

# Remote Data Logger For Ambient Light

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## I. Abstract:-

The Remote Data Logger For Ambient Light is light weighted, portable electronic device used for uploading data on IoT Cloud.

The main purpose of project is to upload analogous data on the cloud which will be helpful for Home Automation.

This handheld device is a small & portable which uploads the data of Light Intensity on the Phant Server.

In the fast growing field of software engineering and development and even more rapidly growing sector of automation the future is hard to predict. Thus developing a project with automation has become a necessity in future growing needs of human life.

Keywords:-Ambient light sensing, Temperature sensing, IOT, Arduino

## II. Introduction:-

In this paper, an effort has been made to design and develop a smart real time embedded Arduino based data logger for

## IV. Block Diagram Explanation:-

### Power Supplies

Types of Power Supply:

There are many types of power supply. Most are designed to convert high voltage AC mains electricity to a suitable low voltage supply for electronics circuits and other devices. A power supply can be broken down into a series of blocks, each of which performs a particular function.

For example a 5V regulated supply:

indoor and outdoor environment. The present work has been concentrated to environmental parameters such as temperature & LDR. The data logger is proposed to be developed with the use of Arduino Nano based on ATmega328. The ArduinoMicrocontroller board is used which has inbuilt ADC and other peripheral circuitry necessary for operation. The physical parameter is sensed by the sensors and is converted into analog signal. This analog signal is fed to the Arduino board ADC pins which is then converted in to an equivalent digital quantity and is further processed in the microcontroller. The raw digital signal or processed signal out of microcontroller may be displayed on the LCD display or at the same time this data is sent to computer through the IoT .

## III. Block Diagram:-

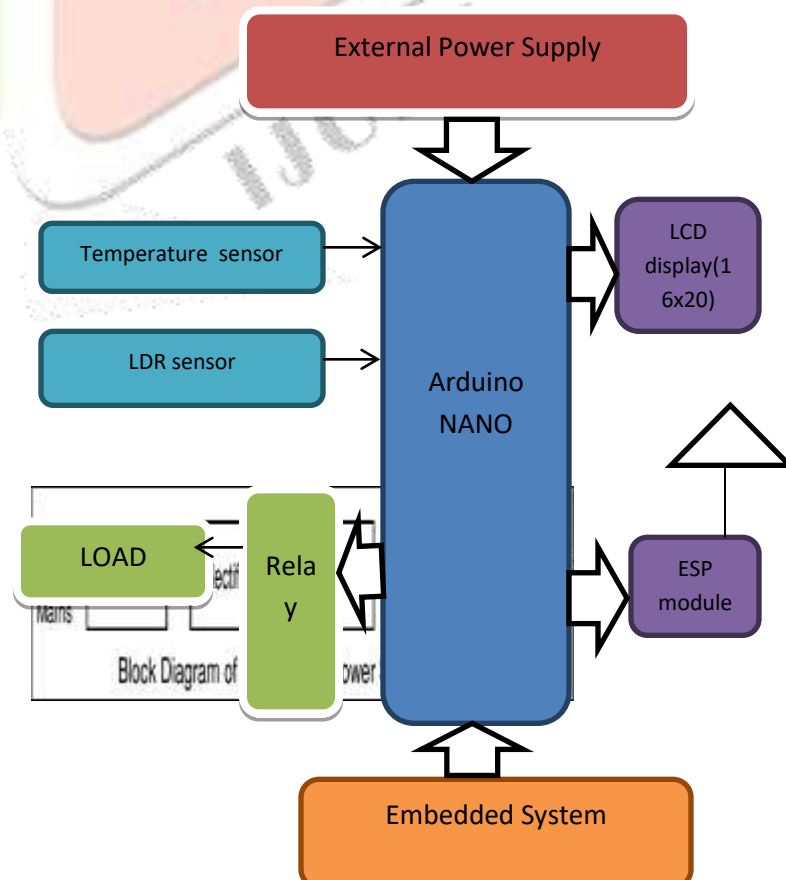


Fig.2.Regulated Power Supply

Each of the blocks is described in more detail below:

The Power Supply

You will definitely need a regulated 5-volt power supply to work with TTL chips. As mentioned previously, neither Radio Shack nor Jameco seem to offer a standard, inexpensive 5-volt regulated power supply. One option you have is to buy from Jameco something like part number 116089. This is a 5-volt power supply from an old Atari video game. If you look in the Jameco catalog, you will find that they have about 20 different surplus power supplies like this, producing all sorts of voltages and amperages. You need 5 volts at at least 0.3 amps (300 milliamps) -- you need no more than 2 amps, so do not purchase more power supply than you need. What you can do is buy the power supply, then cut off the connector and get access to the 5-volt and ground wires. That will work fine, and is probably the easiest path. You can use your volt meter (see below) to make sure the power supply produces the voltage you need.

Your alternative is to build a 5-volt supply from a little power-cube transformer. What you need is a transformer that produces 7 to 12 DC volts at 100 milliamps or more. Note that:

The transformer MUST produce DC voltage.

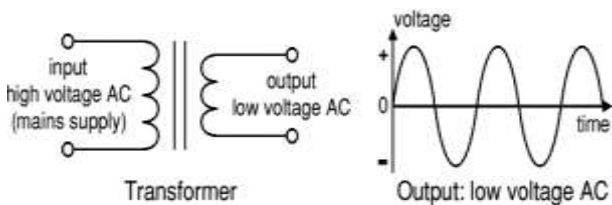
It MUST produce 7 to 12 volts.

It MUST produce 100 milliamps (0.1 amps) or more.

Dual Supplies

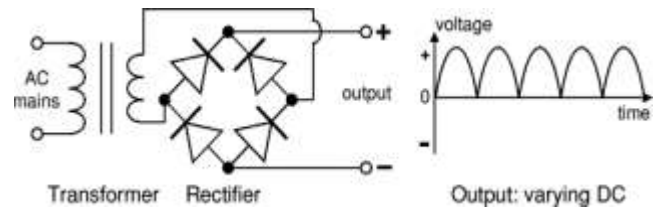
Some electronic circuits require a power supply with positive and negative outputs as well as zero volts (0V). This is called a 'dual supply' because it is like two ordinary supplies connected together as shown in the diagram. Dual supplies have three outputs, for example a  $\pm 3.3V$  supply

Transformer only



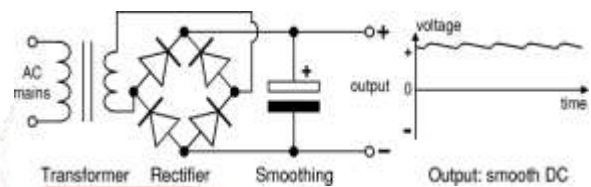
The low voltage AC output is suitable for lamps, heaters and special AC motors. It is not suitable for electronic circuits unless they include a rectifier and a smoothing capacitor.

Transformer + Rectifier



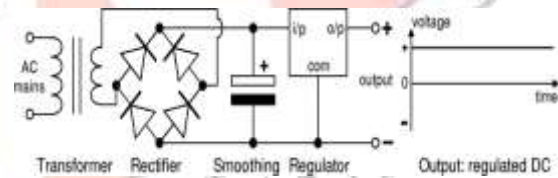
The varying DC output is suitable for lamps, heaters and standard motors. It is not suitable for electronic circuits unless they include a smoothing capacitor.

Transformer + Rectifier + Smoothing:-



The smooth DC output has a small ripple. It is suitable for most electronic circuits.

Transformer + Rectifier + Smoothing + Regulator



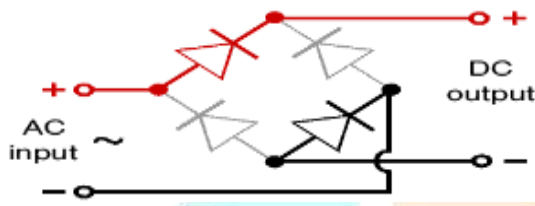
The regulated DC output is very smooth with no ripple. It is suitable for all electronic circuits.

Rectifier:-

There are several ways of connecting diodes to make a rectifier to convert AC to DC. The bridge rectifier is the most important and it produces full-wave varying DC. A full-wave rectifier can also be made from just two diodes if a centre-tap transformer is used, but this method is rarely used now that diodes are cheaper. A single diode can be used as a rectifier but it only uses the positive (+) parts of the AC wave to produce half-wave varying DC.

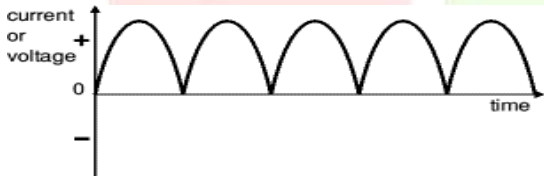
Bridge rectifier:-

A bridge rectifier can be made using four individual diodes, but it is also available in special packages containing the four diodes required. It is called a full-wave rectifier because it uses all the AC wave (both positive and negative sections). 1.4V is used up in the bridge rectifier because each diode uses 0.7V when conducting and there are always two diodes conducting, as shown in the diagram below. The maximum current they can pass rates bridge rectifiers and the maximum reverse voltage they can withstand (this must be at least three times the supply RMS voltage so the rectifier can withstand the peak voltages). Please see the Diodes page for more details, including pictures of bridge rectifiers.



Bridge rectifier

Alternate pairs of diodes conduct, changing over the connections so the alternating directions of AC are converted to the one direction of DC.



Output: full-wave varying DC  
(using all the AC wave)

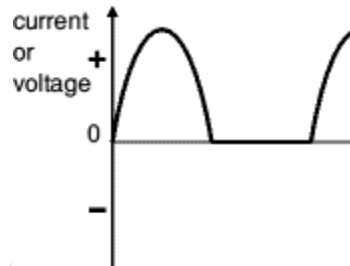
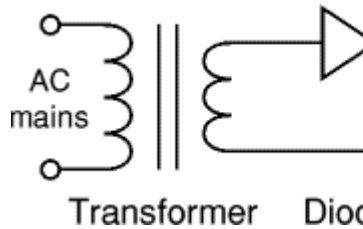
**Bridge rectifier:-**

Alternate pairs of diodes conduct, changing over the connections so the alternating directions of AC are converted to the one direction of DC.

**Single diode rectifier:-**

A single diode can be used as a rectifier but this produces **half-wave** varying DC which has gaps when the AC is negative. It is hard to smooth this sufficiently well to supply electronic circuits unless they require a very small current so

the smoothing capacitor does not significantly discharge during the gaps. Please see the Diodes page for some examples of rectifier diodes.



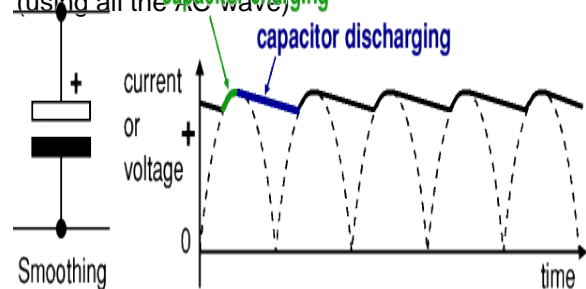
Output: half-wave varying DC  
(using only half the AC wave)

single diode rectifier  
**varying DC**  
(using all the AC wave)

**Smoothing**

Smoothing is performed by a large value electrolytic capacitor connected across the DC supply to act as a reservoir, supplying current to the output when the varying DC voltage from the rectifier is falling. The diagram shows the unsmoothed varying DC (dotted line) and the smoothed DC (solid line). The capacitor charges quickly near the peak of the varying DC, and then discharges as it supplies current to the output.

Output: full-wave varying DC  
(using all the AC wave)



Note that smoothing significantly increases the average DC voltage to almost the peak value ( $1.4 \times \text{RMS value}$ ). For example 6V RMS AC is rectified to full wave DC of about

4.6V RMS (1.4V is lost in the bridge rectifier), with smoothing this increases to almost the peak value giving  $1.4 \times 4.6 = 6.4V$  smooth DC.

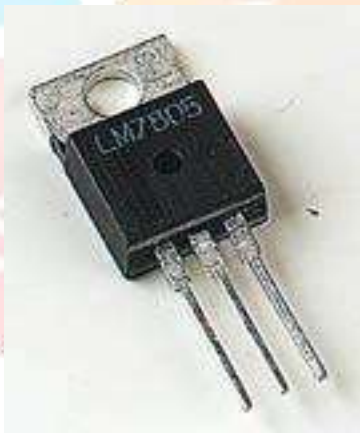
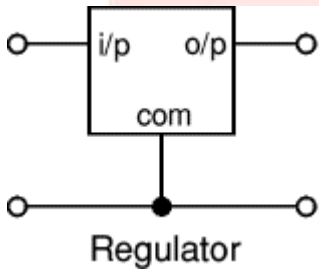
Smoothing is not perfect due to the capacitor voltage falling a little as it discharges, giving a small ripple voltage. For many circuits a ripple which is 10% of the supply voltage is satisfactory and the equation below gives the required value for the smoothing capacitor. A larger capacitor will give less ripple. The capacitor value must be doubled when smoothing half-wave DC.

$$C = \frac{5 \times I_o}{V_s \times f}$$

Smoothing capacitor for 10% ripple, C =

C = smoothing capacitance in farads (F)  
 $I_o$  = output current from the supply in amps (A)  
 $V_s$  = supply voltage in volts (V), this is the peak value of the unsmoothed DC  
 $f$  = frequency of the AC supply in hertz (Hz), 50Hz in the UK

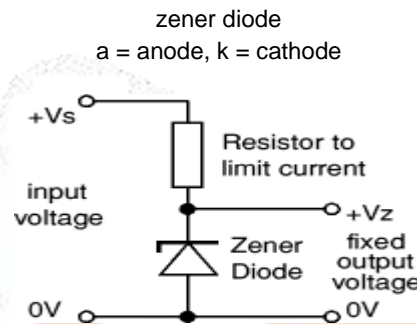
Regulator



Voltage regulator ICs are available with fixed (typically 5, 12 and 15V) or variable output voltages. They are also rated by the maximum current they can pass. Negative voltage

regulators are available, mainly for use in dual supplies. Most regulators include some automatic protection from excessive current ('overload protection') and overheating ('thermal protection').

Many of the fixed voltage regulator ICs have 3 leads and look like power transistors, such as the 7805 +5V 1A regulator shown on the right. They include a hole for attaching a heat sink if necessary.



Zener diode regulator

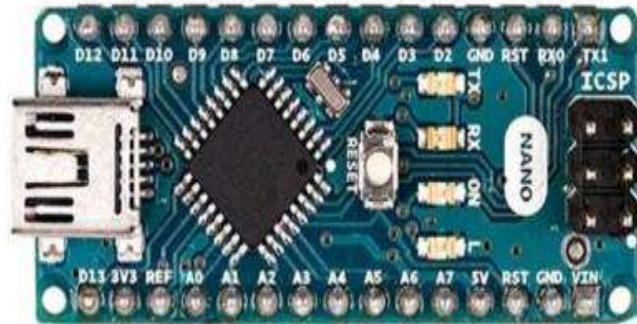
For low current power supplies a simple voltage regulator can be made with a resistor and a zener diode connected **in** reverse as shown in the diagram. Zener diodes are rated by their breakdown voltage  $V_z$  and maximum power  $P_z$  (typically 400mW or 1.3W).

The resistor limits the current (like an LED resistor). The current through the resistor is constant, so when there is no output current all the current flows through the zener diode and its power rating  $P_z$  must be large enough to withstand this.

Choosing a zener diode and resistor:

1. The zener voltage  $3.3V V_z$  is the output voltage required
2. The input voltage  $V_s$  must be a few volts greater than  $V_z$  (this is to allow for small fluctuations in  $V_s$  due to ripple)
3. The maximum current  $I_{max}$  is the output current required plus 10%
4. The zener power  $P_z$  is determined by the maximum current:  $P_z > V_z \times I_{max}$
5. The resistor resistance:  $R = (V_s - V_z) / I_{max}$
6. The resistor power rating:  $P > (V_s - V_z) \times I_{max}$

presently includes the ESP8266EX and ESP8285 chips simply



v. Arduino Nano:-

Overview:-

The Arduino Nano is a small, complete, and breadboard-friendly board based on the ATmega328P (Arduino Nano 3.x). It has more or less the same functionality of the Arduino Duemilanove, but in a different package. It lacks only a DC power jack, and works with a Mini-B USB cable instead of a standard one.

Getting Started

You can find in the Getting Started section all the information you need to configure your board, use the Arduino Software (IDE), and start tinker with coding and electronics.

Technical Specification:-

- Microcontroller ATmega328P
- Architecture AVR
- Operating Voltage 5 V
- Flash Memory 32 KB of which 2 KB used by bootloader
- SRAM 2 KB
- Clock Speed 16 MHz
- Analog I/O Pins 8
- EEPROM 1 KB
- DC Current per I/O Pins 40 mA (I/O Pins)
- Input Voltage 7-12 V
- Digital I/O Pins 22
- PWM Output 6
- Power Consumption 19mA

ESP8266 wi fi module

The ESP8266 series, or family, of Wi-Fi chips is produced by Espressif Systems, a fabless semiconductor company operating out of Shanghai, China. The ESP8266 series

referred to as ESP8266) is a system-on-chip (SoC) which integrates a 32-bit Tensilica microcontroller, standard digital peripheral interfaces, antenna switches, RF balun, power amplifier, low noise receive amplifier, filters and power management modules into a small package. It provides capabilities for 2.4 GHz Wi-Fi (802.11 b/g/n, supporting WPA/WPA2), general-purpose input/output (16 GPIO), Inter-Integrated Circuit (I<sup>2</sup>C), analog-to-digital conversion (10-bit ADC), Serial Peripheral Interface (SPI), I<sup>2</sup>S interfaces with DMA (sharing pins with GPIO), UART (on dedicated pins, plus a transmit-only UART can be enabled on GPIO2), and pulse-width modulation (PWM). The processor core, called "L106" by Espressif, is based on Tensilica's Diamond Standard 106Micro 32-bit processor controller core and runs at 80 MHz (or overclocked to 160 MHz). It has a 64 KB boot ROM, 64 KB instruction RAM and 96 KB data RAM. External flash memory can be accessed through SPI. The silicon chip itself is housed within a 5 mm × 5 mm Quad Flat No-Leads package with 33 connection pads — 8 pads along each side and one large thermal/ground pad in the center. ESP8266 is a wifi SOC (system on a chip) . It is an highly integrated chip designed to provide full internet connectivity in a small package.

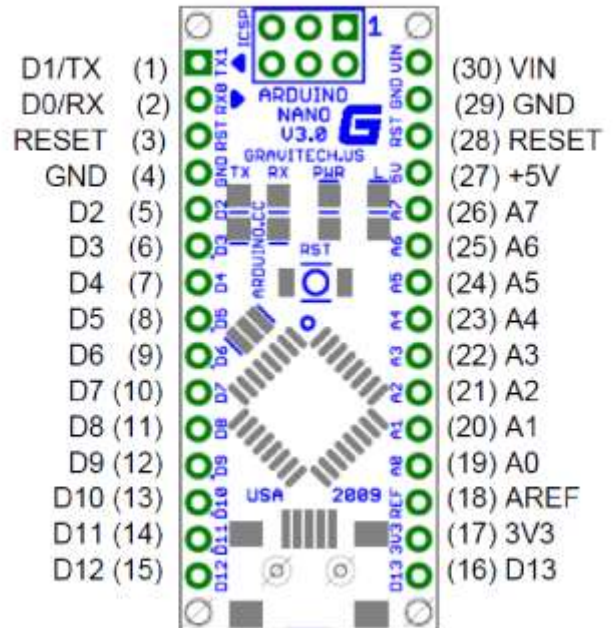
Technical Features

- 802.11 b / g / n
- Wi-Fi Direct (P2P), soft-AP
- Built-in TCP / IP protocol stack
- Built-in TR switch, balun, LNA, power amplifier and matching network

- Built-in PLL, voltage regulator and power management components
- 802.11b mode + 19.5dBm output power
- Built-in temperature sensor
- Support antenna diversity
- off leakage current is less than 10uA
- Built-in low-power 32-bit CPU: can double as an application processor
- SDIO 2.0, SPI, UART
- STBC, 1x1 MIMO, 2x1 MIMO
- A-MPDU, A-MSDU aggregation and the 0.4 Within wake
- 2ms, connect and transfer data packets
- standby power consumption of less than 1.0mW (DTIM3)

Clock Speed 16 MHz  
 Dimensions 0.73" x 1.70"  
 Length 45 mm Width 18 mm Weight 5 g

Arduino Nano Pin Layout:-



The Arduino Nano is a small, complete, and breadboard-friendly board based on the ATmega328P (Arduino Nano 3.x). It has more or less the same functionality of the ArduinoDuemilanove, but in a different package. It lacks only a DC power jack, and works with a Mini-B USB cable instead of a standard one. Arduino Nano is a function module which is very small but has a lot of advantages. The shape is very small so it is suitable to make a project that looks small. Arduino Nano is very special because of this support with breadboards.

Arduino Nano Specifications:

Microcontroller Atmel ATmega168 or ATmega328

Operating Voltage (logic level) 5 V

Input Voltage (recommended) 7-12 V

Input Voltage (limits) 6-20 V

Digital I/O Pins 14 (of which 6 provide PWM output)

Analog Input Pins 8

DC Current per I/O Pin 40 mA

Flash Memory 16 KB (ATmega168) or 32 KB (ATmega328) of which 2 KB used by boot loader

SRAM 1 KB (ATmega168) or 2 KB (ATmega328)

EEPROM 512 bytes (ATmega168) or 1 KB (ATmega328)

Pin No.	Name	Type	Description
1-2, 5-16	D0-D13	I/O	Digital input/output port 0 to 13
3, 28	RESET	Input	Reset (active low)
4, 29	GND	PWR	Supply ground
17	3V3	Output	+3.3V output (from FTDI)
18	AREF	Input	ADC reference
19-26	A0-A7	Input	Analog input channel 0 to 7
27	+5V	Output or Input	+5V output (from on-board regulator) or +5V (input from external power supply)
30	VIN	PWR	Supply voltage

## VI. LM35

(Precision Centigrade Temperature Sensor)

### General Description:-

The LM35 series are precision integrated-circuit temperature sensors, whose output voltage is linearly proportional to the Celsius (centigrade) temperature. The LM35 thus has an advantage over linear temperature sensors calibrated in ° Kelvin, as the user is not required to subtract a large constant voltage from its output to obtain convenient centigrade scaling. The LM35 does not require any external calibration or trimming to provide typical accuracies of  $\pm 1/4$  °C at room temperature and  $\pm 3/4$  °C over a full -55 to +150 °C temperature range. Low cost is assured by trimming and calibration at the wafer level. The LM35's low output impedance, linear output and precise inherent calibration make interfacing to readout or control circuitry especially easy. It can be used with single power supply or with plus and minus power supplies. As it draws only 60  $\mu$ A from its supply, it has very low self-heating, less than 0.1 °C in still air. The LM35 is rated to operate over a -55 to +150 °C temperature range, while the LM35C is rated for a -40 to +110 °C range (-10 ° with improved accuracy). The LM35 series is available packaged in hermetic TO-46 transistor packages, while the LM35C, LM35CA and LM35D are also available in an 8-lead surface mount small outline package.

## Features

- Calibrated directly in ° Celsius (Centigrade)
- Linear + 10.0 mV/°C scale factor
- 0.5°C accuracy guaranteeable (at +25°C)
- Rated for full -55° to +150°C range
- Suitable for remote applications
- Low cost due to wafer-level trimming
- Operates from 4 to 30 volts
- Less than 60  $\mu$ A current drain
- Low self-heating, 0.08°C in still air
- Nonlinearity only  $\pm 1/4$ °C typical
- Low impedance output, 0.1  $\Omega$  for 1 mA load

### Typical Applications

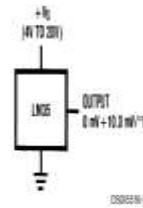
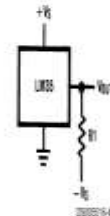


FIGURE 1. Basic Centigrade Temperature Sensor (+2°C to +150°C)



Choose  $R_1 = 1k\Omega$   
 $V_{out} = 1.500$  mV at +150°C  
 $= 250$  mV at +25°C  
 $= -500$  mV at -55°C

FIGURE 2. Full-Range Centigrade Temperature Sensor

### Connection Diagrams



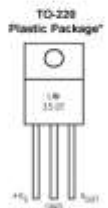
\*This is connected to negative pin (GND)  
 Order Number LM35H, LM35AH, LM35CH, LM35CAH or LM35DH  
 See NS Package Number H93H



A.C. = No Connection  
 Top View  
 Order Number LM35DM  
 See NS Package Number M08A



Order Number LM35CZ, LM35CAZ or LM35DZ  
 See NS Package Number ZB3A



\*This is connected to the negative pin (GND)  
 Note: The LM35DT part is different from the distributed LM35DT  
 Order Number LM35DT  
 See NS Package Number TA03F

## Applications:-

The LM35 can be applied easily in the same way as other integrated-circuit temperature sensors. It can be glued or cemented to a surface and its temperature will be within about 0.01°C of the surface temperature. This presumes that the ambient air temperature is almost the same as the surface temperature; if the air temperature were much higher or lower than the surface temperature, the actual temperature of the LM35 die would be at an intermediate temperature between the surface temperature and the air temperature. This is especially true for the TO-92 plastic package, where the copper leads are the principal thermal path to carry heat into the device, so its temperature might be closer to the air temperature than to the surface temperature. To minimize this problem, be sure that the wiring to the LM35, as it leaves the device, is held at the same temperature as the surface of interest. The easiest way to do this is to cover up these wires with a bead of epoxy which will insure that the leads and wires are all at the same temperature as the surface, and that the LM35 die's temperature will not be affected by the air temperature.

The TO-46 metal package can also be soldered to a metal surface or pipe without damage. Of course, in that case the V- terminal of the circuit will be grounded to that metal. Alternatively, the LM35 can be mounted inside a sealed-end metal tube, and can then be dipped into a bath or screwed into a threaded hole in a tank. As with any IC, the LM35 and accompanying wiring and circuits must be kept insulated and dry, to avoid leakage and corrosion. This is especially true the circuit may operate at cold temperatures where condensation can occur. Printed-circuit coatings and varnishes such as Humiseal and epoxy paints or dips are often used to insure that moisture cannot corrode the LM35 or its connections.

These devices are sometimes soldered to a small light-weight heat fin, to decrease the thermal time constant and speed up the response in slowly-moving air. On the other hand, a small thermal mass may be added to the sensor, to give the steadiest reading despite small deviations in the air temperature. The TO-46 metal package can also be soldered to a metal surface or pipe without damage. Of course, in that case the V- terminal of the circuit will be grounded to that metal.

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The scale factor is .01V/°C The LM35 does not require any external calibration or trimming and maintains an accuracy of +/-0.4 °C at room temperature and +/- 0.8 °C over a range of 0 °C to +100 °C. Another important characteristic of the LM35DZ 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 °C temperature rise in still air.

Assure temperature with an electrical output proportional to the temperature (in °C).

You will need to use a voltmeter to sense Vout. The output voltage is converted to temperature by a simple conversion factor. The sensor has a sensitivity of 10mV / °C.

Use a conversion factor that is the reciprocal that is 100°C/V.

The general equation used to convert output voltage to temperature is:

$$\text{Temperature ( } ^\circ\text{C)} = \text{Vout} * (100 \text{ } ^\circ\text{C/V)}$$

$$\text{So if Vout is 1V, then, Temperature} = 100 \text{ } ^\circ\text{C}$$

The output voltage varies linearly with temperature.

The LM35 -An Integrated Circuit Temperature





Sensor

### LM35

Why not to use LM35 to Measure Temperature?

Range of this sensor is around 1 cm

Hence, it is unsafe to use LM35 as it needs to be near fire at a distance of around 1 cm which can cause damage to the sensor.

LM35 has very less sensitivity

Power Relay

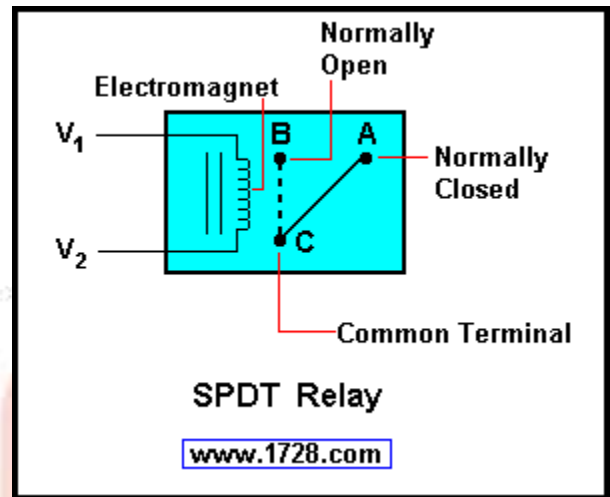
Type: Miniature Power PCB Relay T7N/T7N-WG SPDT TYPE

Specification: 12v/7amp



When electricity is applied to the coil of wire it becomes magnetic, hence the term electromagnet. The A B and C terminals are an SPDT switch controlled by the electromagnet. When electricity is applied to V1 and V2, the electromagnet acts upon the SPDT switch so that the B and C terminals are connected. When the electricity is disconnected, then the A and C terminals are connected. It is important to note that the electromagnet is magnetically linked to the switch but the two are NOT linked electrically.

### Relay Contact Types.



As well as the standard descriptions of Normally Open, (NO) and Normally Closed, (NC) used to describe how the relays contacts are connected, relay contact arrangements can also be classed by their actions. Electrical relays can be made up of one or more individual switch contacts with each "contact" being referred to as a "pole". Each one of these contacts or poles can be connected or "thrown" together by energizing the relays coil and this gives rise to the description of the contact types as being:

SPST - Single Pole Single Throw

SPDT - Single Pole Double Throw

DPST - Double Pole Single Throw

DPDT - Double Pole Double Throw

with the action of the contacts being described as "Make" (M) or "Break" (B). Then a simple relay with one set of contacts as shown above can have a contact description of:

"Single Pole Double Throw - (Break before Make)", or SPDT - (B-M).

### Working :

Notice in the above diagram that a relay uses an electromagnet. This is a device consisting of a coil of wire wrapped around an iron core.

Examples of just some of the more common contact types for relays in circuit or schematic diagrams is given below but there are many more possible configurations.

### Relay Contact Configurations

- Where:
- C is the Common terminal
- NO is the Normally Open contact
- NC is the Normally Closed contact

One final point to remember, it is not advisable to connect relay contacts in parallel to handle higher load currents. For example, never attempt to supply a 10A load with two relays in parallel that have 5A contact ratings each as the relay contacts never close or open at exactly the same instant of time, so one relay contact is always overloaded.

While relays can be used to allow low power electronic or computer type circuits to switch a relatively high currents or voltages both "ON" or "OFF". Never mix different load voltages through adjacent contacts within the same relay such as for example, high voltage AC (240v) and low voltage DC (12v), always use separate relays for safety.

One of the more important parts of any relay is the coil. This converts electrical current into an electromagnetic flux which is used to operate the relays contacts. The main problem with relay coils is that they are "highly inductive loads" as they are made from coils of wire. Any coil of wire has an impedance value made up of resistance ( R ) and inductance ( L ) in series (RL Series Circuit).

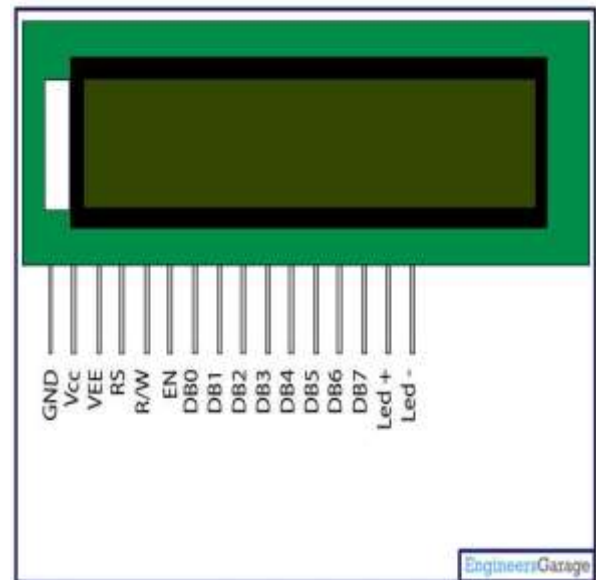
As the current flows through the coil a self induced magnetic field is generated around it. When the current in the coil is turned "OFF", a large back emf (electromotive force) voltage is produced as the magnetic flux collapses within the coil (transformer theory). This induced reverse voltage value may be very high in comparison to the switching voltage, and may damage any semiconductor device such as a transistor, FET or microcontroller used to operate the relay coil.

- 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.
- 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.

### Applications of relays

Relays are used to and for:

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.

#### VII. 16X2 LCD Pin Diagram:-

#### VIII. Arduino Software:-

In Arduino software, using Arduino IDE, programs are generated on a computer. The code can be written and edited by IDE and it converts this code into a form of instructions so that it is understood by Arduino hardware. And also the instructions are transferred to the Arduino board by IDE. This process of transferring instructions is called uploading.

#### IX. Internet of things:-

The Internet of things (IoT) is the network of everyday objects — physical things embedded with electronics, software, sensors, and connectivity enabling data exchange. Basically, a little networked computer is attached to a thing, allowing information exchange to and from that thing. Be it lightbulbs, toasters, refrigerators, flower pots, watches, fans, planes, trains, automobiles, or anything else around you, a little networked computer can be combined with it to accept input (especially object control) or to gather and generate informational output (typically object status or other sensory data). This means computers will be permeating everything around us — ubiquitous embedded computing devices, uniquely identifiable, interconnected across the Internet. Because of low-cost, networkable microcontroller modules, the Internet of things is really starting to take off.

#### X. Future scope:-

This system can be altered marginally to log and record other physical signals rather than temperature, humidity or pressure in requisite application.

Product can be custom build to suit prerequisite accuracy and precision of measurement by upgrading the analog to digital converter rather than using inbuilt 10 bit converter embedded in microcontroller.

Data acquired can be imported further into computational softwares like MATLAB, Python for mathematical computations.

Multiple channel data acquisition can be implemented using collective number of sensors connected to analog or digital inputs respectively as per sensing parameter and sensor specifications.

<http://www.makeuseof.com/tag/how-and-why-to-add-a-realtime-clock-to-arduino/>

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