Interactive Robotic Nurse

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Abstract: The active hospital is aspiring to accelerate services to patients and to reduce the burden of doctors and nurses by reducing the number of mistakes. The main purpose of this study is to develop a Nurse Robot (NR) system that acts as a diagnostic device that is programmable with a multi-function manipulator designed to help doctors and help patients recovering better. The doctor can use an IOT based panel to control the robot. The control commands sent sent online are received by the robot controller. The robot controller operates over Wi-Fi internet. The received commands are received in real time and the robot motors are operated to achieve the desired movement commands. Also the root has other functions including battery status alert to remind of battery charging on time.

Index Terms - **Nursing Robotics, Remote Accessing, Medical data processing, Near field communication, Surveillance.**

I. INTRODUCTION

The robot can follow a specific individual, such as a doctor or nurse, who can use it to record and access patient data. It isn't a humanoid, but it does have expressive eyes that change shape and make it seem responsive. This type of robot will likely be one of the first to be implemented in hospitals because it has fairly minimal patient contact, works with staff, and has a benign appearance. Robots like this are also useful in nursing homes or other caretaking situations which is very helpful in healthcare industry. As technology continues to advance and become comrtitively cheaper and more accessible, its applications are increasingly benefiting human workers in the heathcare industry. Medical professionals are experimenting how robots can grow fast and become more important in healthcare environment. A robotic medical cart that can make hospital rounds, deliver medications and other items, and retrieve records, deliver medications and other items, and retrieve records. Prototypes resembling "robotic nurse" could have not negative and positive impacts. A drawback of robotic nurse aid is the lack of "human touch". It is more likely that the aid of robotic nurse will just allow nurses to fulfill more meaningful duties and work stressors would decrease. Robotic nurses will have the ability to triage pateints in clinics, emergency departments, and via telehealth services in order to sreamline care and provide standardized approaches to symptom management with far fewer resources. Robot nurses will help us scheduling tasks during our nursing shift and prioritizing our care with the click of a button. Charting will become less of burden and less time-consuming for nurses because most will be automatically delegated to Artificial intelligence.

II. ASSUMPTIONS

1   The Robot will move to the chair of the pateint as he sits and scan the patient's barcode to access the database.
2   The Robot will show the patient all the following instructions to follow using a detailed video.
3   It will measure the patient's vital signs and display the results accurately on the monitor screen and after that it will send the patient's report to database.

III. BLOCK DIAGRAM OF PROJECT AND FUNCTIONING
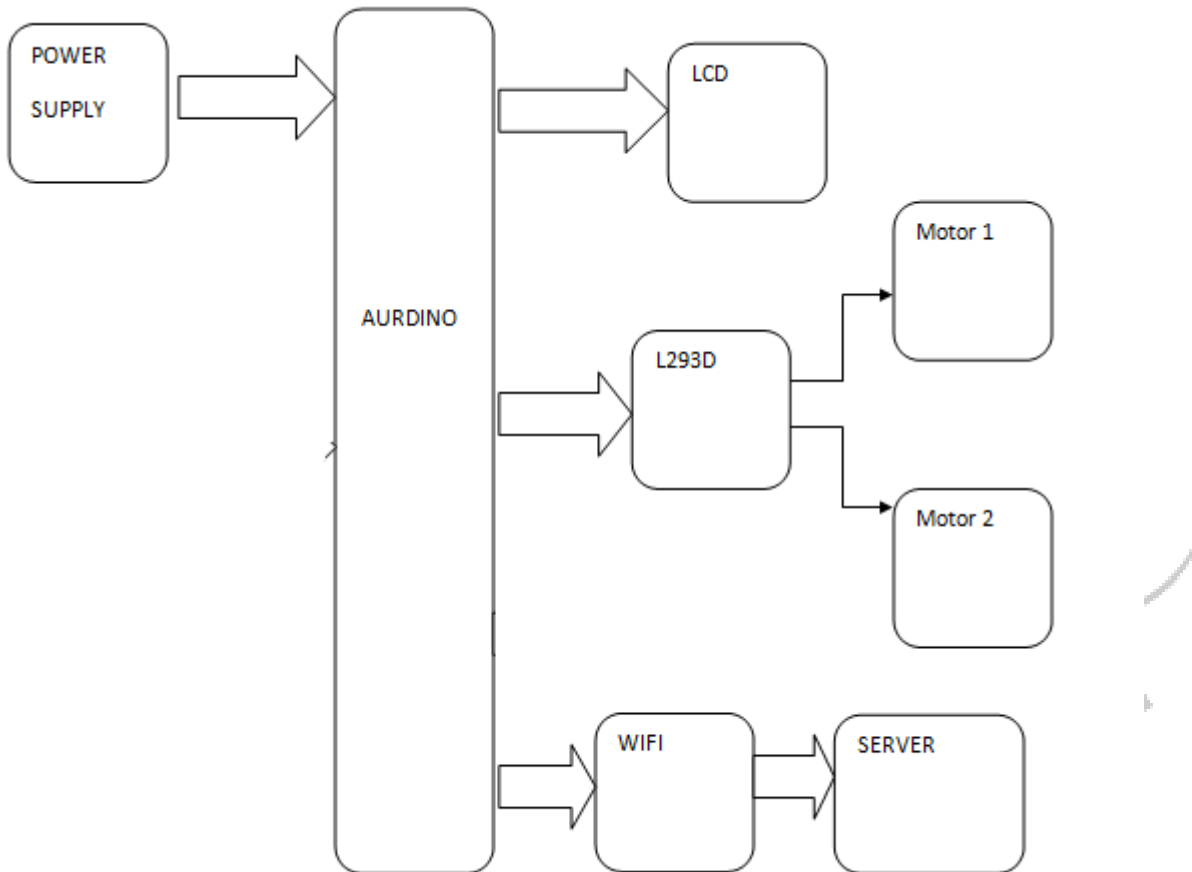
POWER SUPPLY BLOCK DIAGRAM:

PROPOSED MODEL

The system makes use of a robotic vehicle with 4 wheel drive for easy navigation. The robot also includes a controller box for circuitry and a mounting to hold a mobile phone or tablet. The mobile or tablet is used to hold live video calls.

The doctor can use an IOT based panel to control the robot. The control commands sent sent online are received by the robot controller. The robot controller operates over Wi-Fi internet. The received commands are received in real time and the robot motors are operated to achieve the desired movement commands. Also the root has other functions including battery status alert to remind of battery charging on time.

IV. DESCRPTION OF COMPONENTS

1   ARDUINO

Overview The Arduino Uno is a microcontroller board based on the ATmega328 (datasheet). It has 14 digital input/output pins (of which 6 can be used as PWM outputs), 6 analog inputs, a 16 MHz ceramic resonator, a USB connection, a power jack, an ICSP header, and a reset button. It contains everything needed to support the microcontroller; simply connect it to a computer with a USB cable or power it with a AC-to-DC adapter or battery to get started. The Uno differs from all preceding boards in that it does not use the FTDI USB-to-serial driver chip. Instead, it features the Atmega16U2 (Atmega8U2 up to version R2) programmed as a USB-to-serial converter. Revision 2 of the Uno board has a resistor pulling the 8U2 HWB line to ground, making it easier to put into DFU mode. Revision 3 of the board has the following new features:

· 1.0 pinout: added SDA and SCL pins that are near to the AREF pin and two other new pins placed near to the RESET pin, the IOREF that allow the shields to adapt to the voltage provided from the board. In future, shields will be compatible both with the board that use the AVR, which operate with 5V and with the Arduino Due that operate with 3.3V. The second one is a not connected pin, that is reserved for future purposes.

·Stronger RESET circuit.

·Atmega 16U2 replace the 8U2. "Uno" means one in Italian and is named to mark the upcoming release of Arduino 1.0. The Uno and version 1.0 will be the reference versions of Arduino, moving forward. The Uno is the latest in a series of USB Arduino boards, and the reference model for the Arduino platform; for a comparison with previous versions, see the index of Arduino boards.
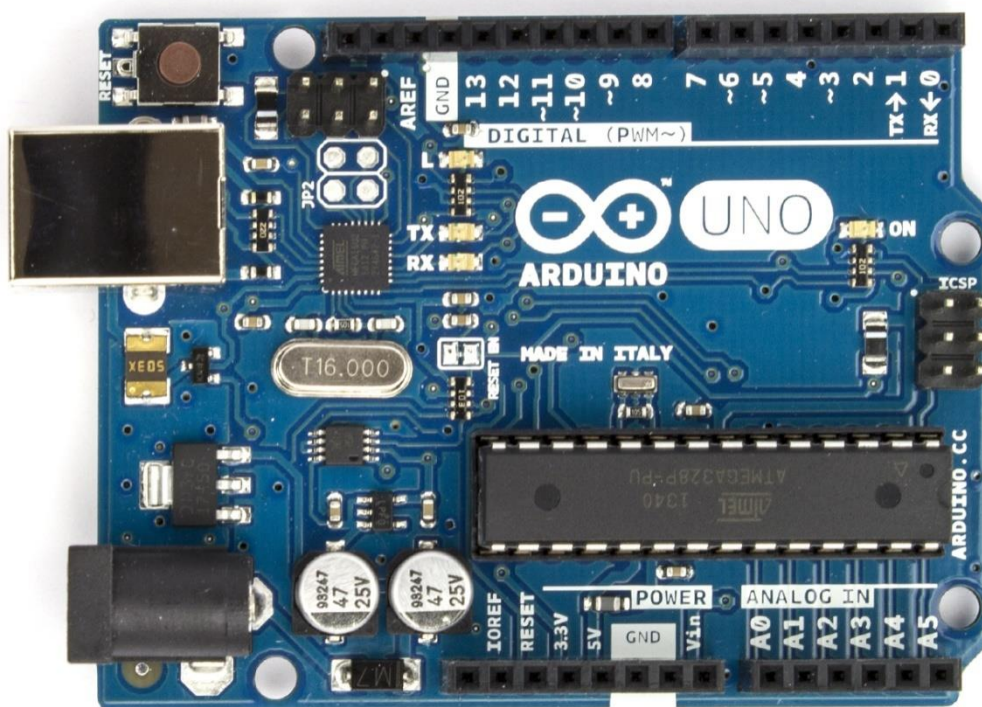
Schematic & Reference Design

 EAGLE files: arduino-uno-Rev3-reference-design.zip (NOTE: works with Eagle 6.0 and newer) Schematic: arduino-uno-Rev3-schematic.pdf Note: The Arduino reference design can use an Atmega8, 168, or 328, Current models use an ATmega328, but an Atmega8 is shown in the schematic for reference. The pin configuration is identical on all three processors

Power

The Arduino Uno can be powered via the USB connection or with an external power supply. The power source is selected automatically.

External (non-USB) power can come either from an AC-to-DC adapter (wall-wart) or battery. The adapter can be connected by plugging a 2.1mm center-positive plug into the board's power jack. Leads from a battery can be inserted in the Gnd and Vin pin headers of the POWER connector.

The board can operate on an external supply of 6 to 20 volts. If supplied with less than 7V, however, the 5V pin may supply less than five volts and the board may be unstable. If using more than 12V, the voltage regulator may overheat and damage the board. The recommended range is 7 to 12 volts.

The power pins are as follows:

VIN. The input voltage to the Arduino board when it's using an external power source (as opposed to 5 volts from the USB connection or other regulated power source). You can supply voltage through this pin, or, if supplying voltage via the power jack, access it through this pin.

5V.This pin outputs a regulated 5V from the regulator on the board. The board can be supplied with power either from the DC power jack (7 - 12V), the USB connector (5V), or the VIN pin of the board (7-12V). Supplying voltage via the 5V or 3.3V pins bypasses the regulator, and can damage your board. We don't advise it.

3V3. A 3.3 volt supply generated by the on-board regulator. Maximum current draw is 50 mA.

GND. Ground pins.

Memory:

 The ATmega328 has 32 KB (with 0.5 KB used for the bootloader). It also has 2 KB of SRAM and 1 KB of EEPROM (which can be read and written with the EEPROM library).

Input and Output:

Each of the 14 digital pins on the Uno can be used as an input or output, using pinMode(), digitalWrite(), and digitalRead() functions. They operate at 5 volts. Each pin can provide or receive a maximum of 40 mA and has an internal pull-up resistor (disconnected by default) of 20-50 kOhms. In addition, some pins have specialized functions:

· Serial: 0 (RX) and 1 (TX). Used to receive (RX) and transmit (TX) TTL serial data. These pins are connected to the corresponding pins of the ATmega8U2 USB-to-TTL Serial chip.

· External Interrupts: 2 and 3. These pins can be configured to trigger an interrupt on a low value, a rising or falling edge, or a change in value. See the attachInterrupt() function for details.

· PWM: 3, 5, 6, 9, 10, and 11. Provide 8-bit PWM output with the analogWrite() function.

· SPI: 10 (SS), 11 (MOSI), 12 (MISO), 13 (SCK). These pins support SPI communication using the SPI library.

·LED: 13. There is a built-in LED connected to digital pin 13. When the pin is HIGH value, the LED is on, when the pin is LOW, it's off. The Uno has 6 analog inputs, labeled A0 through A5, each of which provide 10 bits of resolution (i.e. 1024 different values). By default they measure from ground to 5 volts, though is it possible to change the upper end of their range using the AREF pin and the analogReference() function. Additionally, some pins have specialized functionality:

· TWI: A4 or SDA pin and A5 or SCL pin. Support TWI communication using the Wire library. There are a couple of other pins on the board:

·AREF.Reference voltage for the analog inputs. Used with analogReference().

· Reset. Bring this line LOW to reset the microcontroller. Typically used to add a reset button to shields which block the one on the board. See also the mapping between Arduino pins and ATmega328 ports. The mapping for the Atmega8, 168, and 328 is identical.

Communication:

 The Arduino Uno has a number of facilities for communicating with a computer, another Arduino, or other microcontrollers. The ATmega328 provides UART TTL (5V) serial communication, which is available on digital pins 0 (RX) and 1 (TX). An ATmega16U2 on the board channels this serial communication over USB and appears as a virtual com port to software on the computer. The '16U2 firmware uses the standard USB COM drivers, and no external driver is needed. However, on Windows, a .inf file is required. The Arduino software includes a serial monitor which allows simple textual data to be sent to and from the Arduino board. The RX and TX LEDs on the board will flash when data is being transmitted via the USB-to-serial chip and USB connection to the computer (but not for serial communication on pins 0 and 1). A SoftwareSerial library allows for serial communication on any of the Uno's digital pins. The ATmega328 also supports I2C (TWI) and SPI communication. The Arduino software includes a Wire library to simplify use of the I2C bus; see the documentation for details. For SPI communication, use the SPI library.

3.2 POWER SUPPLY

The input to the circuit is applied from the regulated power supply. The a.c. input i.e., 230V from the mains supply is step down by the transformer to 12V and is fed to a rectifier. The output obtained from the rectifier is a pulsating d.c voltage. So in order to get a pure d.c voltage, the output voltage from the rectifier is fed to a filter to remove any a.c components present even after rectification. Now, this voltage is given to a voltage regulator to obtain a pure constant dc voltage.
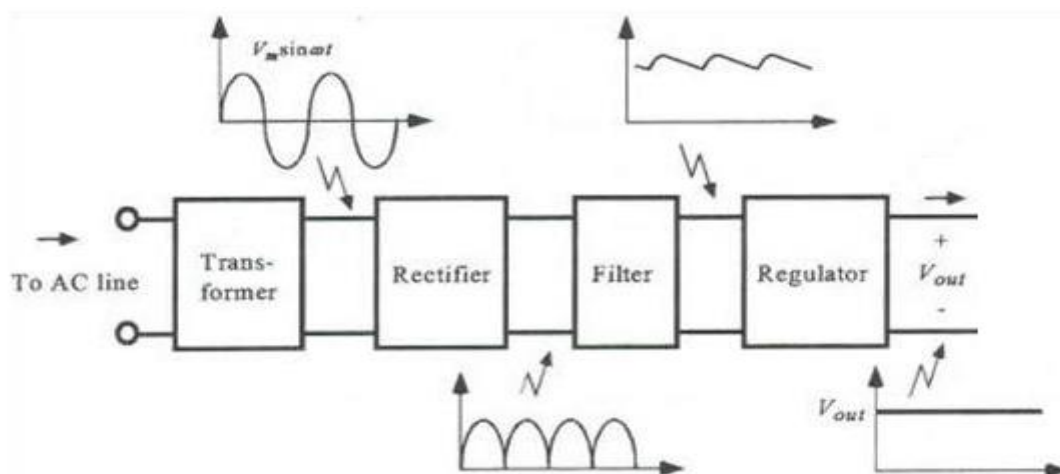

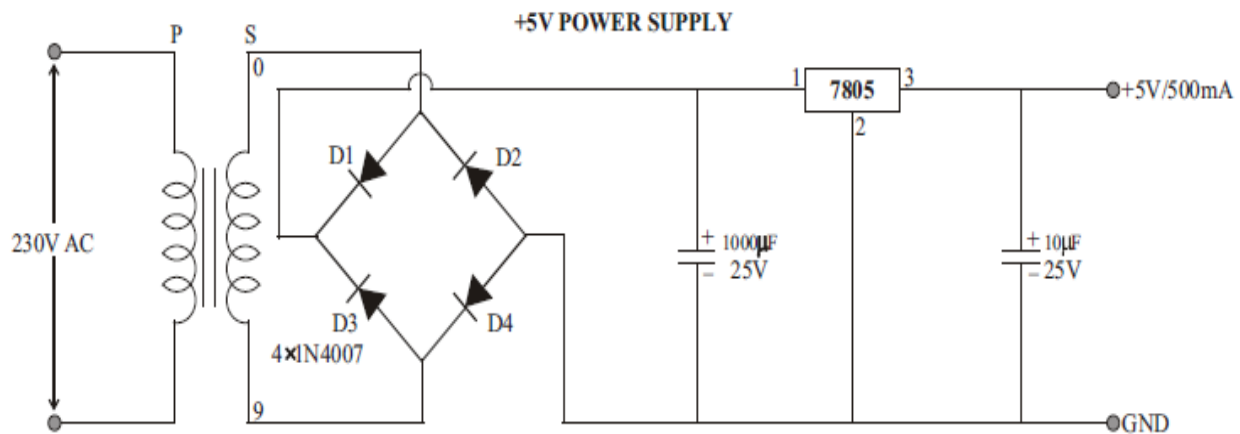Fig 3.5 Block Diagram of Power supply

Fig 3.6 Circuit Diagram of Power supply

3.2.1 Step down Transformer:

Usually, DC voltages are required to operate various electronic equipment and these voltages are 5V, 9V or 12V. But these voltages cannot be obtained directly. Thus the a.c input available at the mains supply i.e., 230V is to be brought down to the required voltage level. This is done by a transformer. Thus, a step down transformer is employed to decrease the voltage to a required level.

3.2.2 Rectifier:

The output from the transformer is fed to the rectifier. It converts A.C. into pulsating D.C. The rectifier may be a half wave or a full wave rectifier. In this project, a bridge rectifier is used because of its merits like good stability and full wave rectification.

3.2.3 Filter:

Capacitive filter is used in this project. It removes the ripples from the output of rectifier and smoothens the D.C. Output   received from this filter is constant until the mains voltage and load is maintained constant. However, if either of the two is varied, D.C. voltage received at this point changes. Therefore a regulator is applied at the output stage.

3.2.4 Voltage Regulator:

As the name itself implies, it regulates the input applied to it. A voltage regulator is an electrical regulator designed to automatically maintain a constant voltage level. In this project, power supply of 5V and 12V are required. In order to obtain these voltage levels, 7805 and 7812 voltage regulators are to be used. The first number 78 represents positive supply and the numbers 05, 12 represent the required output voltage levels.

Features:

• Output Current up to 1A.

• Output Voltages of 5, 6, 8, 9, 10, 12, 15, 18, 24V.

• Thermal Overload Protection.   • Short Circuit Protection.

• Output Transistor Safe Operating Area Protection.

3.3 LCD (LIQUID CRYSTAL DISPLAY)

Liquid Crystal Display also called as LCD is very helpful in providing user interface as well as for debugging

purpose. The most commonly used Character based LCDs are based on Hitachi's HD44780 controller or other which are compatible with HD44580. The most commonly used LCDs found in the market today are 1 Line, 2 Line or 4 Line LCDs which have only 1 controller and support at most of 80 characters, whereas LCDs supporting more than 80 characters make use of 2 HD44780 controllers

Pin Description:

Fig 3.13 Pin Diagram of LCD

Pin No.	Name	Description
1	VSS	Power supply (GND)
2	VCC	Power supply (+5V)
3	VEE	Contrast adjust
4	RS	0 = Instruction input 1 = Data input
5	R/W	0 = Write to LCD module 1 = Read from LCD module
6	EN	Enable signal
7	D0	Data bus line 0 (LSB)
8	D1	Data bus line 1
9	D2	Data bus line 2
10	D3	Data bus line 3
11	D4	Data bus line 4
12	D5	Data bus line 5
13	D6	Data bus line 6
14	D7	Data bus line 7 (MSB)
15	LED+	Back Light VCC
16	LED-	Back Light GND

Table 3.5 Pin Description of LCD

Command	Code										Description	Execution Time
	RS	R/W	DB7	DB6	DB5	DB4	DB3	DB2	DB1	DB0		
Clear Display	0	0	0	0	0	0	0	0	0	1	Clears the display and returns the cursor to the home position (address 0).	82µs~1.64ms
Return Home	0	0	0	0	0	0	0	0	1	*	Returns the cursor to the home position (address 0). Also returns a shifted display to the home position. DD RAM contents remain unchanged.	40µs~1.64ms
Entry Mode Set	0	0	0	0	0	0	0	1	I/D	S	Sets the cursor move direction and enables/disables the display.	40µs
Display ON/OFF Control	0	0	0	0	0	0	1	D	C	B	Turns the display ON/OFF (D), or the cursor ON/OFF (C), and blink of the character at the cursor position (B).	40µs
Cursor & Display Shift	0	0	0	0	0	1	S/C	R/L	*	*	Moves the cursor and shifts the display without changing the DD RAM contents.	40µs
Function Set	0	0	0	0	1	DL	N$	F	*	#	Sets the data width (DL), the number of lines in the display (L), and the character font (F).	40µs
Set CG RAM Address	0	0	0	1	A_{CG}						Sets the CG RAM address. CG RAM data can be read or altered after making this setting.	40µs
Set DD RAM Address	0	0	1	A_{DD}							Sets the DD RAM address. Data may be written or read after making this setting.	40µs
Read Busy Flag & Address	0	1	BF	AC							Reads the BUSY flag (BF) indicating that an internal operation is being performed and reads the address counter contents.	1µs
Write Data to CG or DD RAM	1	0	Write Data								Writes data into DD RAM or CG RAM.	46µs
Read Data from CG or DD RAM	1	1	Read Data								Reads data from DD RAM or CG RAM.	46µs

I/D = 1: Increment S = 1: Accompanies display shift. S/C= 1: Display shift S/C = 0: cursor move R/L= 1: Shift to the right. R/L= 0: Shift to the left. DL = 1: 8 bits DL = 0: 4 bits N = 1: 2 lines N = 0: 1 line F = 1: 5x10 dots F = 0: 5 x 7 dots BF = 1: Busy BF = 0: Can accept data # Set to 1 on 24x4 modules $ With KS0072 is Address Mode.	DD RAM: Display data RAM CG RAM: Character generator RAM A_{CG}: CG RAM Address A_{DD}: DD RAM Address Corresponds to cursor address. AC: Address counter Used for both DD and CG RAM address.	Execution times are typical. If transfers are timed by software and the busy flag is not used, add 10% to the above times.

Table3.6 Command Operation of LCD

Although looking at the table you can make your own commands and test them. Below is a brief list of useful commands which are used frequently while working on the LCD.

No.	Instruction	Hex	Decimal
1	Function Set: 8-bit, 1 Line, 5x7 Dots	0x30	48
2	Function Set: 8-bit, 2 Line, 5x7 Dots	0x38	56
3	Function Set: 4-bit, 1 Line, 5x7 Dots	0x20	32
4	Function Set: 4-bit, 2 Line, 5x7 Dots	0x28	40
5	Entry Mode	0x06	6
6	Display off Cursor off (clearing display without clearing DDRAM content)	0x08	8
7	Display on Cursor on	0x0E	14
8	Display on Cursor off	0x0C	12
9	Display on Cursor blinking	0x0F	15
10	Shift entire display left	0x18	24
12	Shift entire display right	0x1C	30
13	Move cursor left by one character	0x10	16
14	Move cursor right by one character	0x14	20
15	Clear Display (also clear DDRAM content)	0x01	1
16	Set DDRAM address or cursor position on display	0x80+add	128+add
17	Set CGRAM address or set pointer to CGRAM location	0x40+add	64+add

Table 3.7 Command List of LCD

Sending Commands to LCD

To send commands we simply need to select the command register. Everything is same as we have done in the initialization routine. But we will summarize the common steps and put them in a single subroutine. Following are the steps:

· move data to LCD port

· select command register

· select write operation

· send enable signal

· wait for LCD to process the command

· Sending Data to LCD

· To send data move data to LCD port

· select data register

· select write operation.

3.4 WIFI

A wireless network uses radio waves, just like cell phones, televisions and radios do. In fact, communication across a wireless network is a lot like two-way radio communication.

Here's what happens:

A computer's wireless adapter translates data into a radio signal and transmits it using an antenna.

A wireless router receives the signal and decodes it. The router sends the information to the Internet using a physical, wired Ethernet connection.

The process also works in reverse, with the router receiving information from the Internet, translating it into a radio signal and sending it to the computer's wireless adapter.

The radios used for Wi-Fi communication are very similar to the radios used for walkie-talkies, cell phones and other devices. They can transmit and receive radio waves, and they can convert 1s and 0s into radio waves and convert the radio waves back into 1s and 0s. But Wi-Fi radios have a few notable differences from other radios:

· They transmit at frequencies of 2.4 GHz or 5 GHz. This frequency is considerably higher than the frequencies used for cell phones, walkie-talkies and televisions. The higher frequency allows the signal to carry more data.

· They use 802.11 networking standards

3.5 MOTORS

Almost every mechanical development that we see around us is accomplished by an electric motor. Electric machines are a method of converting energy. Motors take electrical energy and produce mechanical energy. Electric motors are utilized to power hundreds of devices we use in everyday life.

Electric motors are broadly classified into two different categories: Direct Current (DC) motor and Alternating Current (AC) motor. In this article we are going to discuss about the DC motor and its working. And also how a gear DC motors works.

A DC motor is an electric motor that runs on direct current power. In any electric motor, operation is dependent upon simple electromagnetism. A current carrying conductor generates a magnetic field, when this is then placed in an external magnetic field, it will encounter a force proportional to the current in the conductor and to the strength of the external magnetic field.It is a device which converts electrical energy to mechanical energy. It works on the fact that a current carrying conductor placed in a magnetic field experiences a force which causes it to rotate with respect to its original position.

Practical DC Motor consists of field windings to provide the magnetic flux and armature which acts as the conductor.
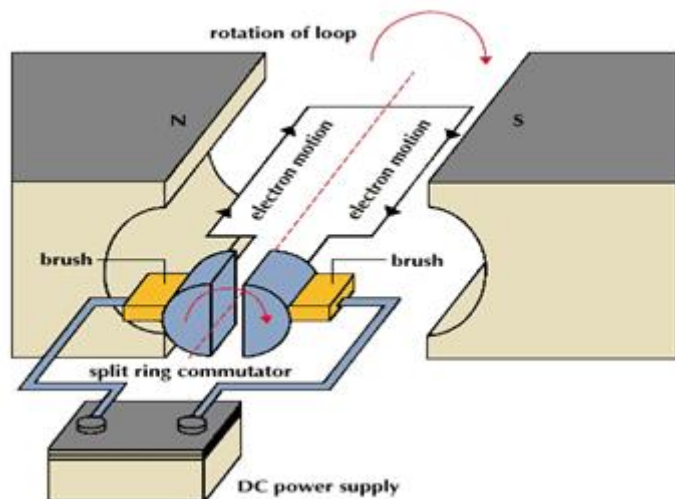
Brushless DC Motors Work

The input of a brushless DC motor is current/voltage and its output is torque. Understanding the operation of DC motor is very simple from a basic diagram is shown in below. DC motor basically consist two main parts. The rotating part is called the rotor and the stationary part is also called the stator. The rotor rotates with respect to the stator.
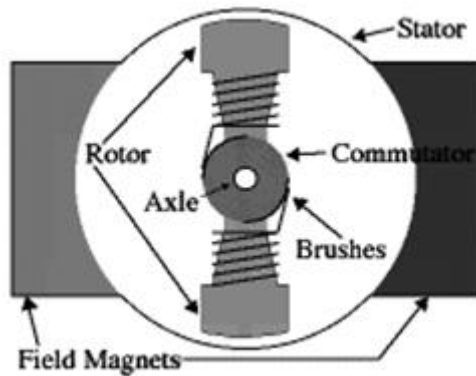
DC MOTOR

The rotor consists of windings, the windings being electrically associated with the commutator. The geometry of the brushes, commutator contacts and rotor windings are such that when power is applied, the polarities of the energized winding and the stator magnets are misaligned and the rotor will turn until it is very nearly straightened with the stator's field magnets.

As the rotor reaches alignment, the brushes move to the next commutator contacts and energize the next winding. The rotation reverses the direction of current through the rotor winding, prompting a flip of the rotor's magnetic field, driving it to keep rotating.
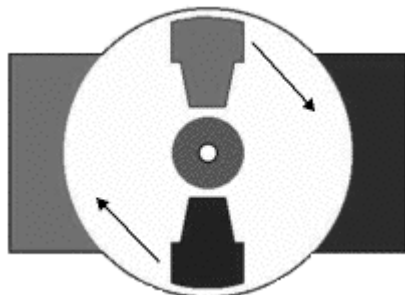
*Advantages of DC Motor:*

1.   Provide excellent speed control for acceleration and deceleration
2.   Easy to understand design
3.   Simple, cheap drive design

Connecting DC Motor with Microcontroller

Microcontrollers can't drive the motors directly. So we need some kind of drivers to control the speed and direction of motors. The motor drivers will acts as interfacing devices between microcontrollers and motors. Motor drivers will act as current amplifiers since they take a low current control signal and provide a high current signal. This high current signal is used to drive the motors. Using L293D chip is the easy way for controlling the motor using microcontroller. It contains two H-bridge driver circuits internally.

This chip is designed to control two motors. L293D has two sets of arrangements where 1 set has input 1, input 2, output1,output 2, with enable pin while other set has input 3, input 4, output 3, output 4 with other enable pin.

Here is an example of DC motor which is interfaced with L293D microcontroller.
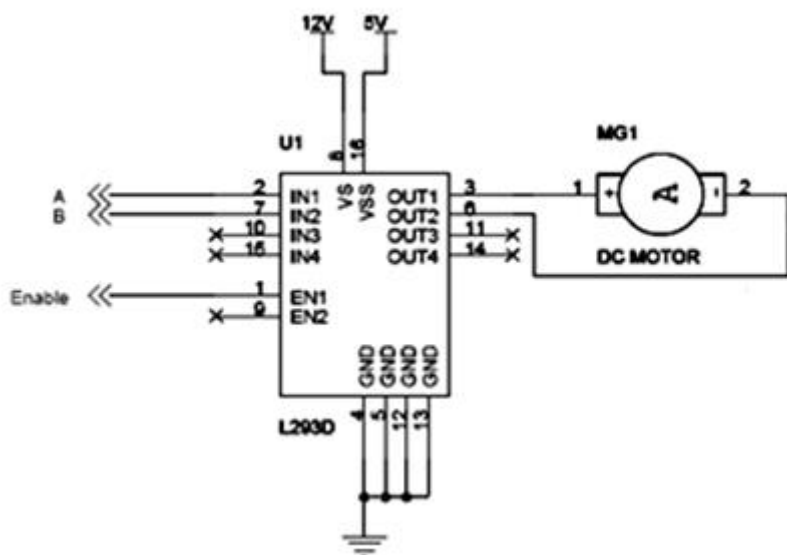
DC motor interfaced with L293D microcontroller

L293D has two set of arrangements where one set has input 1, input 2, output 1 and output 2 and other set has input 3, input 4, output 3 and output 4, according to above diagram,

· If pin no 2 and 7 are high then pin no 3 and 6 are also high. If enable 1 and pin number 2 are high leaving pin number 7 as low then the motor rotates in forward direction.
· If enable 1 and pin number 7 are high leaving pin number 2 as low then the motor rotates in reverse direction.

Today dc motors are still found in many applications as small as toys and disk drives or in large sizes to operate steel rolling mills and paper machines.

DC Motor Equations

Magnitude of flux experienced is

F=BlI

Where, B- Flux density due to flux produced by field windings

l- Active length of the conductor

I-Current passing through the conductor

As the conductor rotates, an EMF is induced which acts in a direction opposite to the supplied voltage. It is given as

$$E_b = \frac{\varnothing PNZ}{60A}$$

Where,   Ø- Fluz due to the field windings

P- Number of poles

A-A constant

N – Speed of the motor

Z- Number of conductors

The supply voltage, $V = E_b + I_a R_a$

The torque developed is

$$T_a = \frac{0.159 \emptyset I a P Z}{A}$$

Thus the torque is directly proportional to the armature current.

Also speed varies with armature current, hence indirectly torque and speed of a motor are dependant on each other.

For a DC shunt motor, speed remains almost constant even if torque increases from no load to full load.

For a DC series motor, speed decreases as torque increases from no load to full load.

Thus torque can be controlled by varying the speed. Speed control is achieved either by

·Changing flux by controlling the current through field winding- Flux Control method. By this method, speed is controlled above its rated speed.

·Armature Voltage Control − Provides speed control below its normal speed.

·Supply Voltage Control − Provides speed control in both directions.

4 Quadrant Operation of DC Motor

Generally a motor can operate in 4 different regions:

·As a motor in forward or clockwise direction.
·As a generator in forward direction.
·As a motor in reverse or anticlockwise direction.
·As a generator in reverse direction.
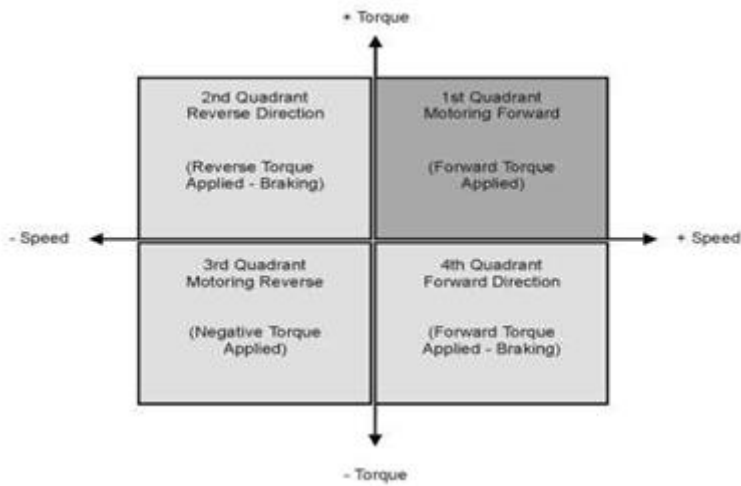
4 Quadrant Operation of DC Motor

In the first quadrant, motor is driving the load with both the speed and torque in positive direction.

In the second quadrant, torque direction reverses and motor acts as a generator

In the third quadrant, motor drives the load with speed and torque in negative direction.

In the 4th quadrant, motor acts a generator in reverse mode.

In the first and third quadrant, motor acts in both forward and reverse directions. For example, motors in cranes to lift the load and also put it down.

In the second and fourth quadrant, motor acts as a generator in forward and reverse directions respectively and provides energy back to the power source. Thus the way to control a motor operation, to make it operate in any of the 4 quadrants is by controlling its speed and direction of rotation. Speed is controlled either by varying the armature voltage or weakening the field. The torque direction or direction of rotation is controlled by varying the extent to which applied voltage is greater than or less than the back emf.

Types of DC Motors
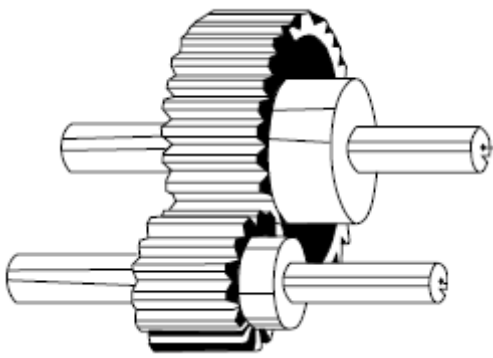
Geared DC Motors:

Geared motors tend to reduce the speed of the motor but with a corresponding increase in torque. This property comes in handy, as DC motors can rotate at speeds much too fast for an electronic device to makes use of. Geared motors commonly consist of a DC brush motor and a gearbox attached to the shaft. Motors are distinguished as a geared by two connected units. It has many applications due to its cost of designing, reduces the complexity and constructing applications such as industrial equipment, actuators, medical tools and robotics.

·No good robot can ever be built without gears. All things considered, a good understanding of how gears affect parameters such as torque and velocity are very important.

·Gears work on the principle of mechanical advantage. This implies that by using distinctive gear diameters, we can exchange between rotational velocity and torque. Robots do not have a desirable speed to torque ratio.

·In robotics, torque is better than speed. With gears, it is possible to exchange the high velocity with a better torque. The increase in torque is inversely proportional to the reduction in speed.

Geared DC Motors

## Speed Reduction in Geared DC Motor:

Speed Reduction in geared DC Motor

Speed reduction in gears comprises of a little gear driving a larger gear. There may be few sets of these reduction gear sets in a reduction gear box. Sometimes the objective of using a gear motor is to reduce the rotating shaft speed of a motor in the device being driven, for example in a small electric clock where the tiny synchronous motor may be turning at 1,200 rpm however is decreased to one rpm to drive the second hand and further reduced in the clock mechanism to drive the minute and hour hands. Here the amount of driving force is irrelevant as long as it is sufficient to overcome the frictional impacts of the clock mechanism.

Series DC Motor:

Series motor is a DC series motor where field winding is connected internally in series to the armature winding. The series motor provides high starting torque but must never be run without a load and is able to move very large shaft loads when it is first energized. Series motors are also known as series-wound motor.

In series motors, the field windings are associated in series with the armature. The field strength varies with progressions in armature current. At the time its speed is reduced by a load, the series motor advances more excellent torque. Its starting torque is more than different sorts of DC motor. It can also radiate more easily the heat that has built up in the winding due to the large amount of current being carried. Its speed shifts considerably between full-load and no-load. When load is removed, motor speed increases and current through the armature and field coils decreases. Unloaded operation of large machines is hazardous.
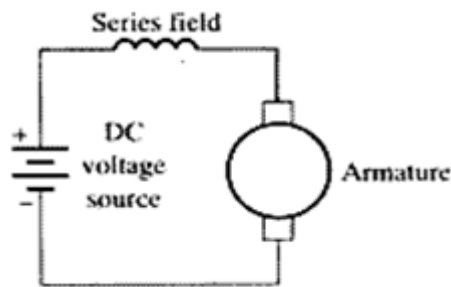
Series Motor

Current through the armature and field coils decreases, the strength of the flux lines around them weakens. If the strength of the flux lines around the coils were reduced at the same rate as the current flowing through them, both would decrease at the same rate which the motor speed increases.

Advantages of Series Motor:

·Huge starting torque
·Simple Construction
·Designing is easy
·Maintenance is easy
·Cost effective

Applications of Series Motor:

Series Motors can produce enormous turning power, the torque from its idle state. This characteristic makes series motors suitable for small electrical appliances, versatile electric equipments and etc. Series motors are not suitable when a constant speed is needed. The reason is that the velocity of series motors varies greatly with varying load.

Shunt Motor:

Shunt motors are shunt DC motors, where the field windings shunted to or are connected in parallel to the armature winding of the motor. The shunt DC motor is commonly used because of its best speed regulation. Also hence both the armature winding and the field windings are presented to the same supply voltage, however there are discrete branches for the stream of armature current and the field current.

A shunt motor has somewhat distinctive working characteristics than a series motor. Since the shunt field coil is made of fine wire, it cannot produce the large current for starting like the series field. This implies that the shunt motor has extremely low starting torque, which requires that the shaft load be quite little.
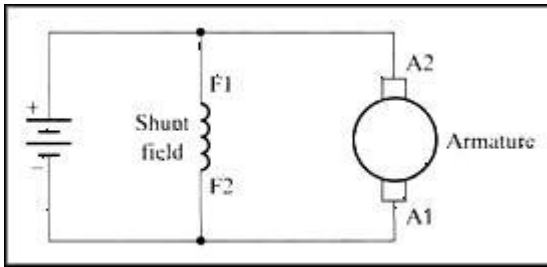
Shunt Motor

When voltage is applied to the shunt motor, a very low amount of current flow through the shunt coil. The armature for the shunt motor is similar to the series motor and it will draw current to produce a strong magnetic field. Due to the interaction of magnetic field around armature and the field produced around the shunt field, the motor starts to rotate. Like the series motor, when the armature begins to turn, it will produce back EMF. The back EMF will cause the current in the armature to begin to diminish to a very small level. The amount of current the armature will draw is directly related to the size of the load when the motor reaches full speed. Since the load is generally small, the armature current will be small.

Advantages of Shunt Motor:

·Simple control performance, resulting in a high level of flexibility for solving complex drive problems
·High availability, therefore minimal service effort needed
·High level of electro-magnetic compatibility
·Very smooth running, therefore low mechanical stress of the overall system and high dynamic control processes
·Wide control range and low speeds, therefore universally usable

Applications of Shunt Motor:

Shunt DC motors are very suitable for belt-driven applications. This constant speed motor is used in industrial and automotive applications such as machine tools and winding/unwinding machines where great amount of torque precision is required.

3.6 L293D:

L293D Description

L293D is a typical Motor driver or 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 motor with a single L293D IC. *Dual H-bridge Motor Driver integrated circuit (IC).*

The l293d can drive small and quiet big motors as well, check the Voltage Specification at the end of this page for more info.

You can Buy L293D IC in any electronic shop very easily and it costs around 70 Rupees (INR) or around 1 $ Dollar (approx Cost) or even lesser cost. You can find the necessary pin diagram, working, a circuit diagram, Logic description and Project as you read through.

L293D Pin Diagram
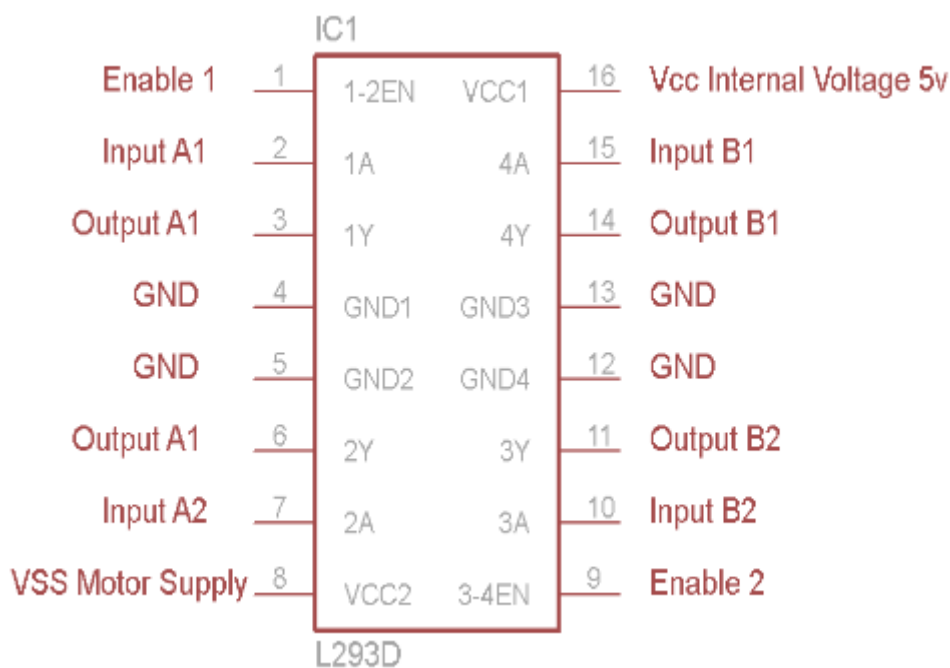
Working of L293D

There are 4 input pins for l293d, pin 2,7 on the left and pin 15 ,10 on the right as shown on the pin diagram. Left input pins will regulate the rotation of motor connected across left side and right input for motor on the right hand side. The motors are rotated on the basis of the inputs provided across the input pins as LOGIC 0 or LOGIC 1.

In simple you need to provide Logic 0 or 1 across the input pins for rotating the motor.

L293D Logic Table.

Lets consider a Motor connected on left side output pins (pin 3,6). For rotating the motor in clockwise direction the input pins has to be provided with Logic 1 and Logic 0.

• **Pin**   **2** = **Logic**   **1** and **Pin**   **7** = **Logic**   **0** | Clockwise   Direction

• **Pin**   **2** = **Logic**   **0** and **Pin**   **7** = **Logic**   **1** | Anticlockwise   Direction

• **Pin**   **2** = **Logic**   **0** and **Pin**   **7** = **Logic**   **0** | Idle   [No   rotation]   [Hi-Impedance   state]

• **Pin 2** = **Logic 1** and **Pin 7** = **Logic 1** | Idle [No rotation]

In a very similar way the motor can also operate across input pin 15,10 for motor on the right hand side.

Circuit Diagram For l293d motor driver IC controller.
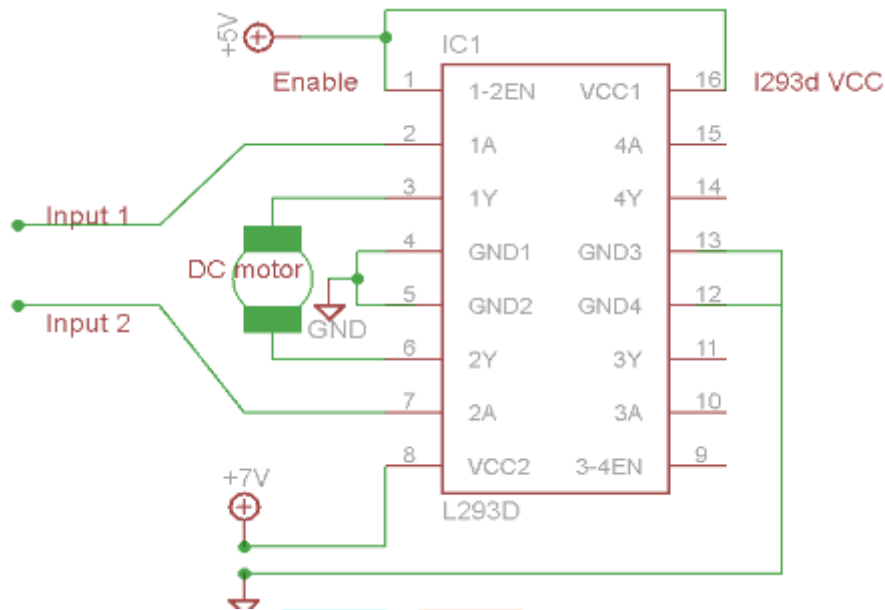
Voltage Specification

VCC is the voltage that it needs for its own internal operation 5v; L293D will not use this voltage for driving the motor. For driving the motors it has a separate provision to provide motor supply VSS (V supply). L293d will use this to drive the motor. It means if you want to operate a motor at 9V then you need to provide a Supply of 9V across VSS Motor supply.

The maximum voltage for VSS motor supply is 36V. It can supply a max current of 600mA per channel.Since it can drive motors Up to 36v hence you can drive pretty big motors with this l293d.

LITRATURE SURVEY

In year 2020, Srikanth Kavirayani, Divya Sree Uddandapu, Aravind Papasani, T. Vamsi Krishna explained report is about Robot for Delivery of Medicines to Patients Using Artificial Intelligence in Health Care in which basically they build a robot to deliver the medicines in hospital ward and patients. The robot can avoid all kind obstacle including human beings, to do that they used artificial intelligence. To deliver the medicines the intelligence algorithm and sensors are used. With the help of this system, it can be very beneficial for the hospital staff as it can save a lot of time.

In year 2020, B.S. Pranathi, Ananya Nair, C.S. Anushree, T.S. Chandar explained report is about SAHAYANTRA - A PATIENT ASSISTANCE ROBOT in which they have explained low cost and effective patient assistance robot which is basically a raspberry-pi based system. In this they have explained how it detects the particular needs of patient with the help of the patient's speech input. It is detected using TensorFlow lite object detection model. In this way the proposed system ensures the safety of medical staff and nurses by reducing the risk of getting infected.

We wanted to make a robot, which would help to save lives during crisis by transmitting essential data as quickly as possible. We took our inspiration from and started with IRsensor. However, as its data would not be sufficient, we wanted to add more sensors. The robot was made wirelessly controllable as seen in and was also made to transmit data.

[1].Mrs Manasi Patil et al., described a better traffic management system using Raspberry pi and RFID technology. The vehicle has a raspberry pi controller fixed in it which is interfaced with sensors like gas sensor, temperature sensor and shock sensor. These sensors are fixed at a predetermined value before accident. When an accident occurs the value of one of the sensor changes and a message to a predefined number (of the ambulance) is sent through GSM. The GPS module which is also interfaced with the controller also sends the location of the vehicle. When the message is received by the ambulance, a clear route has to be provided to the ambulance. The ambulance has a controller ARM which is interfaced with the RFID tag sends electromagnetic waves. When an ambulance reaches the traffic signal the RFID reader which is placed on the joints detect the electromagnetic waves of the tag. If the traffic signal is red, then the readers goes through the database in fraction of seconds and turn the red light green. And automatically in such condition the RFID on opposite joints turn the opposite signal red. This provides a clear route to the ambulance.

[2].V.Sagar Reddy et al., developed an accelerometer based System for driver safety. The system has the advantage of tracking or identifying vehicles location just by sending a SMS or email to the authorized person. The system is designed by using Raspberry Pi (ARM11) for fast access to accelerometer for event detection. Is there any event is occurs the message sent to the authorized person so they can take immediate action to save the lives and reduce the damages. Images captured by the camera on the vehicle are emailed to the concerned person (for example the owner of the vehicle) along with the type of accident and the time of the accident.

[3]. Sri Krishna Chaitanya Varma et al., proposed an Automatic Vehicle Accident Detection and Messaging System Using GPS and GSM Modems. AT89C52 microcontroller is used in the system. When the system is switched on, LED is ON indicating that power is supplied to the circuit. When the IR sensors that are used sense any obstacle, they send interrupt to microcontroller. The GPS receives the location of the vehicle that met with an accident and gives the information back. This information is sent to a mobile number as a message. This message is received using GSM modem present in the circuit. The message gives the information of longitude and latitude values. Using these values the position of the vehicle can be estimated

[4].Apurva Mane et al., described the methods for vehicle collision detection and remote alarm device using Arduino. Key features of this design include real-time vehicle monitoring by sending its information regarding position (longitude, latitude), time, angle to the monitoring station and to the user/owners mobile that should help them to get medical help if accident or the theft occurs. Also user/owner has an access to get real-time position of a vehicle in real time. Whenever accident occurs MEMS and vibration sensor detects and sends the signals to microcontroller, by using GPS particular locations where accident has occurred is found, then GSM sends message to authorized members.

[5]Prof.Mrs.Bhagya Lakshmi V et al., proposed a FPGA Based Vehicle Tracking and Accident Warning system using GPS. FPGA is mainly used to track position of any vehicle and send automated message to pre programmed number. The owner of vehicle, police to clear traffic, ambulance to save people can be informed by this device. FPGA controls and co-ordinate all parts used in system. With the help of accelerometer sensor, the exact position of the vehicle can be detected. It can also be predicted whether the vehicle is in normal position or upside down.

VI. CONCLUSION

From the previous discussion, It is clear that using NR is considered an important multi-functional vital signs measurements that will help hospital nurses in fulfilling regular checkup on new patient's. The adopted system will be installed in a hospital patient's room in the aim of creating a direct interaction between the patient and NR. The main reason is that Nr is considered to be a very secure way to measure the patients vital-signs through measurements based upon electronic sensors that are directly attached to the patient's body.Hence, NR will help in performing better services to the both hospital and patient. Hence this project provide a detailed insight on a medical assistant robot which when implemented in hospitals will enhance the existing quality of health care and will help doctor's to a great extent. The target of this robotic solution is to provide comfort and best of facilities to patient's without human intervention. Results communicate the need for technological competency among nurses, advancement in increasing healthcare robot humans and the importance of conscientious efforts from an interdisciplinary research team in improving robotic system usability and utility for the care of older adult's.

VII Result
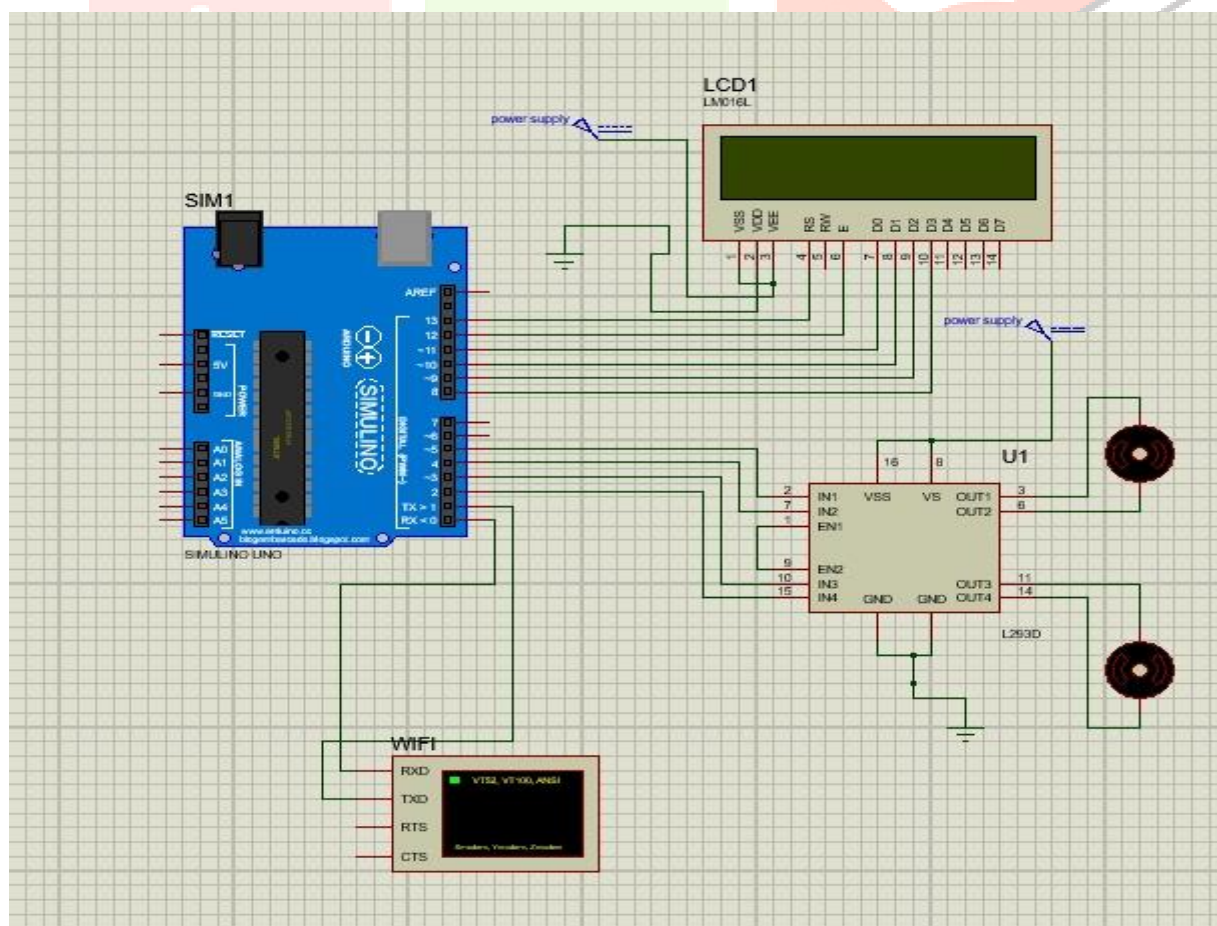
8. REFERENCES

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