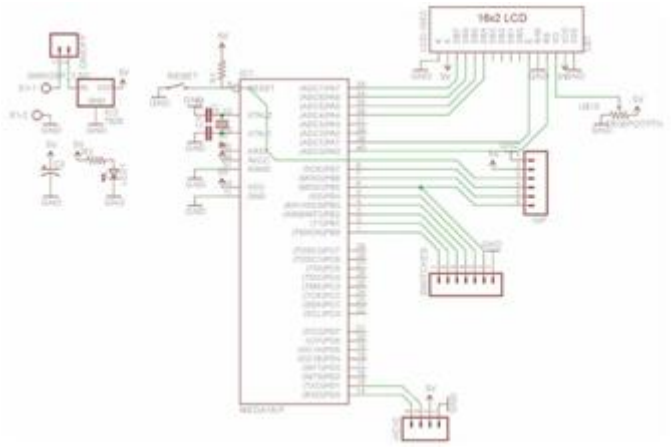
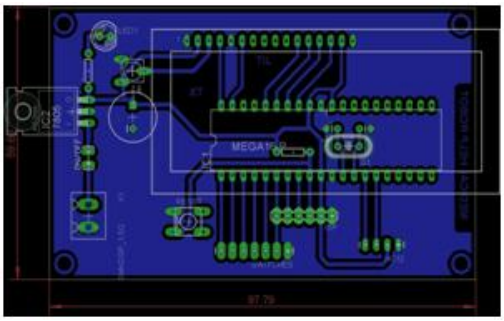
III. DESIGN

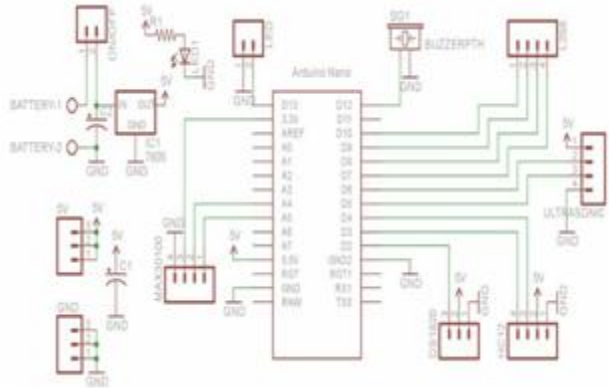
1) Remote schematic



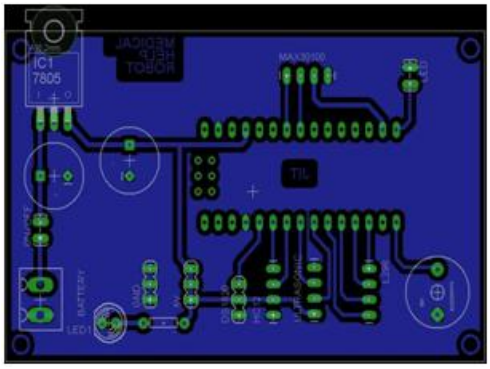
2) Remote layout



3) Trolley schematic



4) Trolley layout



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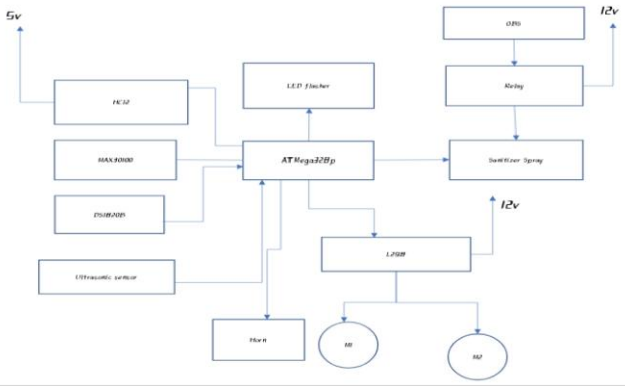
IV. BLOCK DIAGRAM



V. SOFTWARE DETAIL

CADSOFT EAGLE V7.1

CadSoft EAGLE offers user-friendly, flexible and affordable solutions for PCB design, as well as introducing a new XML database structure that you can easily import or export data files to and from other CAD programs. Three modules embedded in a single user interface: Schematic Capture, Board Layout and Autorouter.

It is award-winning software that has a user-friendly interface and is affordable for many designers.It contains a schematic editor that is useful for the construction of circuit diagrams.The software can run on anything including windows and mac.It comes with both freeware and a low-cost ware that can design any PCB.It allows up to 999 sheets to support complex designs that most designers may love to use.Allows for the arrangement of sheets by the drag and drop method.It is an easy to use tool with complex functions for all types of designers.

ATMEL STUDIO v7.0

Atmel Studio is an integrated development platform for Atmel AVR and ARM microcontrollers. You can easily get started by exploring the included example projects and run your solution on a starter or evaluation kit. The refactor and intellisense features in the editor make editing easier.The Atmel Studio 7 IDP gives you a seamless and easy-to-use environment to write, build, and debug your applications written in C/C++ or assembly code. It also connects seamlessly to the debuggers, programmers, and development kits that support AVR and SAM devices.06-Aug-2017.

ARDUINO IDE 1.8.5

The Arduino Integrated Development Environment (IDE) is a cross-platform application (for Windows, macOS, Linux) that is written in functions from C and C++. It is used to write and upload programs to Arduino compatible boards, but also, with the help of third-party cores, other vendor development boards.The Arduino Integrated Development Environment - the piece of software you use to program your Arduino - is written in Java.

VI. COMPONANTS

1) Arduino Nano

Arduino Nano is a microcontroller board. The microcontroller used in the Arduino Nano is Atmega328, the same one as used in Arduino UNO. It has a wide range of applications and is a major microcontroller board because of its small size and flexibility.

Basic Features of Arduino Nano

Here are few of its basic features which you must know if you are thinking to work on this great microcontroller board:

- It has 22 input/output pins in total.
- 14 of these pins are digital pins.
- Arduino Nano has 8 analogue pins.
- It has 6 PWM pins among the digital pins.
- It has a crystal oscillator of 16MHz.

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- It's operating voltage varies from 5V to 12V.
- It also supports different ways of communication, which are:
    - Serial Protocol.
    - I2C Protocol.
    - SPI Protocol.
- It also has a mini USB Pin which is used to upload code.
- It also has a Reset button on it.

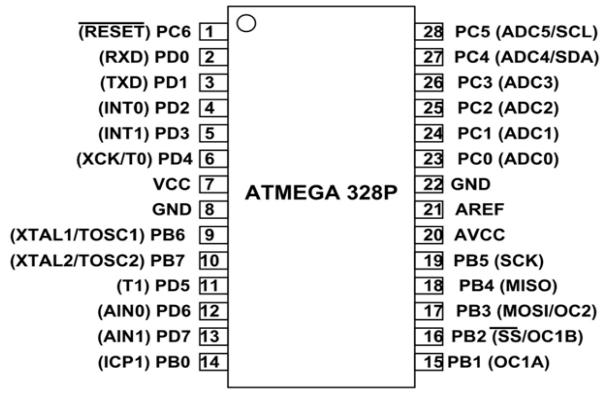
1) Applications of Arduino Nano

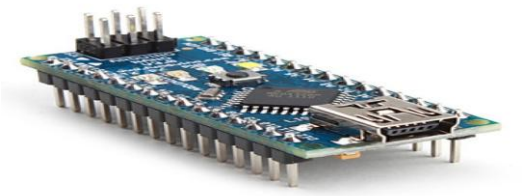
Here are few of its application but it has an extensive range which we can't discuss here. So here's the tip of the iceberg:

- Automation.
- Robotics.
- Control Systems.
- Embedded Computer.
- Instrumentation.

2)MicrocontrollerATMEGA328P :

ATMEGA328P is high performance, low power controller from Microchip. ATMEGA328P is an 8-bit microcontroller based on AVR RISC architecture. It is the most popular of all AVR controllers as it is used in ARDUINO . An ultrasonic sensor is an electronic device that measures the distance of a target object by emitting ultrasonic sound waves, and converts the reflected sound into an electrical signal. Ultrasonic waves travel faster than the speed of audible sound (i.e. the sound that humans can hear). Ultrasonic sensors have two main components: the transmitter (which emits the sound using piezoelectric crystals) and the receiver (which encounters the sound after it has travelled to and from the target).

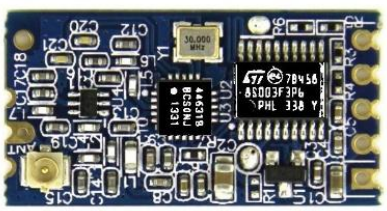




3)HC-12 TX/RX module

The HC-12 is a half-duplex 20 dBm (100 mW) transmitter paired with areceiver that has -117 dBm (2×10-15 W) sensitivity at 5000 bps.

Paired with an external antenna, these transceivers are capable of communicating up to and possibly slightly beyond 1 km in the open and are more than adequate for providing coverage throughout a typical house.



The HC-12 circuit board is built around the STM8S003F3 microcontroller and the Si4463 transceiver.

The HC-12 is a half-duplex wireless serial communication module with 100 channels in the 433.4-473.0 MHz range that is capable of transmitting up to 1 km. This project will begin by using the HC-12 to create a wireless link between two computers and end

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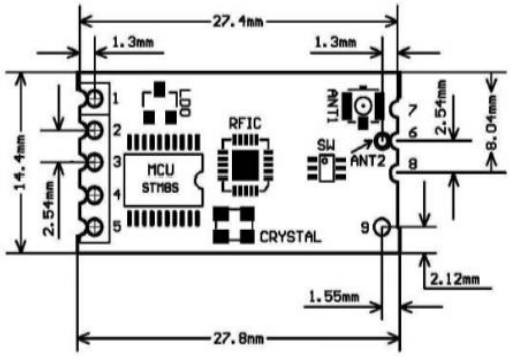
with a second article that creates a simple wireless GPS tracker.MAX 30100 :



4)L298Motor Driver:

L298 is a high voltage and high current motor drive chip which receives TTL logic signals.
They are mostly used when
It is needed to operate different loads like motors and solenoid etc where an H-Bridge is required.
High power motor driver is required.
Control unit can only provide TTL outputs.
Current control and PWM operable single-chip device are needed.
It has two enable inputs to enable or disable the particular device attached at its output independently.
Thus, H-Bridge is basically used to control the rotating direction in DC motors.

5)Motor

Features:
The motor has sturdy construction.
Shaft equip metal bushes for long life.
It comes with high quality gears.
The shaft has a hole for better coupling.
Specifications:
Power supply :12v dc
18000 RPM Base Motor.
RPM :200
Rated torque : 3.9 kg-cm (For Grade-A Johnson motor rated torque is 5.2kg-cm).
6mm diameter shaft with M3 thread hole.
Gearbox diameter: 37mm.
Motor Diameter : 28.5mm.
Length without shaft :63 mm
Shaft length: 30mm.
Weight:180gm
No-load current= 800mA.
Load current = up to 7.5 A(max).

6)LCD 16×2 :

The term LCD stands for liquid crystal display. It is one kind of electronic display module used in an extensive range of applications like various circuits & devices like mobile phones, calculators, computers, TV sets, etc. These displays are mainly preferred for multi-segment light-emitting diodes and seven segments. The main benefits of using this module are inexpensive; simply programmable, animations, and there are no limitations for displaying custom characters, special and even animations, etc.

Features of LCD16x2 :
The features of this LCD mainly include the following.
The operating voltage of this LCD is 4.7V-5.3V

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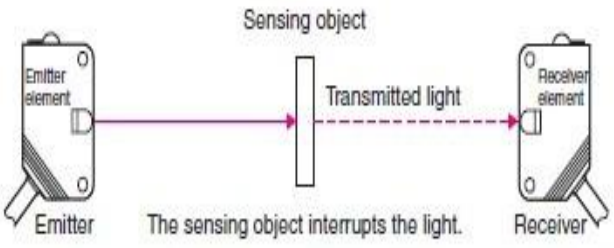
It includes two rows where each row can produce 16-characters.
The utilization of current is 1mA with no backlight
Every character can be built with a 5×8 pixel box
The alphanumeric LCDs alphabets & numbers
Is display can work on two modes like 4-bit & 8-bit
These are obtainable in Blue & Green Backlight
It displays a few custom generated characters.

7)Proximity sensor：

A proximity sensor is a non-contact sensor that detects the presence of an object (often referred to as the "target") when the target enters the sensor's field. Depending on the type of proximity sensor, sound, light, infrared radiation (IR), or electromagnetic fields may be utilized by the sensor to detect a target. Proximity sensors are used in phones, recycling plants, self-driving cars, anti-aircraft systems, and assembly lines. There are many types of proximity sensors, and they each sense targets in distinct ways. The two most commonly used proximity sensors are the inductive proximity sensor and the capacitive proximity sensor.

An inductive proximity sensor can only detect metal targets. This is because the sensor utilizes an electromagnetic field. When a metal target enters the electromagnetic field, the inductive characteristics of the metal change the field's properties, thereby alerting the proximity sensor of the presence of a metallic target. Depending on how inductive the metal is, the target can be detected at either a greater or shorter distance.
Capacitive proximity sensors, on the other hand, are not limited to metallic targets. These proximity sensors are capable of detecting anything that can carry an electrical charge. Capacitive sensors are commonly used in liquid-level detection. Possible targets for capacitive sensors include but are but not limited to: glass, plastic, water, wood, metals, and a myriad of targets of other materials.

Another type of proximity sensor is called a photoelectric proximity sensor. There are two main types of photoelectric proximity



sensors: reflective and through-beam. Reflective proximity sensors detect objects when the light emitted from the sensor is reflected back at the photoelectric receiver. Through-beam sensors detect targets when the target breaks the beam of light between the sensor's emitter and receiver.
Two other commonly used proximity sensors are the magnetic proximity sensors and ultrasonic proximity sensors. Magnetic proximity sensors are only used to detect permanent magnets. Ultrasonic proximity sensors emit a high pitch sound. The distance between the sensor and the target is determined by how long the sound takes to reflect back to the sensor.

8)Max 30100 Sensor (SPO2 & BPM)

The MAX30100 breakout operates from 1.8V and 5.5V. The device has two LEDs, one emitting a red light, another emitting infrared light. ... It turns out, oxygenated blood absorbs more infrared light and passes more red light while deoxygenated blood absorbs red light and passes more infrared light.
Key Features
Complete Pulse Oximeter and Heart-Rate Sensor Solution Simplifies Design
Integrated LEDs, Photo Sensor, and High-Performance Analog Front-End
Tiny 5.6mm x 2.8mm x 1.2mm 14-Pin Optically Enhanced System-in-Package
Ultra-Low-Power Operation Increases Battery Life for Wearable Devices
Programmable Sample Rate and LED Current for Power Savings
Ultra-Low Shutdown Current (0.7µA, typ)
Advanced Functionality Improves Measurement Performance
High SNR Provides Robust Motion Artifact Resilience
Integrated Ambient Light Cancellation
High Sample Rate Capability
Fast Data Output Capability
Applications/Uses
Fitness Assistant Devices
Medical Monitoring Devices
Wearable Devices.

9)Ultrasonic Sensor :

Ultrasonic sensors work by sending out a sound wave at a frequency above the range of human hearing. An ultrasonic sensor is an electronic device that measures the distance of a target object by emitting ultrasonic sound waves, and converts the reflected sound into an electrical signal. Ultrasonic waves travel faster than the speed of audible sound (i.e. the sound that humans can hear). Ultrasonic sensors have two main components: the transmitter (which emits the sound using piezoelectric crystals) and the receiver

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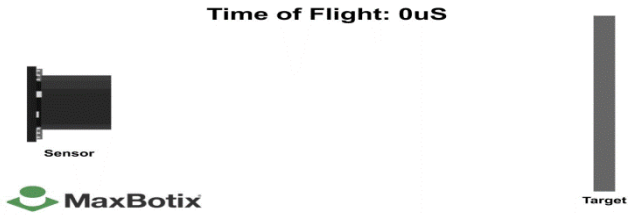
(which encounters the sound after it has travelled to and from the target).



10)Crystal oscillator 16MHZ :-

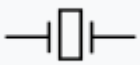
A **crystal oscillator** is a electronic oscillator circuit that uses the mechanical resonanceof a vibrating crystal of piezoelectric material to create an electrical signal with a constant frequency. This frequency is often used to keep track of time, as in quartz wristwatches , to provide a stable clock signal for digital ,integreated circuits and to stabilize frequencies for radio transmitters and receiverse. The most common type of piezoelectric resonator used is a piezoelectric, so oscillator circuits incorporating them became known as crystal oscillators. However, other piezoelectric materials including polycrystalline ceramics are used in similar circuits.

A crystal oscillator relies on the slight change in shape of a quartz crystal under an electric field , a property known aselectrostriction or inverse piezoelectricity. A voltage applied to an electrode on the crystal causes it to change shape; when the voltage is removed, the crystal generates a small voltage as it elastically returns to its original shape. The quartz oscillates at a stable resonant frequency, behaving like an RLC circuit, but with a much higher Q factor(less energy loss on each cycle of oscillation). Once a quartz crystal is adjusted to a particular frequency (which is affected by the mass of electrodes attached to the crystal, the orientation of the crystal, temperature and other factors), it maintains that frequency with high stability.

A miniature 16 MHzquartzcrystel enclosed in a hermitically sealed HC-49/S package, used as the resonator in a crystal oscillator.

Type	electromechanical
Working principle	piezoelectricity, resonance
Invented	Alexander M. Nicholson, Walter Guyton Cady
First production	1918

Electronic symbol



11)7805 :

The 7805 Voltage Regulator IC. A regulated power supply is very much essential for several electronic devices due to the semiconductor material employed in them have a fixed rate of current as well as voltage. The device may get damaged if there is any deviation from the fixed rate.

One of the important sources of DC Supply are Batteries. But using batteries in sensitive electronic circuits is not a good idea as batteries eventually drain out and lose their potential over time. Also, the voltage provided by batteries is typically 1.2V, 3.7V, 9V and 12V. This is good for circuits whose voltage requirements are in that range. But, most of the TTL IC's work on 5V logic and hence we need a mechanism to provide a consistent 5V Supply.

Here comes the 7805 Voltage Regulator IC to the rescue. It is an IC in the 78XX family of linear voltage regulators that

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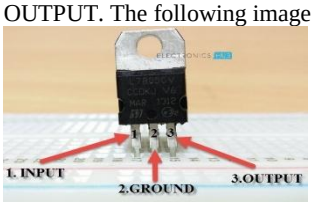
produce a regulated 5V as output. 7805 is a three terminal device with the three pins being 1. INPUT, 2. GROUND and 3. OUTPUT. The following image shows the pins on a typical 7805 IC in To-220 Package.



The pin description of the 7805 is described in the following table:

PIN NO.	PIN	DESCRIPTION
1	INPUT	Pin 1 is the INPUT Pin. A positive unregulated voltage is given as input to this pin.
2	GROUND	Pin 2 is the GROUND Pin. It is common to both Input and Output.
3	OUTPUT	Pin 3 is the OUTPUT Pin. The output regulated 5V is taken at this pin of the IC.

12)12v Battery

A twelve-volt battery has six single cells in series producing a fully charged output voltage of 12.6 volts. ... The size of the battery plates and amount of electrolyte determines the amount of charge lead acid batteries can store. The size of this storage capacity is described as the amp hour (AH) rating of a battery.

13)Capacitor 1000uf :

1000uF 25V Electrolytic Capacitor is a high quality electrolytic capacitor which offers long life and high reliability. Electrolytic Capacitors are most commonly used type of capacitors in Electronic Circuits.
Electrolytic Capacitors have 2 Polars - Positive and Negative.

Specifications of 1000uF 25V Electrolytic Capacitor:-
Capacitance: 1000uF
Voltage: 25V
Capacitor Type: Electrolytic

14)Push to on switches：

The push button switch is usually used to turn on and off the control circuit, and it is a kind of control switch appliance that is widely used. It is used in electrical automatic control circuits to manually send control signals to control contactors, relays, electromagnetic starters, etc. Its characteristic is that it is installed in the machine and instrument in the process of work, most of the time is in the initial free state position, and only when needed, it is converted to the second state (position) under the action of external force. Once the external force is removed, due to With the action of the spring, the switch returns to the initial position.
The push button switch can complete basic controls such as start, stop, forward and reverse rotation, speed change and interlock. Usually each push button switch has two pairs of contacts. Each pair of contacts consists of a NO contact and a NC contact. When the button is pressed, the two pairs of contacts act simultaneously, the NC contact is disconnected, and the NO contact is closed.
In order to indicate the function of each button and avoid disoperation, the button caps are usually made into different colours to show the difference, as shown in the figure below. Its colours are red, green, black, yellow, blue, white, etc. For example, red means stop button, green means start button, etc. The main parameters, type, mounting hole size, number of contacts and current

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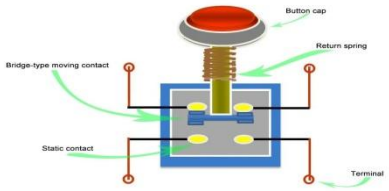
capacity of the button switch are described in detail in the product manual.



The working principle of the push button switch is shown in the figure below: There is an electromagnet adsorption device inside the button. When the button is pressed down, the electromagnet is energized to generate magnetism, and the circuit is connected or disconnected by the adsorption device to realize functions such as remote control circuit.

15)12v Pump For Sanitizer

pump is a device that moves fluids (liquids or gases), or sometimes slurries, by mechanical action, typically converted from electrical energy into hydraulic energy. Pumps can be classified into three major groups according to the method they use to move the fluid: direct lift, displacement, and gravity pumps.Pumps operate by some mechanism (typically reciprocating or rotary), and consume energy to perform mechanical work moving the fluid.

16)Buzzer :

The buzzer is a sounding device that can convert audio signals into sound signals. It is usually powered by DC voltage. It is widely used in alarms, computers, printers and other electronic products as sound devices. It is mainly divided into piezoelectric buzzer and electromagnetic buzzer, represented by the letter "H" or "HA" in the circuit. According to different designs and uses, the buzzer can emit various sounds such as music, siren, buzzer, alarm, and electric bell.

VII. ADVANTAGES

- When compared to humans, robot nurses are quicker to train, cheaper to maintain, easier to refuel and repair, and able to do very odd and repetitive tasks.
- the use of robots may allow providers to offer their healthcare services at a lower cost.
- Robots can transcribe and store crucial medical information minimizing the possibility of error as well as helping doctors and nurses to diagnose patients
- Robots can be extremely helpful in continuous monitoring of patient and data collection for emergency cases like heart failure and diabetes and then relay such data to a human nurse or doctor for action to be taken.
- The strength of robot nurses lay in their ability to assist. They can help out in repetitive tasks, such as medical supply retrieval, food and medication delivery, and patient movement and transfer.

VIII. CONCLUSION

The objectives of this project has been the nursing robot system is designed to serve patients by performing simple services. The development of medical welfare robot is not necessarily harmful rather than it can be promoted since it used in providing health care services are beneficial to people with disabilities and incurable diseases.It is an important issue in nursing practice to recognize and live with advanced sciences. This robotic trolly control method is expected to overcome the problem of healthcare worker such as placing food ,medicine etc. to the patient , pick and place hazardous object in a very fast and easy manner.Robotic trolley can do most of the boring and dangerous nursing jobs that may also result in the occupational exposure of human nurses to hazardous infections or chemicals.Robotic trolley can be extremely helpful in continuous monitoring of patient .

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