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IoT Based Smart Poultry Farm Establish A Climate-Smart, Sustainable Food Economy

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Abstract: *IoT based Smart Poultry Farm will give a hassle free and better observation experience to the user of the Poultry Farm. This system will make use of the sensors and microcontroller unit to perform the said operations of feeding, water supply and temperature- humidity observation which are the main causes for any kind of epidemic or diseases for poultry birds. Introducing IoT in the system will benefit in providing ease of operation as well as real time data observation through internet to the user. Keywords: Microcontroller Unit, Internet, Internet of Things (IoT), Poultry Farm, , Sensors, Temperature and Humidity.*

Keywords: RFID, Smart door lock, Blynk, IoT, Security, Telegram, OTP

I. INTRODUCTION

The Poultry Culture in India has increased to leaps and bounds in the past few years or decades. The country contributes majorly in the export of the poultry products. Due to this, the awareness for the health of poultry birds as well as the quality of products has also increased. Many problems arise while taking good care of the poultry birds as it is a very tedious and intricate task which demands lot of alertness and minimum errors. These sensitive creatures are prone to lot of diseases which might be a hindrance in the business. Also, the manpower required to do the job takes a lot of time and the cost is high. Introducing Automation in Poultry Industry has brought about enormous change in terms of observation and the need to stay aware of the recent condition of the farm. Where a lot of manpower was required for constant needs of the birds, this technology has helped in reducing manual work and given ease of operation to the workers as well as owners. IoT has made the operation of farm easy and very on the go. Due to this technology, the concerned person can get real time data whenever required through cloud and can make use of it to make any necessary changes to the current conditions. In this paper we are introducing a system to control the water supply and a real time temperature and humidity value detector. It uses Node MCU ESP 8266 used as a Wi-Fi connector, Relay for switching the supplies, motor driver L293D for feed motors, DHT11 sensor for detecting the temperature and humidity values. It is a low cost and effective solution designed to help the user take good care of the poultry birds.

1.1 Problem Definition

The ever-increasing demand for broiler chicken places immense pressure on the poultry industry to scale up production. However, this pursuit of higher yields often comes at a cost - inefficiencies in non-precise feed livestock practices. As we produce more chicken, more feed is wasted, and the consequences extend beyond economic losses. The primary source of chicken feed, corn, contributes to deforestation and exacerbates global warming. Embracing precision livestock farming is not only a solution to these challenges but an urgent Traditional poultry farming methods rely on non-precise feed management, leading to excess feed consumption and wastage. This inefficiency not only strains the financial resources of farmers but also puts undue pressure on land and natural resources. As corn becomes the primary source of feed, the demand for its production intensifies. The cultivation of vast cornfields contributes to greenhouse gas emissions, exacerbating global warming and climate change. The excessive use of land and water resources for corn cultivation further strains our ecosystems and threatens the delicate balance of the environment. Converting forests into cornfields to meet the rising feed demand contributes significantly to deforestation and loss of biodiversity. Necessity to secure a sustainable future

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1.2 Objectives

• To increase egg and meat production in order to sufficient the high demand in the state.
• The objective of a defined feeding management program is to supply a range of balanced diets that satisfy the nutrient requirements at all stages of development & that optimize efficiency and profitability without compromising bird welfare or the environment.
• The goal of this project is to produce healthy and sustainable poultry meat and also data analysis for qualitative and quantitative research, where people can get fresh meat with profit. Nowadays, chicken poultry industry is an important industry for sustainable food supply in our country.

1.3 Need of the Project

• Smart poultry farms will help us manage the bird population better by controlling how much food they eat, monitoring their eggs' health, and even letting us know if they're going to lay a batch of eggs before it's due.
• Prepare Poultry farming business plan which includes from purchase of birds to selling. Construct a poultry shed on elevated area in the directions of East-West where you can get good ventilation along with airflow. Secure the poultry shed from all kinds of threats. Provide fresh water and feed as per the chicken age.

II. LITERATURE SURVEY

Chakchai So-In, Sarayut Poolsanguan and Kanokmon Rujirakul1 have developed the global architecture of hybrid systems for mobile and wireless network management systems for intelligent poultry sensors. One of the ideas is to distinguish the electronic and mechanical parts of the farm in terms of mobility and flexibility. Take into account EVAP systems in general once. Managers and farmers have established farms, in addition to the selection of food and animal heritage, other important factors such as temperature, humidity, light and population density are also necessary for the controller can adjust the environmental conditions correctly. In Hironao Okada, Koutarou Suzuki, Tsukamoto Kenji in Toshihiro Itoh2 is explicitly explained by the bird flu virus in skin cancer, but also by the behavior of the sensor. List puts the strain in the field or use of body temperature in lifetime acceleration data. Surveillance data detected on unusual media, automatically reported by users of internet services, as well as historical information, terms and conditions of sale accepted by the media, sensitive individuals. Chicken growth will decrease if the presence of dust and ammonia in the air is excessive. To avoid a low growth rate, moisture should be kept below 50% if the temperature is above 27
degrees. E. L. Nichols3 addresses the following important questions: for growth to be effective, moisture must be controlled. Moisture describes the amount of heat and ammonia to which birds are exposed. Moisture is directly proactive for dust and ammonia in the home. When the temperature is between 15 and 17 degrees, the humidity should be between 50 and 70 degrees. H. Okada1, H. Nogami1, T. Kobayashi, T. Masuda and T. Itoh4 have been developed with a wireless sensor button with very low power to continuously monitor the activity of animal health care. The interrupted effect of measuring body temperature is sufficient for health care and effective to reduce energy consumption. However, in the measurement of activity, intermittent action is not adequate because the change in activity is rapid. This report demonstrates that a highly efficient method in the use of energy to measure continuous activity with a custom LSI developed works with approximately 320 nW of calculated power consumption in standby mode and a piezoelectric false door-to-door MEMS. They also show the knot applied to a chicken health surveillance system for the surveillance of avian influenza in poultry farms.

III. SYSTEM DESIGN

3.1 Block Diagram

System block diagram and description (Also includes Hardware & Software details
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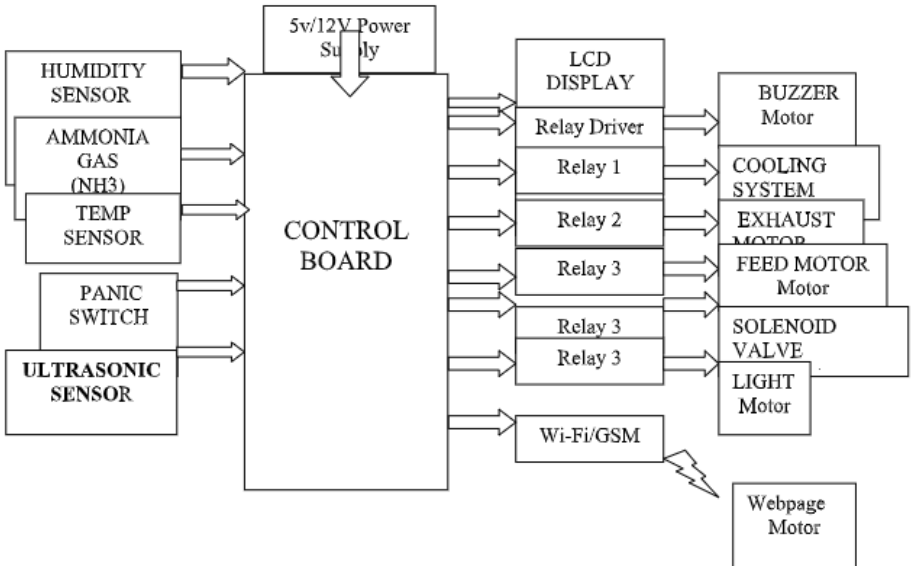

3.2 Block Diagram Description

Poultry automation system can be implemented for monitoring and controlling the poultry farms. With the help of this automated system, we can monitor and control the environmental parameters such as temperature, humidity (moisture), and ammonia gas level (for large scale), feeding which plays a vital role in the production of healthy chicken. Other important specifications like water level, feeding and egg collecting are also can be monitored and controlled by using controller .The above automated system can be accessed by mobile phone or pc anywhere with the help of internet. The above-mentioned environmental parameters are measured and displayed with the help of sensors that are connected with the controller. If the measured parameters are not in suitable range, then the controller triggers the controlling system to maintain the range for the maximum poultry production. The other processes also automated with the regular time period by using the controller. All the information are updated and stored in a cloud platform. The user can control the entire system by using mobile phones or pc from anywhere. This proposed system is unique which can monitor and control all the essential things that are crucial for the maximum production with cost effective method. While other systems only deal with some parameters that are not enough for the better production. Our proposed system is also portable so that it can be easily installed and dismantled anywhere. Moreover, it is fully automated system which significantly reduces the effort of man power and saves time. Moreover, it is cost efficient system which means that any farmer/people can afford it for their purpose. The block diagram of the proposed system is shown in above figure

Hardware Tools:

1. Microcontroller unit (Pic Series)
2. Humidity sensor
3. Temp sensor
4. NH3 sensor
5. Dc Motor
6. Power supply
7. Battery/transformer
8. Buzzer
9. Switches
10. LCD display
11. DC motor
12. Metal Spiral wire

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13. Feeding mechanism

Software Tool:
1. MPLAB IDE
2. PCB wizard
3. Protel SE99
4. Proteus

3.3: Specification of components

3.3.1: Microcontroller (PIC18F4520)

PIC18F4520 is a low-cost, low-power, high-speed 8-bit, fully-static Microcontroller unit that has 40 pins out of which 36 pins can be used as I/O pins. It has Power-on-Reset (POR) as well as the Extended Watchdog Timer (WDT) circuitry, which can be programmed for 4ms to 131s.

It is an 8-bit enhanced flash PIC microcontroller that comes with nano Watt technology and is based on RISC architecture. Many electronic applications house this controller and cover wide areas ranging from home appliances, industrial automation, security system and end-user products. This microcontroller has made a renowned place in the market and becomes a major concern for university students for designing their projects, setting them free from the use of a plethora of components for a specific purpose, as this controller comes with inbuilt peripheral with the ability to perform multiple functions on a single chip.

PIC18F4520 is a PIC microcontroller, introduced Microchip, and mainly used in automation and embedded systems. It comes in three packages known as PDIP, QFN, and TQFP where the first one is 40-pin (mostly used) while other two come with a 44-pin interfacePIC18F4520 also comes with 3 programmable external interrupts & 4 Interrupts-On-Change (IOC) pins, which are reliable features for interrupts related applications. Also, the system has a 13-channel 10-bit ADC converter module.

It has a wide operating voltage range, from 2V to 5.5V., Thus it can be used in 3.3V or 5.0V logic level operations. The below image is showing the detailed pin diagram of the PIC18F4520.

Features:

Embedded Interface Type:
EUSART, I2C, PSP, SPI
Supply Voltage Min: 4.2V
Supply Voltage Max: 5.5V
MCU Family: PIC18
MCU Series: PIC18F45xx
CPU Speed: 40MHz
Program Memory Size: 32KB
RAM Memory Size: 1.5KB
No. of Pins: 40Pins
MCU Case Style: DIP
No. of I/O's: 36I/O's

Fig 3.3.1(a): pic18f4520 microcontroller

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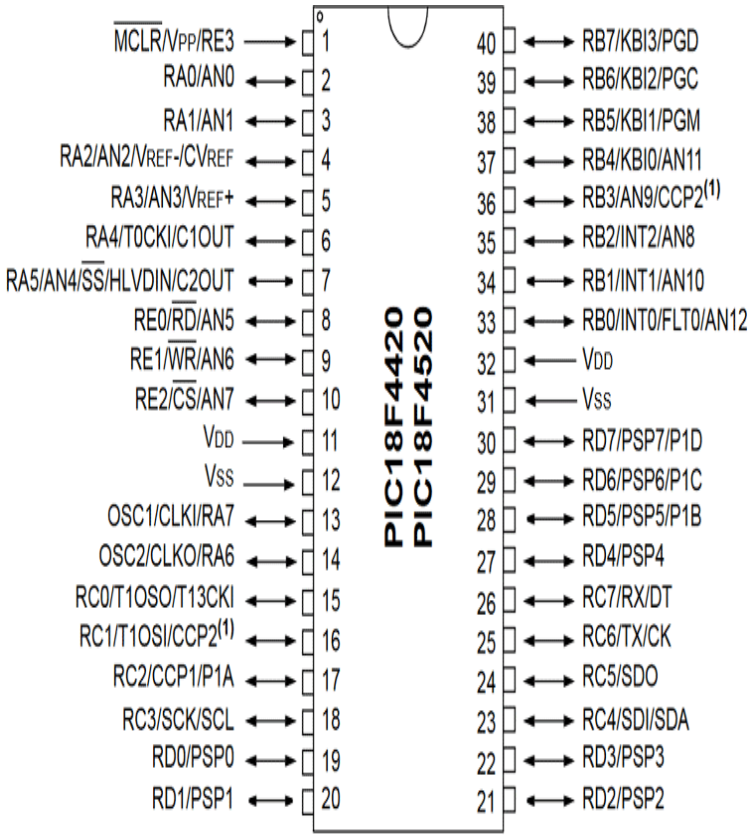
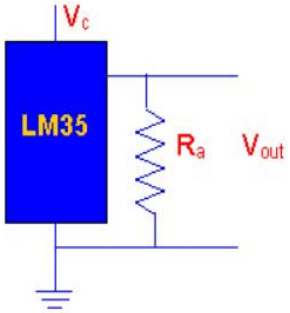


Fig 3.3.1(b): pin diagram of PIC18f452

3.3.2 Temperature Sensor

• It has an output voltage that is proportional to the Celsius temperature.
• The scale factor is .01V/oC or 1mV/C.
• Another important characteristic of the LM35 is that it draws only 60 micro amps from its supply and possesses a low self-heating capability. The sensor self-heating causes less than 0.1 oC temperature rise in still air.
• The operating temperature range is from -55°C to 150°C
• In this circuit, parameter values commonly used are:
o Vc = 4 to 30v
o 5v or 12 v are typical values used.
o Ra = Vc /10-6
o Actually, it can range from 80 KW to 600 KW , but most just use 80 KW.



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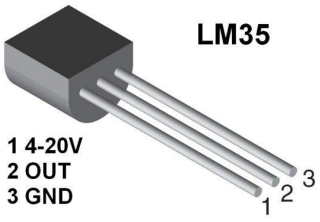
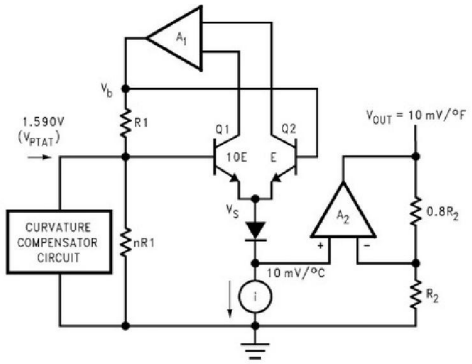
LM35 is an analog, linear temperature sensor whose output voltage varies linearly with change in temperature. LM35 is three terminal linear temperature sensor from National semiconductors. It can measure temperature from-55 degree celsius to +150 degree celsius. The voltage output of the LM35 increases 10mV per degree Celsius rise in temperature. LM35 can be operated from a 5V supply and the stand by current is less than 60uA. The pin out of LM35 is shown in the figure below.



Working

LM35 sensor uses the basic principle of a diode ,where as the temperature increases, the voltage across a diode increases at a known rate.By precisely amplifying the voltage change, it is easy to generate an analog signal that is directly proportional to temperature.

Consider the circuit shown below:



There are two transistors in the center of the circuit. One has ten times the emitter area of the other. This means it has one tenth of the current density, since the same current is going through both transistors. This causes a voltage across the resistor R1 that is proportional to the absolute temperature, and is almost linear across the range we care about. The "almost" part is taken care of by a special circuit that straightens out the slightly curved graph of voltage versus temperature.

The amplifier at the top ensures that the voltage at the base of the left transistor (Q1) is proportional to absolute temperature (PTAT) by comparing the output of the two transistors.

The amplifer at the right converts absolute temperature (measured in Kelvin) into either Fahrenheit or Celsius, depending on the part (LM34 or LM35). The little circle with the "i" in it is a constant current source circuit.

The two resistors are calibrated in the factory to produce a highly accurate temperature sensor.

The integrated circuit has many transistors in it - two in the middle, some in each amplifier, some in the constant current source, and some in the curvature compensation circuit. All of that is fit into the tiny package with three leads

Internet of Things

"The Internet of Things (IoT) is a system of interrelated computing devices, mechanical and digital machines, objects, animals or people that are provided with unique identifiers and the ability to transfer data over a network without requiring human-to-human or human-to-computer interaction."

Things are either sensors or actuators. A sensor is something that tells us about our environment. Think of a temperature sensor, or even the GPS receiver on your mobile phone. Actuators are something that you want to control,

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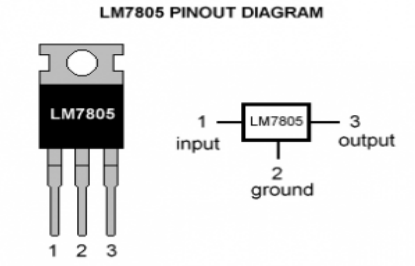
things like thermostats, lights, pumps, and outlets. The "Internet of Things" brings everything together and allows us to interact with our things. For example, you could have your thermostat control itself based on where you're located.

Thing Speak Basics

ThingSpeak is an application platform for the Internet of Things. ThingSpeak allows you to build an application around data collected by sensors. Features of ThingSpeak include real-time data collection, data processing, visualizations, apps, and plugins.

At the heart of ThingSpeak is a ThingSpeak Channel. A channel is where you send your data to be stored. Each channel includes 8 fields for any type of data, 3 location fields, and 1 status field. Once you have a ThingSpeak Channel you can publish data to the channel, have ThingSpeak process the data, and then have your application retrieve the data.



LM7805:

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

Description

The MC78XX/LM78XX/MC78XXA series of three terminal positive regulators are available in theTO-220/D-PAK package and with several fixed output voltages, making them useful in a wide range of applications. Each type employs internal current limiting, thermal shut down and safe operating area protection, making it essentially indestructible. If adequate heat sinking is provided, they can deliver over 1A output current. Although designed primarily as fixed voltage regulators, these devices can be used with external components to obtain adjustable voltages and currents.

Ultrasonic Ranging Module HC - SR04

Product features:

Ultrasonic ranging module HC - SR04 provides 2cm - 400cm non-contact measurement function, the ranging accuracy can reach to 3mm. The modules includes ultrasonic transmitters, receiver and control circuit. The basic principle of work:

(1) Using IO trigger for at least 10us high level signal,

(2) The Module automatically sends eight 40 kHz and detect whether there is a pulse signal back.

(3) IF the signal back, through high level , time of high output IO duration is the time from sending ultrasonic to returning.

Test distance = (high level time×velocity of sound (340M/S) / 2,

Wire connecting direct as following:

5V Supply
Trigger Pulse Input
Echo Pulse Output
0V Ground

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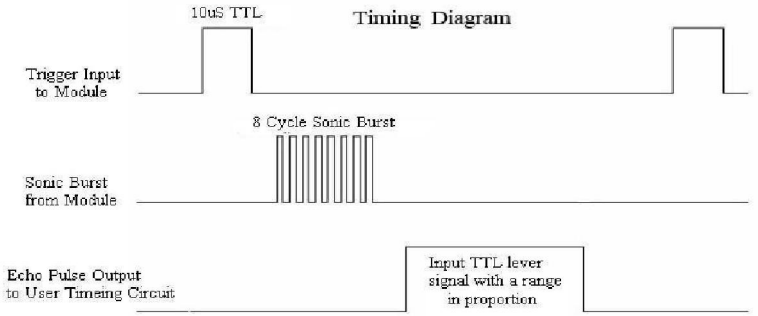
Electric Parameter

Working Voltage	**DC 5 V**
Working Current	**15mA**
Working Frequency	**40Hz**
Max Range	**4m**
Min Range	**2cm**
MeasuringAngle	**15 degree**
Trigger Input Signal	**10uS TTL pulse**
Echo Output Signal	**Input TTL lever signal and the range in proportion**
Dimension	**45*20*15mm**

Vcc, Trig, Echo, GND

Timing diagram

The Timing diagram is shown below. You only need to supply a short 10uS pulse to the trigger input to start the ranging, and then the module will send out an 8 cycle burst of ultrasound at 40 kHz and raise its echo. The Echo is a distance object that is pulse width and the range in proportion .You can calculate the range through the time interval between sending trigger signal and receiving echo signal. Formula: uS / 58 = centimeters or uS / 148 =inch; or: the range = high level time * velocity (340M/S) / 2; we suggest to use over 60ms measurement cycle, in order to prevent trigger signal to the echo signal.



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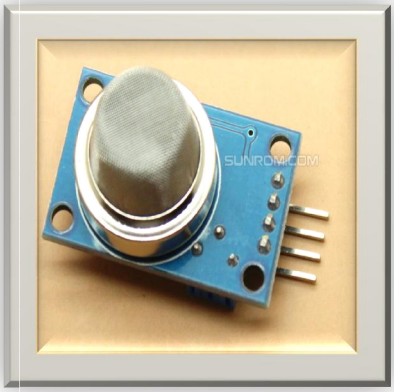
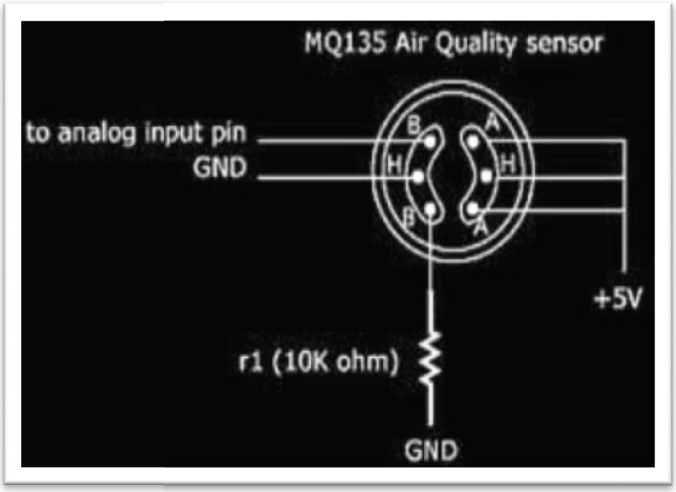
IV. AIR QUALITY SENSOR



What is MQ-135 sensor?

MQ-135 is an air quality or air pollution measuring sensor device. It can detect various chemical contents in air and give appropriate voltage variation at the output pin depending on the chemical concentration in air. It can detect alcohol, Benzene, smoke, NH3, butane, propane etc. if anyone of the stated chemical concentration , the sensor convert the chemical concentration in air to appropriate voltage range, which can be processed by Arduino or any microcontroller. It cannot tell what kind of chemical concentration rose in the air. Here is a basic connection diagram



Two 'A' pins are shorted internally and two 'B' pins are shorted internally. H and H pins is heater coil of the. The heater coil is used to heat up the air around the sensor, so that it can detect the chemical content in the air optimally.

The sensor can take up to few minutes to heat up to reach optimal working condition. It not advisable to touch the sensor while operating because it can get pretty warm.

The sensor has an operating voltage of 5V; the sensor must be powered from external sources only, as it consumes about 200mA for heating. The arduino voltage regulator can't deliver this much current.

For testing, you can connect a ammeter in mA range at the output pin B and bring a cigar gas lighter. Try to leak the gas without igniting it near the sensor. As the concentration of gas rises around the sensor, the current flow through ammeter increases. If this works, your sensor is working normally.

Now, you know quite a bit about MQ-135 Sensor, let's move ahead and learn how to interface the MQ-135 with Arduino interfacing

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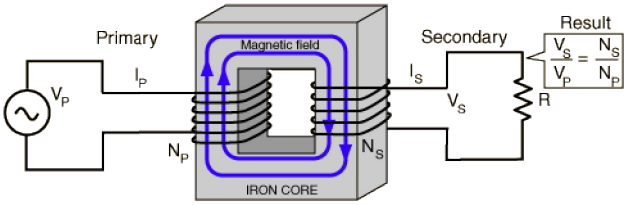
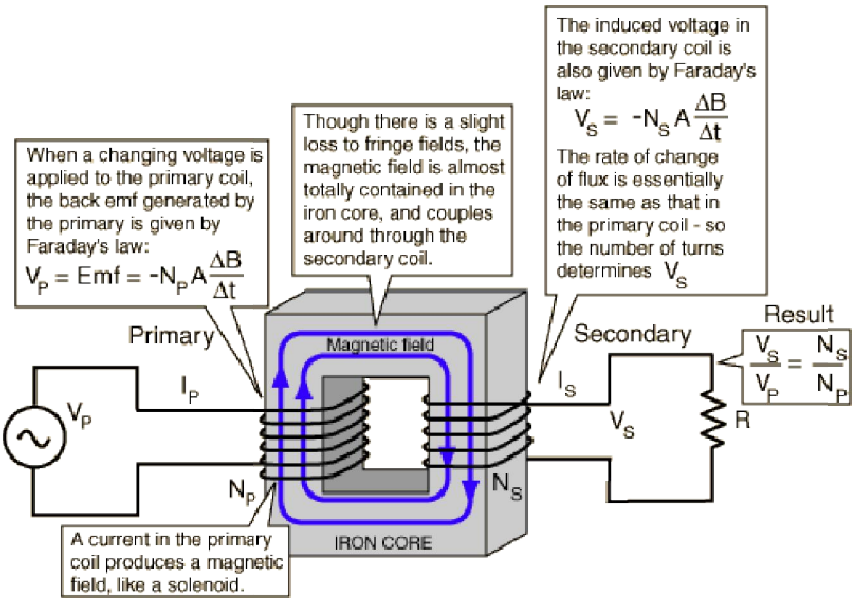
Transformer

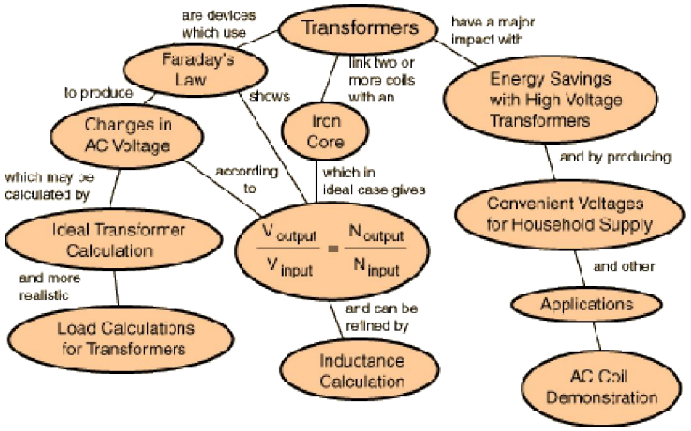
A transformer makes use of Faraday's law and the ferromagnetic properties of an iron core to efficiently raise or lower AC voltages. It of course cannot increase power so that if the voltage is raised, the current is proportionally lowered and vice versa.



Transformer and Faraday's Law



TRANSFORMER CONCEPTS



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A resistor is a two-terminal electronic component designed to oppose an electric current by producing a voltage drop between its terminals in proportion to the current, that is, in accordance with Ohm's law:

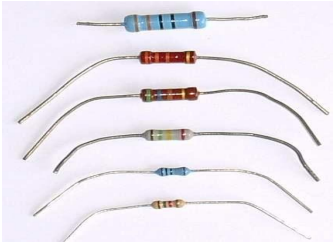
$$V = IR$$

Resistors are used as part of electrical networks and electronic circuits. They are extremely commonplace in most electronic equipment. Practical resistors can be made of various compounds and films, as well as resistance wire (wire made of a high-resistivity alloy, such as nickel/chrome).

The primary characteristics of resistors are their resistance and the power they can dissipate. Other characteristics include temperature coefficient, noise, and inductance. Less well-known is critical resistance, the value below which power dissipation limits the maximum permitted current flow, and above which the limit is applied voltage. Critical resistance depends upon the materials constituting the resistor as well as its physical dimensions; it's determined by design.

RESISTORS

Resistors can be integrated into hybrid and printed circuits, as well as integrated circuits. Size, and position of leads (or terminals) are relevant to equipment designers; resistors must be physically large enough not to overheat when dissipating their power.



A resistor is a two-terminal passive electronic component which implements electrical resistance as a circuit element. When a voltage V is applied across the terminals of a resistor, a current I will flow through the resistor in direct proportion to that voltage. The reciprocal of the constant of proportionality is known as the resistance R, since, with a given voltage V, a larger value of R further "resists" the flow of current I as given by Ohm's law:

$$I = \frac{V}{R}$$

Resistors are common elements of electrical networks and electronic circuits and are ubiquitous in most electronic equipment. Practical resistors can be made of various compounds and films, as well as resistance wire (wire made of a high-resistivity alloy, such as nickel-chrome). Resistors are also implemented within integrated circuits, particularly analog devices, and can also be integrated into hybrid and printed circuits.

The electrical functionality of a resistor is specified by its resistance: common commercial resistors are manufactured over a range of more than 9 orders of magnitude. When specifying that resistance in an electronic design, the required precision of the resistance may require attention to the manufacturing tolerance of the chosen
resistor, according to its specific application. The temperature coefficient of the resistance may also be of concern in some precision applications. Practical resistors are also specified as having a maximum power rating which must exceed the anticipated power dissipation of that resistor in a particular circuit: this is mainly of concern in power electronics applications. Resistors with higher power ratings are physically larger and may require heat sinking. In a high voltage circuit, attention must sometimes be paid to the rated maximum working voltage of the resistor.

The series inductance of a practical resistor causes its behavior to depart from ohms law; this specification can be important in some high-frequency applications for smaller values of resistance. In a low-noise amplifier or pre-amp the noise characteristics of a resistor may be an issue. The unwanted inductance, excess noise, and temperature coefficient are mainly dependent on the technology used in manufacturing the resistor. They are not normally specified individually for a particular family of resistors manufactured using a particular technology. A family of discrete resistors is also characterized according to its form factor, that is, the size of the device and position of its leads (or terminals) which is relevant in the practical manufacturing of circuits using them.

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Units

The ohm (symbol: Ω) is the SI unit of electrical resistance, named after Georg Simon Ohm. An ohm is equivalent to a volt per ampere. Since resistors are specified and manufactured over a very large range of values, the derived units of milliohm (1 mΩ = 10^{-3} Ω), kilohm (1 kΩ = 10^{3} Ω), and megohm (1 MΩ = 10^{6} Ω) are also in common usage.

The reciprocal of resistance R is called conductance G = 1/R and is measured in Siemens (SI unit), sometimes referred to as a mho. Thus a Siemens is the reciprocal of an ohm: $S = \Omega^{-1}$. Although the concept of conductance is often used in circuit analysis, practical resistors are always specified in terms of their resistance (ohms) rather than conductance.

Variable resistors

Adjustable resistors

A resistor may have one or more fixed tapping points so that the resistance can be changed by moving the connecting wires to different terminals. Some wirewound power resistors have a tapping point that can slide along the resistance element, allowing a larger or smaller part of the resistance to be used.

Where continuous adjustment of the resistance value during operation of equipment is required, the sliding resistance tap can be connected to a knob accessible to an operator. Such a device is called a rheostat and has two terminals.

Potentiometers

A common element in electronic devices is a three-terminal resistor with a continuously adjustable tapping point controlled by rotation of a shaft or knob. These variable resistors are known as potentiometers when all three terminals are present, since they act as a continuously adjustable voltage divider. A common example is a volume control for a radio receiver.

Accurate, high-resolution panel-mounted potentiometers (or "pots") have resistance elements typically wire wound on a helical mandrel, although some include a conductive-plastic resistance coating over the wire to improve resolution. These typically offer ten turns of their shafts to cover their full range. They are usually set with dials that include a simple turns counter and a graduated dial. Electronic analog computers used them in quantity for setting coefficients, and delayed-sweep oscilloscopes of recent decades included one on their panels.

PIEZOELECTRIC BUZZER

MICRO BUZZER 5V DC / 20mA PCB TYPE

Features

sealed: yes
operating power: 3-6V DC / 25mA
extremely compact, ultrathin construction
no electrical noise
low current consumption yet high sound pressure level

Specifications

tone type: single
operating voltage: 3-6V DC
rated voltage: 5V DC
current consumption: 25mA
osc. frequency: 3.2kHz

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sound level: 87dB
connector type: pcb
body color: gray
weight: 0.056oz

Motor:

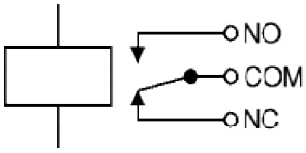
Geared DC motors can be defined as an extension of DC motor which already had its Insight details demystified here. A geared DC Motor has a gear assembly attached to the motor. The speed of motor is counted in terms of rotations of the shaft per minute and is termed as RPM .The gear assembly helps in increasing the torque and reducing the speed. Using the correct combination of gears in a gear motor, its speed can be reduced to any desirable figure. This concept where gears reduce the speed of the vehicle but increase its torque is known as gear reduction. This Insight will explore all the minor and major details that make the gear head and hence the working of geared DC motor.

12V DC FAN:

A **DC** ceiling **fan** works pretty much on the same **principle** as the **DC motor**. A **DC motor** uses an internal arrangement of magnets with opposing polarity. As current passes through the coil around this arrangement, a strong magnetic field is produced. This magnetic field then creates a torque that causes the **motor** to rotate

RELAY

A relay is an electrically operated switch. Many relays use an electromagnet to operate a switching mechanism mechanically, but other operating principles are also used. Relays are used where it is necessary to control a circuit by a low-power signal (with complete electrical isolation between control and controlled circuits), or where several circuits must be controlled by one signal.



A relay is an electrically operated switch. Current flowing through the coil of the relay creates a magnetic field which attracts a lever and changes the switch contacts. The coil current can be on or off so relays have two switch positions and most have double throw (changeover) switch contacts as shown in the diagram.

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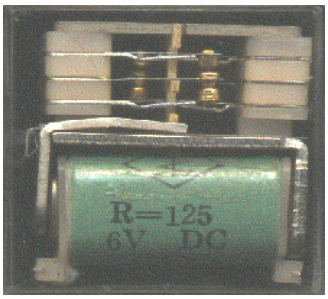


Fig 4.8 Relay showing coil and switch contacts

Relays allow one circuit to switch a second circuit which can be completely separate from the first. For example a low voltage battery circuit can use a relay to switch a 230V AC mains circuit. There is no electrical connection inside the relay between the two circuits; the link is magnetic and mechanical.

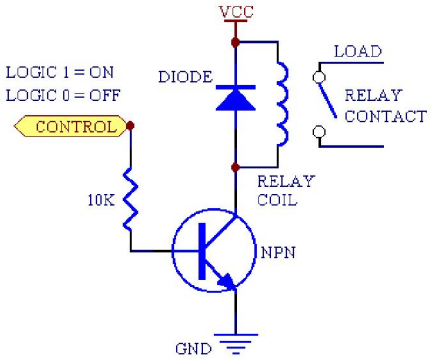
The coil of a relay passes a relatively large current, typically 30mA for a 12V relay, but it can be as much as 100mA for relays designed to operate from lower voltages. Most ICs (chips) cannot provide this current and a transistor is usually used to amplify the small IC current to the larger value required for the relay coil. The maximum output current for the popular 555 timer IC is 200mA so these devices can supply relay coils directly without amplification.

Relays are usually SPDT or DPDT but they can have many more sets of switch contacts, for example relays with 4 sets of changeover contacts are readily available. For further information about switch contacts and the terms used to describe them please see the page on switches.

Most relays are designed for PCB mounting but you can solder wires directly to the pins providing you take care to avoid melting the plastic case of the relay.

The supplier's catalogue should show you the relay's connections. The coil will be obvious and it may be connected either way round. Relay coils produce brief high voltage 'spikes' when they are switched off and this can destroy transistors and ICs in the circuit. To prevent damage you must connect a protection diode across the relay coil.

The figure shows a relay with its coil and switch contacts. You can see a lever on the left being attracted by magnetism when the coil is switched on. This lever moves the switch contacts.



There is one set of contacts (SPDT) in the foreground and another behind them, making the relay DPDT.

The relay's switch connections are usually labelled COM, NC and NO:

COM = Common, always connect to this; it is the moving part of the switch.

NC = Normally Closed, COM is connected to this when the relay coil is off.

NO = Normally Open, COM is connected to this when the relay coil is on.

Applications of relays

Relays are used to and for:

Control a high-voltage circuit with a low-voltage signal, as in some types of modems or audio amplifiers.

Control a high-current circuit with a low-current signal, as in the starter solenoid of an automobile.

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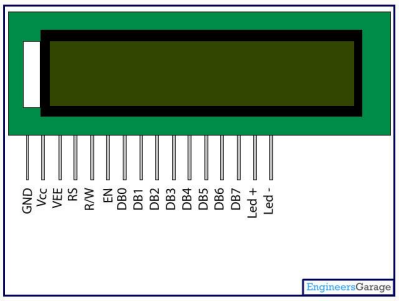
Detect and isolate faults on transmission and distribution lines by opening and closing circuit breakers.
Time delay functions. Relays can be modified to delay opening or delay closing a set of contacts. A very short (a fraction of a second) delay would use a copper disk between the armature and moving blade assembly. Current flowing in the disk maintains magnetic field for a short time, lengthening release time. For a slightly longer (up to a minute) delay, a dashpot is used. A dashpot is a piston filled with fluid that is allowed to escape slowly. The time period can be varied by increasing or decreasing the flow rate. For longer time periods, a mechanical clockwork timer is installed

16*2 LCD DISPLAY:

LCD (Liquid Crystal Display) screen is an electronic display module and find a wide range of applications. A 16x2 LCD display is very basic module and is very commonly used in various devices and circuits. These modules are preferred over seven segments and other multi segment LEDs. The reasons being: LCDs are economical; easily programmable; have no limitation of displaying special & even custom characters (unlike in seven segments), animations and so on.

A **16x2 LCD** means it can display 16 characters per line and there are 2 such lines. In this LCD each character is displayed in 5x7 pixel matrix. This LCD has two registers, namely, Command and Data.

The command register stores the command instructions given to the LCD. A command is an instruction given to LCD to do a predefined task like initializing it, clearing its screen, setting the cursor position, controlling display etc. The data register stores the data to be displayed on the LCD. The data is the ASCII value of the character to be displayed on the LCD. Click to learn more about internal structure of a LCD.



6. Interface pin description

Pin no.	Symbol	External connection	Function
1	Vss	Power supply	Signal ground for LCM
2	V_{DD}		Power supply for logic for LCM
3	V_0		Contrast adjust
4	RS	MPU	Register select signal
5	R/W	MPU	Read/write select signal
6	E	MPU	Operation (data read/write) enable signal
7~10	DB0~DB3	MPU	Four low order bi-directional three-state data bus lines. Used for data transfer between the MPU and the LCM. These four are not used during 4-bit operation.
11~14	DB4~DB7	MPU	Four high order bi-directional three-state data bus lines. Used for data transfer between the MPU
15	LED+	LED BKL power supply	Power supply for BKL
16	LED-		Power supply for BKL

V0 (Set Lcd contrast)

Set lcd contrast here. Best way is to use variable resistor such as potentiometer. Output of the potentiometer is connected to this pin. Rotate the potentiometer knob forward and backward to adjust the lcd contrast.

RS(Register select)

Their are two registers in every lcd
1 Command Register
2 Data Register

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Command Register

When we send commands to lcd these commands go to Command register and are processed their.
Commands with their full description are given in the picture below.

When RS=0 Command Register is Selected.

Data Register

When we send Data to lcd it goes to data register and is processed their.

When RS=1 Data Register is selected.

RW(Read - Write)

When RW=1 We want to read data from lcd.
When RW=0 We want to write to lcd.

EN(Enable signal)

When you select the register(Command and Data) and set RW(read - write) now its time to execute the instruction. By instruction i mean the 8-bit data or 8-bit command present on Data lines of lcd.
This requires an extra voltage push to execute the instruction and EN(enable) signal is used for this purpose. Usually we make it en=0 and when we want to exectue the instruction we make it high en=1 for some milli seconds. After this we again make it ground en=0.
Data which we send to our lcd can be any alphabet(small or big) , digit or ASCII character.

NOTE: we can not send an integer,float,long,double type data to lcd because lcd is designed to display a character only. The 8 data pins on lcd carries only ASCII 8-bit code of the character to lcd. How ever we can convert our data in character type array and send one by one our data to lcd. Data can be sent using lcd in 8-bit 0r 4-bit mode. If 4-bit mode is used, two nibbles of data (First high four bits and then low four bits) are sent to complete a full eight-bit transfer. 8-bit mode is best used when speed is required in an application and at least ten I/O pins are available. 4-bit mode requires a minimum of seven bits. In 4-bit mode, only the top 4 data pins (4-7) are used.

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 coursor position on display	0x80+add	128+add

Command 0x30 means we are setting 8-bit mode lcd having 1 line and we are initializing it to be 5x7 character display.Now this 5x7 is some thing which every one should know what it stands for. usually the characters are displayed on lcd in 5x8 matrices form. where 5 is total number of coulombs and is number of rows.Thus the above

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0x30 command initializes the lcd to display character in 5 coulombs and 7 rows the last row we usually leave for our cursor to move or blink etc.

The Character is displayed on lcd screen in 5x8 or 5x7 matrix. Where 5 represents number of coulombs and 7,8 represent number of rows. Maximum size of the matrix is 5x8. You can not display character greater then 5x8 dimension matrix. To display character greater than this dimension you have to switch to graphical lcds. To learn about graphical lcds here is a good tutorial GRAPHICAL LCD WORKING AND PINOUT.

The command 0x38 means we are setting 8-bit mode lcd having two lines and character shape between 5x7 matrix.

The command 0x20 means we are setting 4-bit mode lcd having 1 line and character shape between 5x7 matrix.

The command 0x28 means we are setting 4-bit mode lcd having 2 lines and character shape between 5x7 matrix.

The command 0x06 is entry mode it tells the lcd that we are going to use you'

The command 0x08 dispalys cursor off and display off but with out clearing DDRAM contents.

The command 0x0E displays cursor on and dispaly on.

The command 0x0c dispaly on cursor off(displays cursor off but the text will appear on lcd)

The command 0x0F dispaly on cursor blink(text will appear on screen and cursor will blink).

The command 0x18 shift entire dispaly left(shift whole off the text on the particular line to its left).

The command 0x1C shift entire dispaly right(shift whole off the text on the particular line to its right).

The command 0x10 Moves cursor one step left or move cursor on step a head to left when ever new character is displayed on the screen.

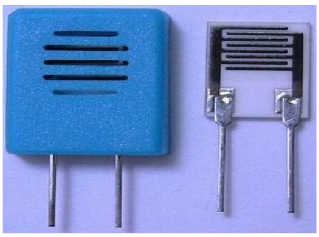
The command 0x14 Moves cursor one step right or move cursor on step a head to righ when ever new character is displayed on the screen.

The command 0x01 clear all the contents of the DDRAM and also clear the lcd removes all the text from the screen.

The command 0x80 initialize the cursor to the first position means first line first matrix(start point) now if we add 1 in 0x80+1=0x81 the cursor moves to second matrix.

16x1 lcd displays 16 characters only. The first will appear on 0x80 second 0x81 third 0x82 and so on until last, the 16 once on address 0x8F

Resistive humidity sensor, Model: HR202



HR202 is a new kind of humidity-sensitive resistor made from organic macromolecule materials, it can be used in occasions like: hospitals, storage, workshop, textile industry, tobaccos, pharmaceutical field, meteorology, etc.

Features:

Excellent linearity, low power consumption, wide measurement range, quick response, anti-pollution, high stability, high performance-price ratio.

Technical Specification:

Operating range: humidity(20-95%RH) temperature(0-60Celsius)
Power supply: 1.5V AC(Max sine)
Operating frequency: 500Hz-2kHz
Rated power: 0.2mW(Max sine)
Central value: 31kΩ(at 25Celsius, 1kHz ,1V AC, 60%RH)
Impedance range: 19.8-50.2kΩ(at 25Celsius, 1kHz ,1V AC, 60%RH)
Accuracy: +-5%RH

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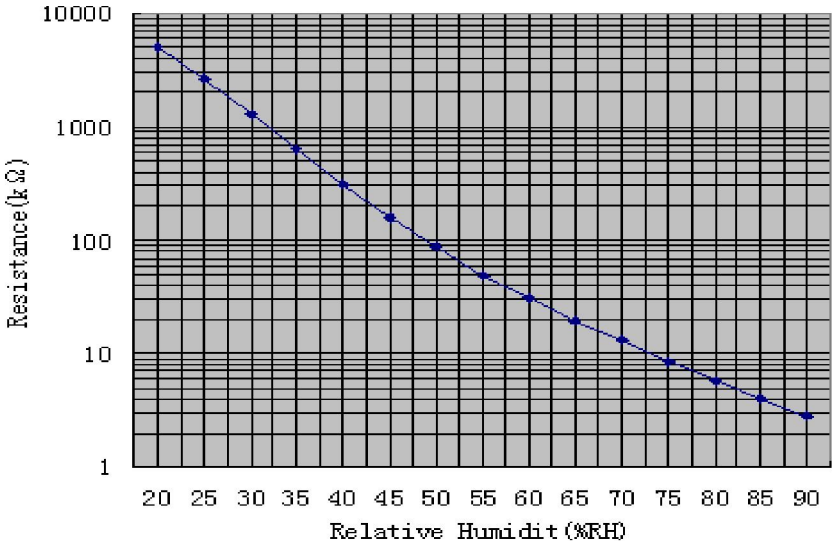
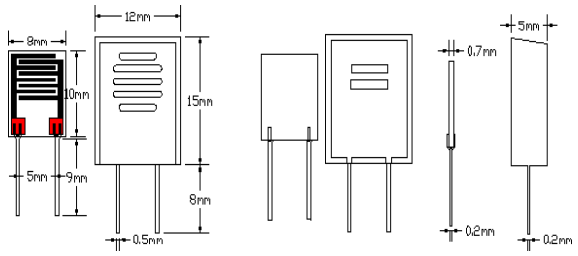
Hysteresis: +-1%RH
Long-term stability: +-1%RH/year
Response time: <10s
Dimensions: with case 12*15*5mm, without case 8*10*0.7mm

Performance parameter(at 1KHz) Unit: ohm

	0℃	5℃	10℃	15℃	20℃	25℃	30℃	35℃	40℃	45℃	50℃	55℃	60℃
20%RH				10M	6.7M	5.0M	3.9M	3.0M	2.4M	1.75M	1.45M	1.15M	970K
25%RH		10M	7.0M	5.0M	3.4M	2.6M	1.9M	1.5M	1.1M	880K	700K	560K	450K
30%RH	6.4M	4.6M	3.2M	2.3M	1.75M	1.3M	970K	740K	570K	420K	340K	270K	215K
35%RH	2.9M	2.1M	1.5M	1.1M	850K	630K	460K	380K	280K	210K	170K	130K	150K
40%RH	1.4M	1.0M	750K	540K	420K	310K	235K	190K	140K	110K	88K	70K	57K
45%RH	700K	500K	380K	280K	210K	160K	125K	100K	78K	64K	50K	41K	34K
50%RH	370K	26K	200K	150K	115K	87K	69K	56K	45K	38K	31K	25K	21K
55%RH	190K	140K	110K	84K	64K	49K	39K	33K	27K	24K	19.5K	17K	14K
60%RH	105K	80K	62K	50K	39K	31K	25K	20K	17.5K	15K	13K	11K	9.4K
65%RH	62K	48K	37K	30K	24K	19.5K	16K	13K	11.5K	10K	8.6K	7.6K	6.8K
70%RH	38K	30K	24K	19K	15.5K	13K	10.5K	9.0K	8.0K	7.0K	6.0K	5.4K	4.8K
75%RH	23K	18K	15K	12K	10K	8.4K	7.2K	6.2K	5.6K	4.9K	4.2K	3.8K	3.4K
80%RH	15.5K	12.0K	10.0K	8.0K	7.0K	5.7K	5.0K	4.3K	3.9K	3.4K	3.0K	2.7K	2.5K
85%RH	10.5K	8.2K	6.8K	5.5K	4.8K	4.0K	3.5K	3.1K	2.8K	2.4K	2.1K	1.9K	1.8K
90%RH	7.1K	5.3K	4.7K	4.0K	3.3K	2.8K	2.5K	2.2K	2.0K	1.8K	1.55K	1.4K	1.3K

Impedance performance (at25℃ 1V AC 1kHz)





Cautions:

Avoid polarization, driving voltage or current should be 100% alternative.
Please measure the sensor with LCR alternative-current bridge, don't use multimeter.

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Avoid dew condensation.
Recommended storage conditions: temperature 0-60Celsius; humidity <80%RH

Design of Power supply:

All electronic circuits use DC power supply of adequate voltage for their operation.
To obtain this DC voltage from 230V AC mains, we need to use a 'rectifier'. The rectified DC voltage is 'pulsating ' in nature. We know that a combination of rectifier & filter can produce a dc voltage which is almost pure i.e. ripple free.
However, the problem with such a power supply is that its output voltage will not remain constant in the event of fluctuations in ac input voltage or changes in load current. This type of power supply is called as unregulated power supply.
The power supply, which provides a constant output voltage irrespective of everything is called, regulated power supply. So we have to design a regulated power supply using series voltage regulator IC 7805.
Following figure shows general block diagram of regulated power supply.

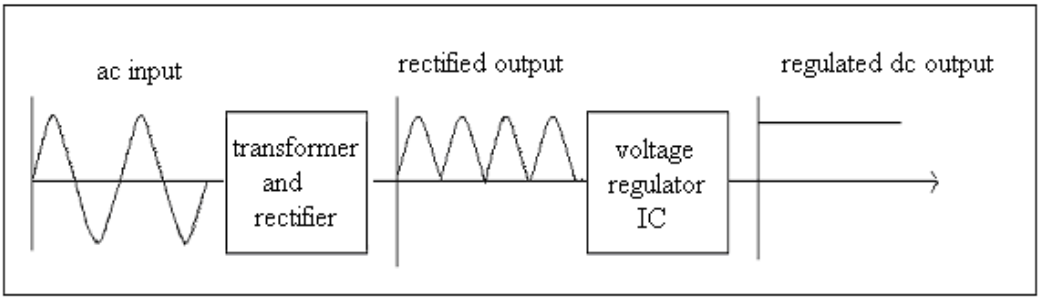

FIGURE 8: GENERAL BLOCK DIAGRAM OF POWER SUPPLY

BRIDGE RECTIFIER

Bridge rectifier circuit consists of four diodes arranged in the form of a bridge as shown in figure

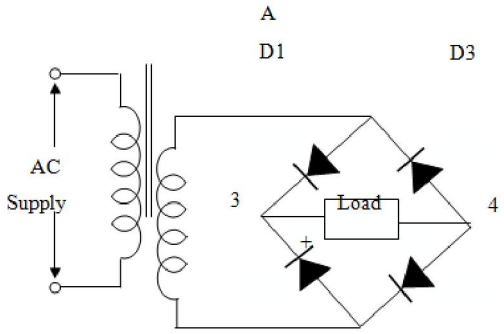

Figure No. 1.11: Bridge Rectifier

OPERATION

During the positive half cycle of the input supply, the upper end A of the transformer secondary becomes positive with respect to its lower point B. This makes Point1 of bridge
Positive with respect to point 2. The diode D1 & D2 become forward biased & D3 & D4 become reverse biased. As a result a current starts flowing from point1, through D1 the load & D2 to the negative end.
During negative half cycle, the point2 becomes positive with respect to point1. Diodes
D1 & D2 now become reverse biased. Thus a current flow from point 2 to point1.

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TRANSFORMER

Transformer is a major class of coils having two or more windings usually wrapped around a common core made from laminated iron sheets. It has two cols named primary and secondary. If the current flowing through primary is fluctuating, then a current will be inducted into the secondary winding. A steady current will not be transferred from one coil to other coil.

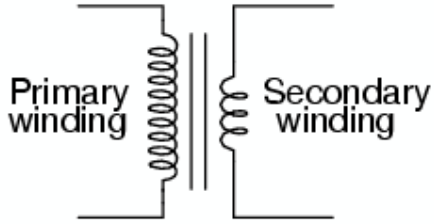

Figure No. 1.12: Basic Transformer

Design of C1:

The maximum current that can be drawn from this IC is 1A.

But our circuit requires maximum current of Imax, which is summation of all the current required to drive individual IC,s.

Im = 100 mA

For safety purpose, we consider the maximum current limit exactly double of the circuit requirement

Imax=2Im.

Therefore, Imax = 200 mA.

We know that,

$$Q = CV \quad \ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots (1)$$

Where,

Q = charge on capacitor.

C = capacitance.

V = voltage applied to capacitor.

Also,

$$Q = I\,t. \quad \ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots (2)$$

Where,

I = Imax.

t = period of output voltage of rectifier.

Equating equations (1) & (2), we get

$$CV = Imax\,t. \quad \ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots (3)$$

Now, at input of transformer, applied voltage frequency is 50 Hz.

As we have used step down transformer of 9-0-9 V, we get output voltage having same frequency of 50 Hz but amplitude step down to 9V (rms).

After rectification, frequency doubles & amplitude becomes Vpeak, as shown in figure.

Vin(rms) = 230 v.

Vsec(rms)= 9v.

Therefore, Vpeak = Vp = Vsec / 0.707.

Vp = 12 v.

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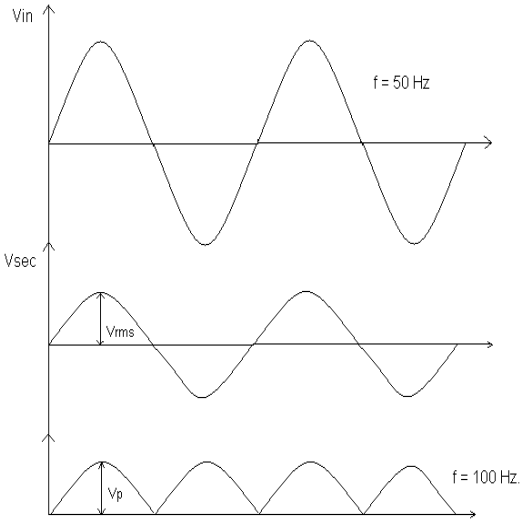

And, t = 1 / 2f.
= 1 / 100.
= 0.01 sec.

From equation (3),

CV = I t.

Therefore,

C = Imax t / V.
= 200 * 0.01 / 12
= 166.66 uF.

Select, C1= 470 uF.

Design of C2:

We know that, due to internal circuitry of IC 7805 and load connected at the output of power supply; various types of noises are generated at its output, such as thermal noise, flicker noise, shot noise, white noise etc. Hence in order to bypass all these noises, we have to connect a capacitor C2.

It can take value between 0.1uF to 100uF.

Here we have connected C2 = 100 uF

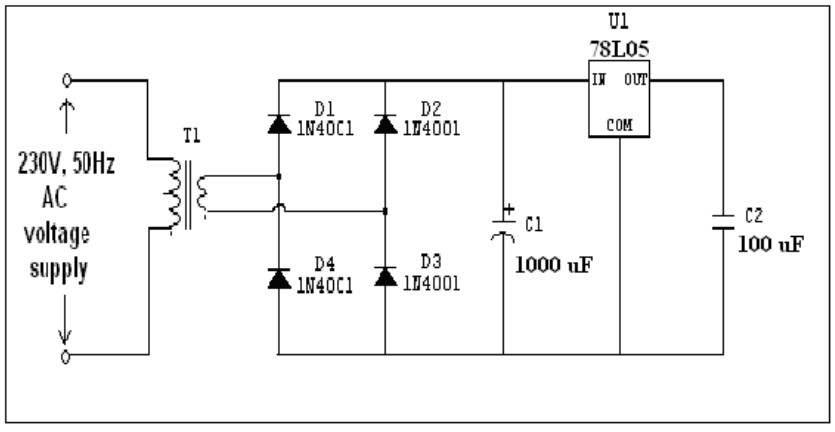

FIGURE 9: DESIGN FOR 5v POWER SUPPLY

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LCD DISPLAY

DESCRIPTION OF LCD DISPLAY

This is the first interfacing example for the Parallel Port. We will start with something simple. This example doesn't use the Bi-directional feature found on newer ports, thus it should work with most, if not all Parallel Ports. It however doesn't show the use of the Status Port as an input. These LCD Modules are very common these days, and are quite simple to work with, as all the logic required to run them is on board.

SCHEMATIC DIAGRAM

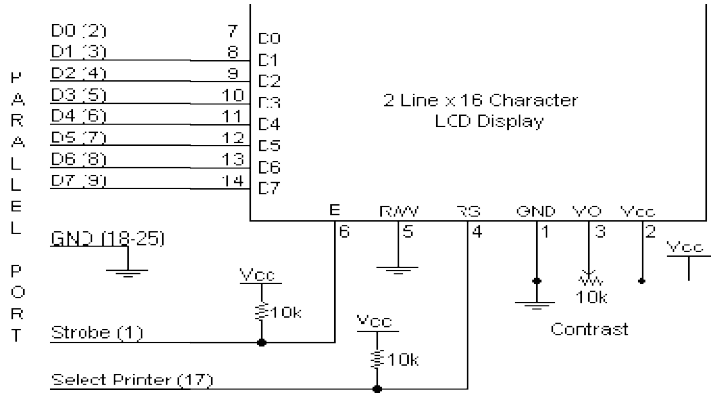

Figure No. 1.8: Schematic Diagram of LCD Display

V. PROJECT PLAN

Week No.	Action plan
1	Searching of Project information
2	Collection of components requiredfor project
3	Designing of PCB , printing of copper for interior layer
4	Etching, drilling, layer alignment ofPCB
5	Mounting components on PCB as per circuit diagram
6	Soldering components on PCB
7	Software Development for theproject
8	Testing circuit is proper or not
9	Troubleshooting for any problems
10	Checking project is properly working or not if not then correct
11	Presentation of report
12	Presentation of PPT
13	Checking project from project guide
14	Checking report & PPT fromproject guide
15	Confirmation from project guide,co-ordinator , HOD
16	Submission of Project model,Project report, PPT

VI. ADVANTAGES & APPLICATION

6.1 Advantages:

• The proposed system converts traditional farm into a smart farm.

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• It provides quicker and accurate information about different parameters to Poultry owner. The System is less expensive and affordable for not only poultry owners but also all those who look up for poultry farming as their side business.
• The smart monitoring of different parameters like temperature, light, humidity, gas etc. by using wireless sensor network.
• Production and health of poultry product improves
• Cleanliness of the farm becomes easier.
• Sufficient electricity is generated itself in the farm

6.2 Disadvantages:
• One potential disadvantage of an IoT-based smart poultry farm is the vulnerability to cyber threats.
• As the farm relies on interconnected devices, there's a risk of unauthorized access or data breaches, which could impact the farm's operations and compromise the well-being of the poultry..

6.3 Application
• An IoT-based smart poultry farm can monitor and automate various aspects,
• temperature control, feeding schedules, and health tracking for chickens.
• It enhances efficiency, reduces costs, and ensures optimal conditions for poultry growth.

VII. CONCLUSION & FUTURE SCOPE

7.1 Conclusion
• After the development of the system it is found that the system is successful in the case of small scale poultry farming.
• Product installation is very much flexible, it can be installed in any coop.
• By installing this product small scale poultry farmers could spare their time for other beneficial activities.
• It encourages household to be self-sufficient in poultry products. An egg collecting system should be added to the existing system.
• A floor cleaning system can also be incorporated with solar source.

7.2 Future Scope:
Several studies have been conducted in countries such as Saudi Arabia and Japan, and it has been deduced that most chickens were generally affected by the bird flu virus. Poultry farms usually produce a large amount of animal waste. Thanks to this, Goober's gas can be developed and used for daily energy needs. That is why it is very important to maintain the right environment for the chickens. The health of the chicken at a young age is something that needs to be taken care of, because it is possible that chicks are arguing for survival. The import of air into poultry farming is also important. You must therefore take precautions when building the farm. Studies have shown that the effective growth of chickens depends on the amount of ammonia in the environment. That is why this also offers an opportunity for future study.

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