

SOLAR TRACKER COMBINED WITH WATER LEAKAGE DEDUCTION

Submitted in partial fulfillment of the requirements for the award of

Bachelor of Engineering degree in

Electrical and Electronics Engineering

by

ARUNS (38140701)



DEPARTMENT OF ELECTRICAL AND ELECTRONICS ENGINEERING

SCHOOL OF ELECTRICAL AND ELECTRONICS ENGINEERING

SATHYABAMA

INSTITUTE OF SCIENCE AND TECHNOLOGY

(DEEMED TO BE UNIVERSITY)

Accredited with Grade “A” by NAAC

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MAY – 2022



DEPARTMENT OF ELECTRICAL AND ELECTRONICS ENGINEERING
BONAFIDE CERTIFICATE

This is to certify that this Project Report is the bonafide work of **ARUN.S (38140701)** who carried out the project entitled "**SOLAR TRACKER COMBINED WITH WATER LEAKAGE DEDUCTION**" under our supervision from December 2021 to March 2022.



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Submitted for Viva voce Examination held on _____

Internal Examiner

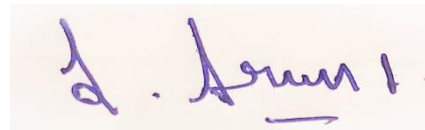
External Examiner

DECLARATION

S. ARUN (38140701) hereby declare that the Project Report entitled “**SOLAR TRACKING SYSTEM COMBINED WITH WATER LEAKAGE DEDUCTION**” done by us under the guidance of **Dr. V. SENTHIL NAYAGAM** is submitted in partial fulfillment of the requirements for the award of Bachelor of Engineering degree in Electrical and Electronics Engineering.

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SIGNATURE OF THE CANDIDATES

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ABSTRACT

A star pursuit system mistreatment Arduino is intended and designed. this method collects free energy from the sun and stores it within the battery then converts this energy to the several electrical energy. Its makes the energy usable in traditional homes as AN freelance power supply. this method is intended to react to its setting within the shortest quantity of your time. Any errors at software package and hardware are controlled or eliminated. Our system is tested for its period of time responsiveness, responsibleness, stability and safety. Our system is intended to be immune to weather, temperature and a few minor mechanical stresses.

Leakage interference And breaks identification in water distribution networks square measure elementary for an adequate use of natural resources. to deal with this drawback, and alter the discharge identification method, the authors have designed a wireless network system creating use of mobile wireless sensors ready to find breaks and save energy, time and price with having good Water discharge Detection (SWLD) in pipelines, live water level in tank and management in pump to show it on once water level is low.

For human life and therefore the health of the setting, water is vital. we've got created an automated water quality management system for home, workplaces, etc. so as to attain

the good water quality required by the voters through IoT. we've got used totally different sensors to style a tool to calculate the water pH scale, the water pressure, flow, temperature etc.

In this paper, we've got suggested the employment of a sensible interface sensing element to trace water reservoirs, track

water contamination and monitor leakages from water pipelines. The storage tank level, the waterleak detector within the pipelines and therefore the pH scale sensing element are wont to monitor water quality and therefore the

water temperature sensing element to track the water temperature. They use the inaudible sensing element forttests.

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ABSTRACT

A star pursuit system mistreatment Arduino is intended and designed. this method collects free energy from the sun and stores it within the battery then converts this energy to the

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CHAPTER – 1

1.1INTRODUCTION

Currently, IoT and remote sensing techniques are being employed for chase, gathering and analysing knowledge from remote locations in varied areas of study. Thanks to the tremendous increase in world industrial production, rural to urban drift and over-use of land and ocean resources, individuals have undergone a serious decrease within the quality of water on the market. Within the sector of mining and construction the significant use of fertilizers in farming and alternative chemicals have contributed staggeringly to the worldwide reduction of water quality.

In IoT water solutions, the info ingest from water provides is exactly monitored in order that

water is handled effectively and with efficiency. IoT's intelligent water management has had a large impact on water treatment prices and has rendered an economical urban water delivery. The IoT blessings in water management area unit harvested significantly from the agricultural sector.

solar huntsman, a system that positions associate degree object at associate degree angle relative to the Sun. The most-common applications for star trackers area unit positioning electrical phenomenon (PV) panels (solar panels) in order that they continue to be perpendicular to the Sun's rays and positioning house telescopes in order that they will verify the Sun's direction.

A significant quantity of water is lost within the installation system. Water leakages are a serious drawback for several regions round the world (Weifeng et al, 2011). In some countries water loss because of water leakages within the provide network exceeds four-hundredth of the water within the provide system.

CHAPTER - 2

2.1 Literature Survey

2.1.1 Star chase System victimization Arduino

This system collects free energy from the sun and stores it at intervals the battery then converts this energy to the individual electricity.

the solar panel Output Voltage to Analog pin of Arduino and convert that in Digital and show result on digital display or laptop. And suppose if you'd prefer to live up to 10 volts then you have to use the given equipment. resistance factor= 511.5 for up to 10 volts and for added see given table.

Solar Module for Arduino is also a small board which will power your Arduino board, to induce a awfully autonomous outside board. It includes a 3W solar panel that provides 5V to your Arduino board, and a 1100mah Li-Ion battery. 5V Regulator Module for Arduino provides 5V to your Arduino board with a 1100mah Li-Ion battery.

2.1.2 Fuzzy management primarily based star trained worker using Arduino Uno

The projected symbolic logic controller has been enforced and tested using MATLAB.

Fuzzy controllers unit really easy conceptually. They embrace associate degree input stage, a method stage, AND associate degree output stage. The input stage maps device or totally different inputs, like switches, thumbwheels, and so on, to the acceptable membership functions and truth values. the method stage invokes each applicable rule and generates a result for each, then combines the results of the foundations. Finally, the output stage converts the combined result back to a selected management output price.

2.1.3 Good Water run Detection victimization Wireless sensing element Networks (SWLD)

To address this downside, and alter the run identification method.

Leak detection systems work by watching water flow through either a mechanical rotary engine or inaudible wavelengths. These leak detection systems observe the pattern of

the water flow, either by reckoning the gallonage passing through the sensing element or sonically recording the time delay.

At its simplest, a water alarm, conjointly referred to as a water leak sensing element, may be a tiny device concerning the scale of a garage door opener placed on the ground close to anyplace a leak may occur. they are typically connected to a sway panel, remotely or with a wire.

2.1.4 The implementation of star huntsman victimisation arduion with servomotor

Solar trailing permits a lot of energy to be made as a result of the solar panel is ready to stay aligned to the sun.

A star huntsman may be a device onto that star panels square measure inbuilt that tracks the motion of the sun making certain that most quantity of daylight strikes the panels everywhere the day. Power output from a electric cell are going to be most once it's facing the sun i.e. the angle between its surface and sun rays is ninety degree. star trailing permits a lot of energy to be made as a result of the solar panel is ready to stay aligned to the sun. The parts used for its construction square measure servo motor, Arduino and LDR. The active sensors ceaselessly monitor {the daylight|the daylight} and alternate the panel towards the direction wherever the intensity of sunlight is most. during this project, it's divided by 2 categories; hardware and code. In hardware half, two lightweight dependent resistance (LDR) has been accustomed trace the synchronize of daylight by police work luminosity of daylight. For rotation half, one customary servo motor has been elect. In code half, the code is built in C programming and inserted in Arduino. This project is intended for low power and transportable application. Therefore, it's appropriate for geographical region usage. Moreover, the effectiveness of output power that collected by daylight square measure magnified.

2.1.5 Towards Achieving a Reliable run Detection and Localization rule for Application in Water Piping Networks

Leakage detection and localization in pipelines has become a crucial side of water management systems.

Since watching run in large-scale water distribution networks (WDNs) may be a difficult task, the requirement to develop a reliable and strong leak detection and localization technique is crucial for loss reduction in potable WDNs. during this paper, a number of the prevailing techniques for water run detection square measure mentioned and open analysis square measureas and challenges are highlighted. it's complete that despite the many analysis efforts and advancement in run detection technologies, an outsized scope continues to be open for any analysis during this domain. One such space is that the effective detection of background kind leakages that haven't been lined totally within the literature. the use of wireless sensing element networks for run detection

purposes, its technical challenges moreover as some future analysis areas are conferred. in a very general remark, usage of those techniques for large-scale water distribution networks continues to be a serious concern. during this work, an summary of this vital downside is addressed .

2.1.6 A Shazam-like menage water run detection methodology

This analysis proposes a completely unique approach to menage run detection by means that of sound signal.

This analysis proposes a completely unique approach to menage run detection by means that of sound signal recordings. The approach consists of recording the sound signals that square measure made by water fixtures and appliances, then use these recordings to observe any abnormal state of affairs which can be a sign of a leak.

2.1.7 Style of parabolic solar furnace trailing system victimisation arduino

The dual axis epitome is enforced through the assistance of Arduino plank that's simply in maintenance.

This paper demonstrates the planning parameters of a star parabolic dish epitome for rustic areas with nice star irradiance rate availableness, wherever don't have any access of electricity services or low-income folks survives to shop for a stove (electric or gas). The star parabolic dish epitome intends an answer against these forms of remedies and pursues star lightweight to figure. The parabolic dish encompasses a polished surface, wherever the star radiations fall and picked up at one focused put attentiveness. At this time the collected type of energy is employed to derive completely different thermal applications like as; cookery & heating with single and twin axis schemes. This paper discusses the vital stages of twin axis prototype; implementation, star location strategy, the analysis in terms of theory, structural style & material. the twin axis epitome is enforced through the assistance of Arduino plank that's simply in maintenance, along side that this epitome is designed with anti-lock H-bridge (L298) module to beat the feedback loop quality and AVR modules. 2 move motors of 12V square measure put in on 4*4ft designed atomic number 13 frame with a dual-axis trailing system. The jerks among trackers are reduced with this epitome that maintains the experimental declination angle concerning .To finish, this paper results that parabolic solar furnace huntsman obtains three.43% improved power potency compared of electrical phenomenon panel huntsman.

2.1.8 Economical and low-priced Arduino based mostly star following System

A dual-axis star hunter paradigm is intended to maximise the harvested solar power.

Compared to a set mount electrical device, a single-axis hunter will increase annual output by concerning thirty p.c and a dual-axis hunter an extra half dozen p.c. alternative estimates say that electrical device trackers add between twenty five and forty five p.c to the potency of a median residential star PV system.

In most cases, star trackers don't seem to be definitely worth the further investment, although they are doing turn out a lot of electricity. as a result of star panels area unit cheaper than ever, it might value less to put in a lot of star panels than it might to incorporate a following system.

2.1.9 Hydrogeological Modeling and Water Resources Management:

rising the Link Between information, Prediction, and higher cognitive process

Despite the good potential of hydrogeological models in supporting water resources selections.

A risk-based decision-making mechanism capable of accounting for uncertainty relating to native conditions is crucial to water resources management, regulation, and affairs of state. Despite the good potential of hydrogeological models in supporting water resources selections, challenges stay thanks to the various sources of uncertainty further as creating and human activity selections aware of this uncertainty. This paper presents a framework that utilizes applied mathematics hypothesis testing associated an integrated approach to the design of website characterization, modeling prediction, and higher cognitive process. advantages of this framework embrace aggregate uncertainty quantification and risk analysis, simplified communication of risk between stakeholders, and improved defensibility of choices. The framework acknowledges that getting absolute certainty in higher cognitive process is impossible; rather, the framework provides a scientific thanks to create selections in light-weight of uncertainty and verify the quantity of knowledge needed. during this manner, quantitative analysis of a field campaign style is feasible before information area unit collected, starting from any information state, which may be updated as a lot of info becomes out there. we have a tendency to discuss the constraints of this approach by the kinds of uncertainty that may be recognized and create suggestions for addressing the remainder.

2.1.10 Style and implementation of sensible electronic star hunter supported Arduino

By circuit style and sun following management method, the value reduction has been improved

he main factor of exploitation electrical device is to provide voltage from sun's energy however the optimum energy will be generated by following electrical device thanks to the sun movement from east to west. the matter will be resolved by planned systems wherever the sun following by electrical device that supported high intensity of sun ray. This paper concentrates on following the sun by exploitation servo motor plus electrical device. So that, the biggest amount of sun light-weight at the incident panel on the day at any time is best than that for methodology of mounted panel array that is a smaller amount economical. The microcontroller Arduino (mode UNO) was programmed by exploitation C++ language whereas the track of sun light-weight process was enforced by exploitation light-weight relying electrical device (LDR), Chip IC H-bridge and microcontroller Arduino (UNO) circuits are designed by exploitation Proteus code.

CHAPTER– 3

3.1 AIM OF THE PROJECT

star Trackers square measure wont to keep star collectors/solar panels adjusted directly towards the sun because it moves through the sky on a daily basis. mistreatment star Trackers will increase the number of solar power that is received by the solar power collector and improves the energy output of the heat/electricity that is generated.

Therefore, the aim of this project was to develop Associate in Nursing IoT-based system for water escape detection. The image was developed comprising 2 sensors embedded at the supply and destination points to live the rate of water.

3.1.1 EXISTING SYSTEM

1. Multiple star following systems are developed, and that they will be divided into 2 types: passive following systems, that gift low resistance to wind action and have low installation and maintenance prices, with assortment potency will increase up to twenty third, and active following systems, which might be single axis and are rumored to extend the gathering potency by 12-25%, following the star mechanical phenomenon on one axis, which might be horizontal, vertical, polar and inclined .
2. Leaks in resource transmission pipelines could be a growing concern for the water transmission trade. This creates a desire to stop the threat of leaks and minimize their damages through in depth analysis in leak detection technology.

3.1.2 PROPOSED BLOCK DIAGRAM

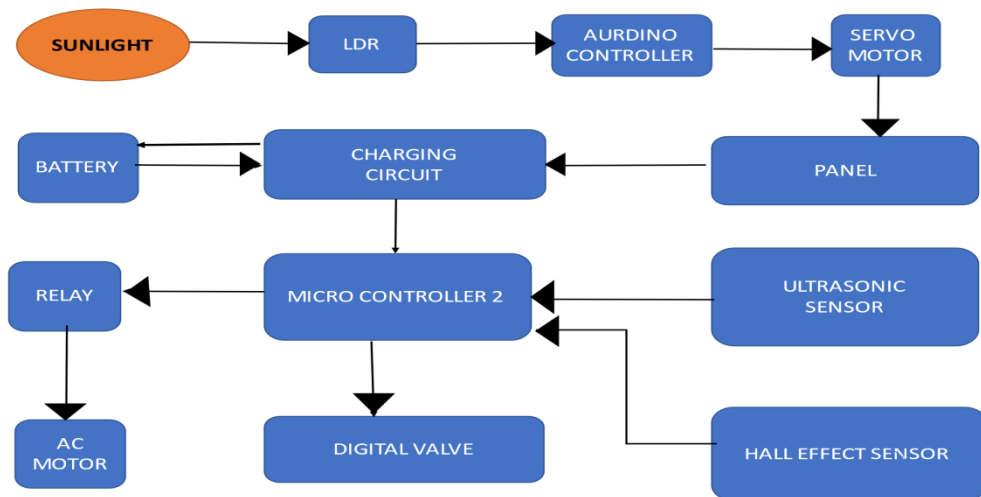


Fig. no.3.1.2 BLOCK DIAGRAM

1. The fig. no. 3.1.2 shows the diagram. star trackers generate a lot of electricity than their stationary counterparts because of Associate in Nursing enlarged direct exposure to star rays.
2. Solar trackers generate a lot of electricity in roughly identical quantity of house required for mounted tilt systems, creating them ideal optimizing land usage.
3. By sleuthing a broken pipe, you'll be able to forestall your home from being destroyed by water injury. Water will quickly cause mould and damp also as laying waste piece of furniture and belongings.

3.1.3 CIRCUIT DIAGRAM

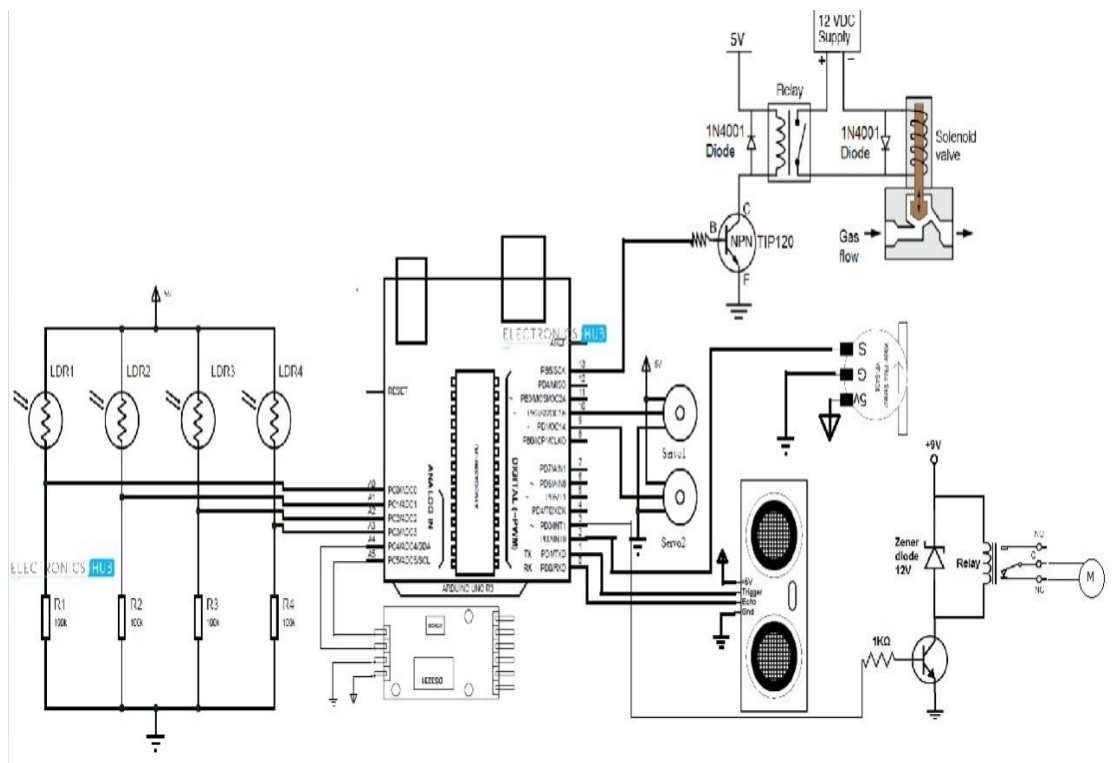


Fig. no.3.1.3 CIRCUIT DIAGRAM

The fig. no. 3.1.3 is the circuit diagram consist of Arduino UNO as a main controller with 4 IDR and two Servo Motors for solar tracking system , one water flow sensor and electronic valve for water leakage detection and one ultrasonic sensor and relay module to control the motor and fill the tank without over flowing. For solar tracking system 4ldr is connected to Arduino so that it collect data from LDR and convert the value to angle and give it to server Motors. for water leakage detectionthe water flow module is connected to the Arduino which calculate the flow of water and give the data to Arduino. the Arduino calculate the time using RTC module and if the water flows continuously for more than the predefined time the Arduino send the signal to Electronic valve to turn off

the flow of water. For water tank overflow system, the ultrasonic sensor is connected to the Arduino and it is kept inside the water tank so that the ultrasonic sensor calculate the amount of water present in the tank and send the data to Arduino. if the tank is empty the Arduino send the data to relay to turn on the motor and if the tank is going to overflow which send the data to relay to turn on the motor.

CHAPTER-4

4.1 HARDWARE DESCRIPTION

4.1.1 SOLAR PANAL

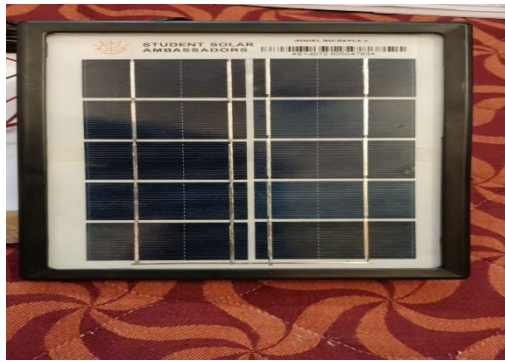


Fig. no.4.1.1 SOLAR PANAL

The fig. no. 4.1.1 may be a cell panel, star electrical panel, photo-voltaic (PV) module or solar battery, it's associate assembly of photo-voltaic cells mounted in an exceedingly framework for installation. star panels use daylight as a supply of energy to get electrical energy electricity. a group of PV modules is named a PV panel, associated a system of PV panels is named an array. Arrays of a electrical phenomenon system provide star electricity to electrical instrumentation.

SPECIFICATIONS :

1. Open Circuit Voltage(Voc) four.6V $\pm$ 8%
2. Short Circuit Current (Isc) 105mA $\pm$ 8%
3. Maximum Power Voltage(Vmp) four.0V $\pm$ 8%
4. Maximum Power Current(Imp) one hundred.0mA $\pm$ 8%

5. Maximum Power(Ppm) zero.4W±8%

4.1.2 SERVOMOTOR

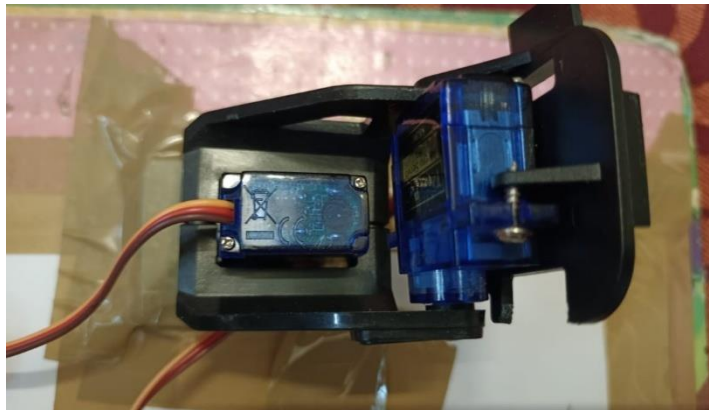


Fig. no.4.1.2 servomotor

The fig. no. 4.1.2 is shows a servomotor (or servo motor), it's a mechanism positioner actuator or linear actuator that enables for precise management of angular or linear position, rate and acceleration. It consists of an appropriate motor coupled to a detector for position feedback.

SPECIFICATIONS :

ModelSG90

1. Weight(gm)9
2. Operating Voltage (VDC)3.0 ~ 7.2
3. Operating Speed @4.8V0.10sec/60°
4. Stall force @ four.8V (Kg-Cm)1.2
5. Stall force @6.6V (Kg Cm)1.6
6. Operating Temperature (°C)-30 to sixty
7. Dead Band breadth (μ s)7
8. Gear kind : fibre

- 9. Rotational Degree 180°
- 10. Servo Plug Junior
- 11. Cable Length (cm) 25
- 12. Length (mm) 22.8
- 13. Width (mm) 12.6
- 14. Height (mm) 34.54.1.3 ARDUINO

4.1.3 Arduino

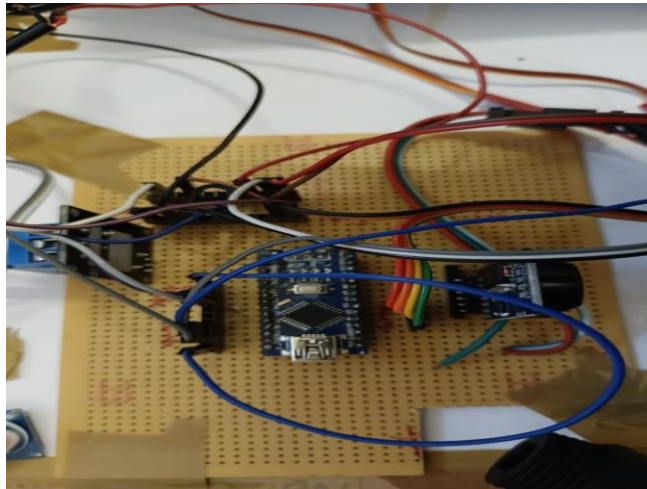


Fig. No.4.1.3 ARDUINO

The fig. No. 4.1.3 is shows the Arduino, it's AN ASCII text file platform used for building physics comes. Arduino consists of each a physical programmable board (often mentioned as a microcontroller) and a bit of package, or IDE (Integrated Development Environment) that runs on your laptop, accustomed write and transfer coding system to the physical board.

The Arduino platform has become quite fashionable folks simply beginning out with physics, and permanently reason. not like most previous programmable circuit boards, the Arduino doesn't would like a separate piece of hardware (called a programmer) so as to load new code onto the board -- you'll be able to merely use a USB cable. to boot, the Arduino IDE uses a simplified version of C++, creating it easier to find out to program. Finally, Arduino provides a customary kind issue that breaks out the functions of the micro-controller into a additional accessible package.

SPECIFICATION :

1. Microcontroller: ATmega328P
2. Operating Voltage: 5V
3. Input Voltage (recommended): 7-12V Inout Voltage (limit): 6-20V
4. Digital I/O Pins: fourteen (of that half-dozen give PWM output)
1. PWM Digital I/O Pins: half-dozen
2. Analog Input Pins: half-dozen
3. DC Current per I/O Pin: twenty mA
4. DC current for three.3V Pin: fifty mA
5. Flash Memory: thirty two kilobyte (ATmega328P) of that zero.5 kilobyte employed by bootloader
6. SRAM: a pair of kilobyte (ATmega328P)
7. EEPROM: one kilobyte (ATmega328P)
8. Clock Speed: sixteen megacycle per second
9. LED_BUILTIN: thirteen
- 10.Length: sixty eight.6 mm
- 11.Width: fifty eight.4 millimetre Weight: twenty five g

4.1.4 ULTRASONIC SENSOR

The fig. no. 4.1.4 is associate inaudible detector, it's associate instrument that measures the gap to associate object exploitation inaudible sound waves. associate inaudible detector uses a electrical device to send associated receive inaudible pulses that relay back info concerning an object's proximity.



Fig. no.4.1.4 ULTRASONIC SENSOR

SPECIFICATIONS :

1. Power Supply: DC 5V
2. Working Current: 15mA
3. Working Frequency: 40Hz
4. Ranging Distance : 2cm – 400cm/4m
5. Resolution : zero.3 cm
6. Measuring Angle: fifteen degree
7. Trigger Input Pulse width: 10uS
8. Dimension: 45mm x 20mm x 15mm

4.1.5 HALL EFFECT SENSOR





Fig. no.4.1.5 HALL EFFECT SENSOR

The fig. no.4.1.5 could be a Hall impact device, it is AN device that's designed to find the Hall impact, and convert its findings into electronic information, either to change a circuit on and off, offer a measure of a varied force field, be processed by AN embedded laptop or displayed on AN interface. In 1879, mortal king Hall discovered that if a magnet is placed perpendicular to a conductor with a gradual flow of current, the electrons flowing at intervals the conductor ar force to at least one facet, so making a possible distinction accountable (i.e. voltage). The Hall impact, then, is indicative of the presence and magnitude of a force field close to a conductor.

SPECIFICATIONS :

1. Digital Output Hall-effect device
2. Operating voltage: four.5V to 28V (typically 5V)
3. Output Current: 25mA
4. Can be wont to find each the poles of a magnet
5. Output voltage is capable operative voltage
6. Operating temperature: -40°C to 85°C
7. Turn on and switch off time is 2uS every
8. Inbuilt reverse polarity protection
9. Suitable for Automotive and Industrial Applications

4.1.6 LDR – Light Dependent resistor

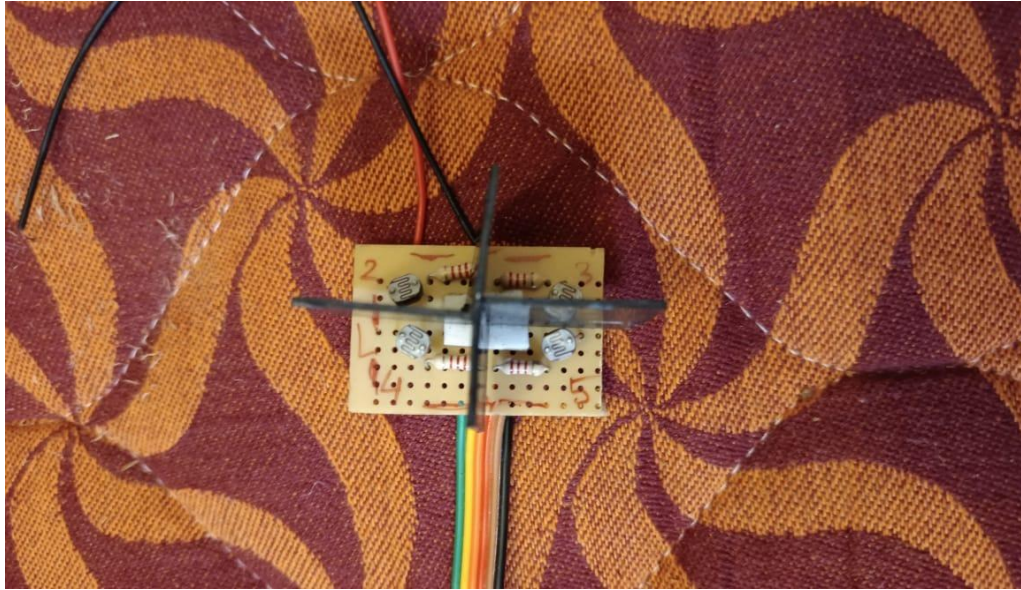


Fig. no.4.1.6 LIGHT DEPENDENT RESISTOR (LDR)

The fig. no. 4.1.6 may be an LDR is a part that encompasses a (variable) resistance that changes with the sunshine intensity that falls upon it. this enables them to be utilized in light-weight sensing circuits. light-weight Dependent Resistors (LDR) also are known as photoresistors. they're made from high resistance semiconductor material.

SPECIFICATIONS :

SL NO	PARAMETER	SPECIFICATION
1	Type	Coating
2	Light Resistance	10K –20K
3	Dark Resistance	2M
4	Power Dissipation at 25°C	30 mW
5	Impressed voltage DC	150 V
6	Operating Temp.	–20 ~ +60°C

4.1.7 AUTOMATIC VALVE



Fig. no.4.1.7 AUTOMATIC VALVE

The fig. no. 4.1.7 could be a automatic flow management valve it regulates the flow or pressure of a fluid. Flow management valves commonly reply to signals generated by freelance devices like flow meters or temperature gauges. management valves square measure commonly fitted with actuators and positioners. Pneumatically-actuated globe valves square measure wide used for management functions in several industries, though quarter-turn sorts like (modified) ball and butterfly valves also are used. management valves also can work with hydraulic actuators (also called hydraulic pilots). These forms of valves also are called Automatic management Valves. The hydraulic actuators can reply to changes of pressure or flow and can open/close the valve. Hydraulic Operated Automatic management Valves don't need associate degree external power supply, that means that the fluid pressure is enough for gap and shutting the valve.

SPECIFICATIONS :

1. Electric power reduction: a brief current pulse is fed to open or shut the valve and therefore the power is reduced so much enough to carry it in position. This helps in preserving energy.
2. Latching: Latching or pulse coil version provides an answer for applications with low frequency switch. The valve is energized by a brief electrical pulse to maneuver the plunger. A static magnet is then accustomed keep the plunger in this position with no extra

spring or field. This lowers power consumption and warmth development within the valve.

3. High Pressure: high versions square measure designed for pressure needs up to 250 bar.
4. Manual override: nonmandatory manual override feature provides higher safety and convenience throughout commission, testing, maintenance, and just in case of an influence failure. In some versions, the valve cannot electrically actuate once the manual management is bolted.
5. Media separation: Media separation style permits isolation of the media from the valve's operating elements, creating it a decent resolution for aggressive or slightly contaminated media.
6. Vacuum: Valves that don't need a minimum pressure differential square measure appropriate for rough vacuums. Universal direct acting or semi-direct acting magnet valves square measure like minded for these applications. For additional demanding discharge rate needs special vacuum versions square measure on the market.
7. Adjustable response time: The time it takes the valve to open or shut may be adjusted, generally by rotating screws on the valve's body. This feature will facilitate forestall a clap
8. Position feedback: The switch standing of a magnet valve may be indicated with associate degree electrical or optical position feedback as a binary or city signal. city could be a sensing element output that indicates the on or off state of the valve.
9. Low noise: Valves have a damped style to cut back the noise throughout the closing of the valve.

4.2 ADVANTAGES

star trackers generate additional electricity than their stationary counterparts thanks to associate degree enlarged direct exposure to star rays. There square measure many various sorts of star huntsman, like single-axis and dual-axis trackers, which may assist you notice the proper acceptable your distinctive job website.

A restricted quantity of injury will grow to a good deal additional if undetected . Water leak detection permits owners and businesses to quickly repair a tangle before it gets out of hand, saving a good deal of bother and expense shortly. Water leaks will do over simply waste water.

4.3 DISADVANTAGES

1. Very serious and hulking.
2. Typical coulombic charge potency solely seventieth however may be as high as eighty fifth to ninetieth for special styles.
3. Danger of heating throughout charging
4. Not appropriate for quick charging
5. Typical cycle life three hundred to five hundred cycles .
6. Must be keep during a charged state once the solution has been introduced to avoid deterioration of the active chemicals.

4.4 APPLICATIONS

1. Automotive and traction applications.
2. Standby/Back-up/Emergency power for electrical installations.
3. Submarines
4. UPS (Uninterruptible Power Supplies)
5. Lighting
6. High current drain applications.
7. Sealed battery sorts obtainable to be used in transportable instrumentation.

4.5 PIC MICROCONTROLLER:

PIC could be a family of Harvard design microcontrollers created by semiconductor device Technology, derived from the PIC1640. Originally developed by General Instrument's electronics Division. The name PIC ab initio noted "Programmable Interface Controller".

PICs are a unit popular with industrial developers and hobbyists alike thanks to their low value, wide availability, giant user base, in depth assortment of application notes, availability of low value or free development tools, and serial programming (and re-programming with flash memory) capability. Microchip declared on Gregorian calendar month 2008 the cargo of its six billionth PIC processor.

Microcontroller could be a general purpose device, that integrates variety of the elements of a silicon chip system on to single chip. It's integral electronic equipment, memory and peripherals to form it as a mini laptop. A microcontroller combines on to constant microchip:

1. CPU core
2. Memory (both memory and RAM)
3. Some parallel digital input/output

Microcontrollers can mix different devices such as:

- 1) A timer module to permit the microcontroller to perform tasks sure time periods.
- 2) A serial I/O port to permit knowledge to flow between the controller and different devices like a PIC or another microcontroller.
- 3) An ADC to permit the microcontroller to just accept analogue input file for process.

Microcontrollers are:

- 1) Smaller in size
- 2) Consumes less power
- 3) Inexpensive

Microcontroller could be a standalone unit, which may perform functions on its own with none necessities for extra hardware like I/O ports and external memory.

The heart of the microcontroller is that the electronic equipment core. Within the past, this has historically been supported Associate in Nursing eight bit silicon chip unit. For instance, Motorola uses a basic 6800 silicon chip core their 6805/6808 microcontroller

devices. within the recent years, microcontrollers are developed around specifically designed electronic equipment cores, for instance the semiconductor device PIC vary of microcontrollers.

4.5.1 Introduction to PIC:

The microcontroller that has been used for this project is from PIC series. PIC microcontroller is that the 1st RISC primarily based microcontroller fictional in CMOS (complementary metal compound semiconductor) that uses separate bus for instruction and knowledge permitting coinciding access of program and knowledge memory. the most advantage of CMOS and RISC combination is low power consumption leading to a really tiny chip size with alittle pin count. the most advantage of CMOS is that has immunity to noise than different fabrication techniques.

4.5.2 PIC 16877A:

Various microcontrollers supply completely different forms of reminiscences. EEPROM, EPROM, FLASH etc. area unit a number of the reminiscences of that FLASH is that the last developed. Technology that's employed in PIC 16877 is flash technology, so knowledge is preserved even once the facility is converted. simple programming and erasing area unit different options of PIC 16F877. PIC16F877A microcontroller is employed within the project. the subsequent area unit a number of the necessary options of the controller.

4.6 LDR sensing element

Light dependent resistors or LDRs area unit typically employed in circuits wherever it's necessary to discover the presence or the amount of sunshine. they will be represented by a range of names from lightweight dependent resistance, LDR, ikon resistance, or perhaps ikon cell (photocell) or photoconductor.

4.6.1 SYMBOL:

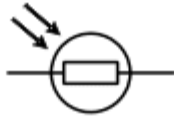


Fig no.4.6.1 SYMBOL OF LDR

The fig. no. 4.6.1 shows the image of LDR. though different devices like photodiodes or photo-transistor may be used, LDRs square measure a very convenient natural philosophy part to use. they supply massive amendment in resistance for changes in light-weightlevel.

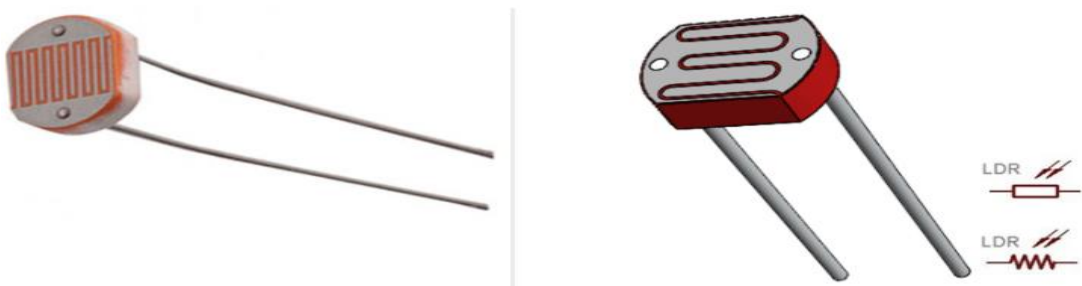


fig. no.4.6.2 LIGHT DEPENDENT RESISTOR (LDR)

The fig. no. 4.6.2 shows the sunshine dependent electrical device (LDR).

In view of their low price, simple manufacture, and simple use LDRs are employed in a range of various applications. At just one occasion LDRs were employed in photographic light-weight meters, and even currently they're still employed in a range of applications wherever it's necessary to discover light-weight levels

A photo electrical device or light-weight dependent electrical device could be a element that's sensitive to light-weight. once light-weight falls upon it then the resistance changes. Values of the resistance of the LDR might amendment over several orders of magnitude the worth of the resistance falling because the level of sunshine will increase.

It is not uncommon for the values of resistance of Associate in Nursing LDR or ikon electrical device to be many mega ohms darkly and so to fall to many hundred ohms in bright light-weight. With such a good variation in resistance, LDRs ar straightforward to use and there ar several LDR circuits out there.

LDRs are made up of semiconductor materials to change them to own their light-weight sensitive properties. Several materials will be used, however one widespread material for these light resistors is cadmium sulfide (CdS).

4.6.3 WORKING PRINCIPLE:

It is comparatively straightforward to grasp the fundamentals of however Associate in Nursing LDR works while not delving into sophisticated explanations. It's initial necessary to grasp that Associate in Nursing electrical current consists of the movement of electrons at intervals a fabric. Sensible conductors have an outsized variety of free electrons which will drift in a very given direction underneath the action of a possible distinction. Insulators with a high resistance have only a few free electrons, and thus it's arduous to form the them move and thence a current to flow.

An LDR or light electrical device is created any semiconductor material with a high resistance. It's a high resistance as a result of there are only a few electrons that are free and ready to move - the overwhelming majority of the electrons are fast into the lattice and unable to maneuver. So during this state there's a high LDR resistance.

As light-weight falls on the semiconductor, the sunshine photons are absorbed by the semiconductor lattice and a few of their energy is transferred to the electrons. This provides a number of them sufficient energy to interrupt free from the lattice so they will then conduct electricity. This leads to a lowering of the resistance of the semiconductor and thence the general LDR resistance.

The process is progressive, and as a lot of light-weight shines on the LDR semiconductor, therefore a lot of electrons are free to conduct electricity and also the resistance falls any.

LDRs are terribly helpful elements which will be used for a range of sunshine sensing applications. Because the LDR resistance varies over such a good vary, they're notably helpful, and there are several LDR circuits out there on the far side any shown here. So as to utilize these elements, it's necessary to grasp one thing of however Associate in Nursing LDR works, that has been explained on top of.

CHAPTER – 5

5.1 PIN DIAGRAM:

5.1.1 ARDUINO :

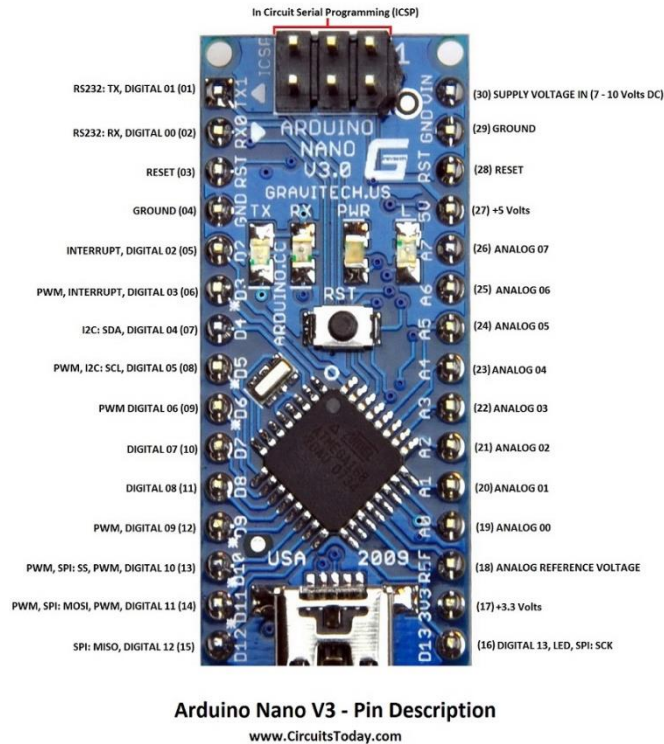


Fig no.5.1.1 ARDINO NANO PIN DIAGRAM

APPLICATION :

1. The fig. no. 5.1.1 is the pin diagram of Arduino.
2. Weighing Machines.
3. Traffic Light Count Down Timer.
4. Parking Lot Counter.
5. Embedded systems.
6. Home Automation.
7. Industrial Automation.
8. Medical Instrument.
9. Emergency Light for Railways*

5.1.2 REAL TIME CLOCK (RTC) :

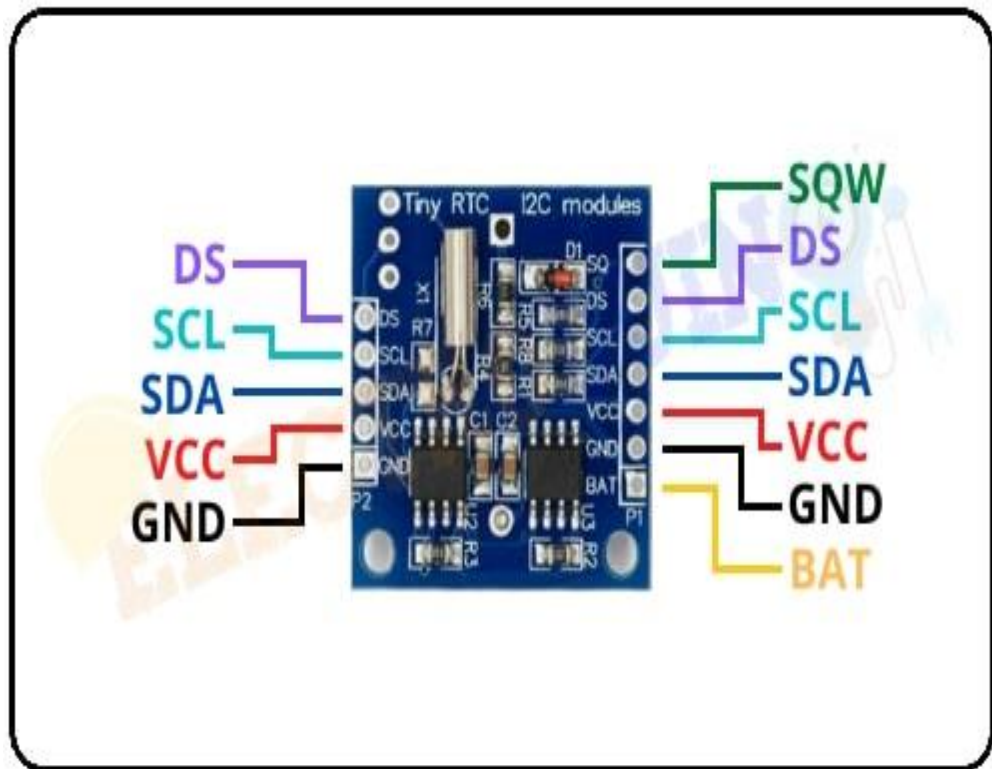


Fig. no.5.1.2 REAL TIME CLOCK (RTC)

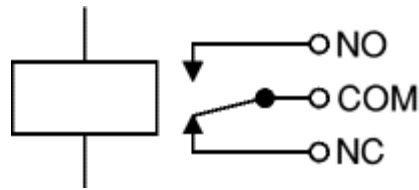
APPLICATION :

The fig. no. 5.1.2 is that the pin diagram of real clock (RTC)

The purpose of AN RTC or a true clock is to supply precise time and date which may be used for varied applications. RTC is AN device within the variety of AN Integrated Chip (IC) out there in varied packaging choices. it's supercharged by an enclosed metal battery.

5.2 RELAYS

The fig. no. 5.2 shows the circuit diagram for a relay and electrical operated



switch.

Fig no.5.2 Circuit symbol for a relay

A relay is associate electrically operated switch. Current flowing through the coil of the relay creates a field that attracts a lever and changes the switch contacts. The coil current is on or off therefore relays have 2 switch positions and most have double throw (changeover) switch contacts as shown within the diagram.



fig no.5.2ELECTRICALOPERATED SWITCH

Relays enable one circuit to modify a second circuit which may be fully break away the primary. for instance an occasional voltage battery circuit will use a relay to modify a 230V AC mains circuit. there's no electrical association within the relay between the 2 circuits, the link is magnetic and mechanical.

The coil of a relay passes a comparatively giant current, generally 30mA for a 12V relay, however it is the maximum amount as 100mA for relays designed to work from lower voltages. Most ICs (chips) cannot offer this current and a semiconductor device is sometimes accustomed amplify the little IC current to the larger worth needed for the

relay coil. the most output current for the favored 555 timer IC is 200mA therefore these devices will provide relay coils directly while not amplification.

Relays square measure typically SPDT or DPDT however they'll have more sets of switch contacts, for instance relays with four sets of transmutation contacts square measure promptly accessible. The coil are obvious and it's going to be connected either means spherical. Relay coils manufacture transient high voltage 'spikes' once they square measure transitioned and this might destroy transistors and ICs inside the circuit. to forestall injury you wish to attach a protection diode across the relay coil.

The relay's switch connections square measure sometimes tagged COM, NC and NO:

1. COM = Common, continually connect with this, it's the moving a part of the switch.
2. NC = ordinarily Closed, COM is connected to the present once the relay coil is off.
3. NO = ordinarily Open, COM is connected to the present once the relay coil is on.
4. Connect to COM and NO if you would like the switched circuit to get on once the relay coil is on.
5. Connect to COM and American state if you would like the switched circuit to get on once the relay coil is off.

5.2.1 selecting a relay

You need to contemplate many options once selecting a relay:

1. Physical size and pin arrangement

If {you square measure|you're} selecting a relay for associate degree existing PCB you'll ought to make sure that its dimensions and pin arrangement are appropriate. you ought to notice this data within the supplier's catalogue.

2. Coil voltage

The relay's coil voltage rating and resistance should suit the circuit powering the relay coil. several relays have a coil rated for a 12V offer however 5V and 24V relays are without delay on the market. Some relays operate absolutely well with a offer voltage that could be a very little less than their rated worth.

3. Coil resistance

The circuit should be able to offer this needed by the relay coil. you'll use law to calculate the current:

Relay coil current = offer voltage

coil resistance

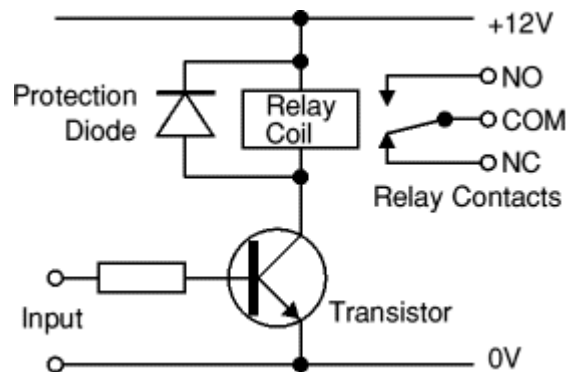
For example: A 12V offer relay with a coil resistance of four hundred Ohm passes a current of 30mA. this is often OK for a 555 timer IC (maximum output current 200mA), however it's an excessive amount of for many ICs and that they would require a semiconductor unit to amplify this.

4. Switch ratings(voltage and current)

The relay's switch contacts should be appropriate for the circuit they're to regulate. you'll ought to check the voltage and current ratings. Note that the voltage rating is typically higher for AC, for example: "5A at 24V DC or 125V AC".

5. Switch contact arrangement(SPDT,DPDT etc)

Most relays square measure SPDT or DPDT that square measure usually represented



as "single pole changeover" (SPCO) or "double pole changeover" (DPCO).

Fig.no.5.2.2 PROTECTIONDIODES

5.2.2 Protection diodes for relays

Transistors and ICs must be protected from the brief high voltage produced when a relay coil is switched off. The diagram shows how a signal diode (eg 1N4148) is connected 'backwards' across the relay coil to provide this protection.

The fig. no. 5.2.2 shows the protection diode for relay.

Current flowing through a relay coil creates a field of force that collapses suddenly once the present is shifted. The unforeseen collapse of the field of force induces a quick high voltage across the relay coil that is extremely possible to wreck transistors and ICs. The protection diode permits the induced voltage to drive a quick current through the coil (and diode) that the field of force dies away quickly instead of instantly. This prevents the induced voltage turning into high enough to cause harm to transistors and ICs.

5.2.3 Relays and transistors compared

Like relays, transistors may be used as associate electrically operated switch. For switch little DC currents ($< 1A$) at low voltage they're sometimes an improved alternative than a relay. However, transistors cannot switch AC (such as mains electricity) and in straightforward circuits they're not sometimes a decent alternative for switch giant currents ($> 5A$). In these cases a relay are required, however note that a coffee power junction transistor should still be required to modify the present for the relay's coil! the most blessings and drawbacks of relays square measure listed below:

5.2.4 Advantages of relays:

1. Relays will switch AC and DC, transistors will solely switch DC.
2. Relays will switch higher voltages than customary transistors.
3. Relays square measure typically an improved alternative for switch giant currents ($> 5A$).
4. Relays will switch several contacts directly.
5. 5.2.5 Disadvantages of relays:
6. Relays square measure bulkier than transistors for switch little currents.
7. Relays cannot switch apace (except reed relays), transistors will switch repeatedly per second.
8. Relays use a lot of power because of the present flowing through their coil.
9. Relays need a lot of current than several ICs will give, thus a coffee power junction transistor could also be required to modify the present for the relay's coil.

CHAPTER-6

6.1 RESULT AND CONCLUSION

Compared to their ancient fixed-position counterparts, star systems that track the changes within the sun's flight over the course of the day collect a so much bigger quantity of solar power, and so generate a considerably higher output power.

This study issues primarily the event of a strategy for the determination and locating areally the water leakages concerning distribution networks. so as to accomplish this work, a case study was conducted within the water distribution system of a bigger town, Ankara. North pressure zone was choosen for the most study space as a result of this zone is way a lot of in restraint with regard to alternative zones. Preliminary studies and private communications within the water utility have indicated that N8.1 pressure zone was unseaworthy considerably; as a results of this truth, it absolutely was determined to conduct this study during this pressure zone. There area unit 2 basic definitions in reference to the water losses; one is unaccounted-for water, the opposite is water outpouring. Unaccounted-for water will be calculable by examination annual water

production and annual water bills regarding water consumption; unaccounted for water will occur thanks to the water leaks, the use of fire hydrants, flushing works, main breaks, cleansing of storage tanks, inaccurate meters, and extralegal use. Water outpouring, generally, forms the biggest proportion among all the already mentioned things. The share of water losses thanks to outpouring might vary from five-hundredth to five hundredth and even larger of the full offer. Water outpouring will be outlined because the distinction between delivered water by the water utility and consumed water by the shoppers. During this study, water outpouring was studied. Water outpouring involves supererogatory expenses in pumping and water treatment prices; it ought to be additional that costs necessary for repairing broken pipes of any size ought to be additional to the current list; in fact, maintaining a system often at an acceptable level is preferable to use in depth rehabilitation programs to problematic systems (Walski et al., 2001). Outpouring might also cause excessive investment for developing new sources and/or increasing the system capability to stay pace with increasing demands. Additionally to those things, the quantity of water itself, could also be the foremost vital issue regarding water outpouring for cities set at realms which could be full of drought periods. Generally, cities with unseaworthy systems get conversant by the drought ahead of cities with sturdy systems. Moreover, excessive quantity of water could also be a limiting issue for the event of a water distribution network; huge quantity of losses can lead to low pressures throughout the network. During this case - even there's sufficient quantity of water - while not conducting a water outpouring study, a program can suggest solely the development of parallel offer lines and a lot of storage tanks, and incorporating a lot of pumps into the system; it's obvious that these solutions are terribly uneconomical. The most purpose for conducting this study - among others - was to indicate that it's attainable to see weak pressure zones of a water distribution network of a bigger town with the out there personnel, tools, and technology of the water utility.

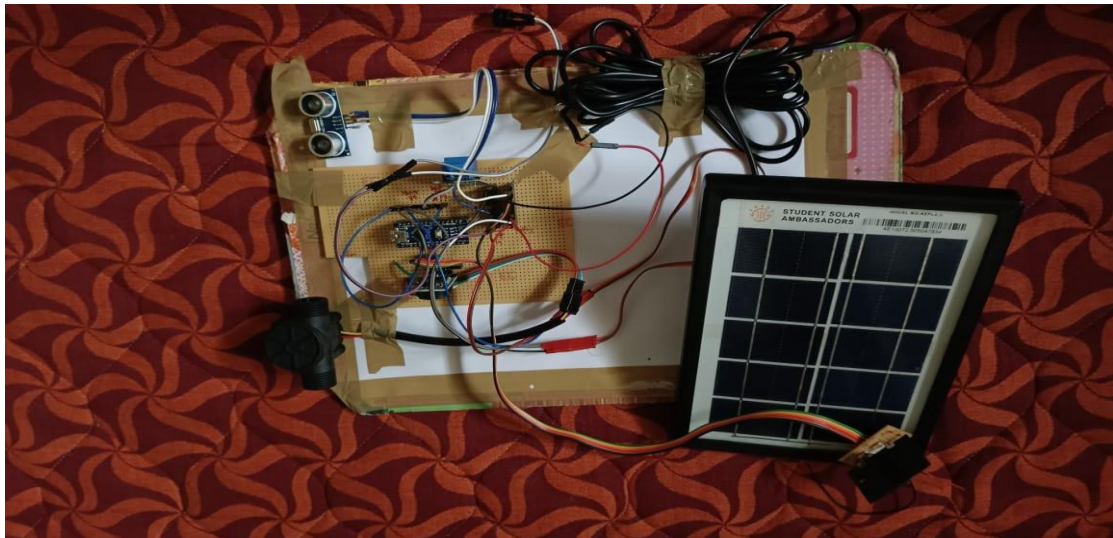


Fig.no.6.1 OVERALL PROJECT DEMO KIT

The fig. No. 6.1 shows the overall project demo kit. The crews of the water utility particularly groups of the Department of Operations of ASKI area unit fashioned of skillful and capable people; but, this can be not sufficient for operative a water distribution system. The water utility ought to have an entire management of the system concerning its parts (concerning all the outlined pressure zones) as well as the characteristics, the locations and therefore the standing of the pipes, valves, hydrants, pumps, and tanks. Especially, valves ought to be mentioned/discussed way more than others, as a result of a more robust performance of this study was hindered by the nonexisting or existing valves at acceptable locations; awry valves ought to be additional to the current list. If there have been not huge issues regarding valves, more division would be attainable for locating the leaks a lot of exactly. The duty of dominant the complete infrastructure of the water distribution network mustn't run solely to the Operations Department; it's a task to be consummated additionally by the SCADA Department and laptop Department. Geographical info Systems (GIS) and SCADA services ought to integrated along for giving services to the Department of Operations. Anyhow, a precise exploration study at associate degree acceptable scale ought to be conducted to analyze the buried a part of the network.

6.2 REFERENCE

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