Monitoring and Alert System of Transformer Using GSM



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Declaration

It is declared hereby that this thesis paper or any part of it has not been submitted to anywhere else for the award of any degree.

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Certification

This is to certify that this project entitled " Monitoring and Alert system of Transformer Using GSM" is done by the following students under my direct supervision. This project work has been carried out by them in the laboratories of the Department of Electrical and Electronic Engineering under the Faculty of Engineering, Sonargaon University (SU) in partial fulfillment of the requirements for the degree of Bachelor of Science in Electrical and Electronic Engineering.

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ABSTRACT

This project is about design and implementation of a mobile embedded system tomonitor and record key parameters of transformer like , oil level and ambient temperature. The idea of on-line monitoring system integrates a global service mobile (GSM) Modem, with a standalone single chip microcontroller and different sensors. It is installed at the transformer site and the above parameters are recorded using the analog to digital converter (ADC) of the embedded system. The obtained parameters are processed and recorded in the system memory. If any abnormality or an emergency situation occurs the system sends SMS (short message service) messages to the mobile phones containing information about theabnormality according to some predefined instructions programmed in the microcontroller. This mobile system will help the transformers to operate smoothly and identify problems before any catastrophic failure.

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List of ABBREVIATIONS

DC	Direct Current
AC	Alternating Current.
LCD	Liquid Crystal Display
ADC	Analog-to-Digital Converter
IR	Infrared Receiver
IC	Integrated Circuit
LED	Light Emitting Diode
PCB	Printed Circuit Board
LCD	Liquid Crystal Display

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CHAPTER I

INTRODUCTION

1.1 Introduction

The invention of the power transformer towards the end of the nineteenth century made possible the development of the modern constant voltage AC supply system, with power stations often located many miles from centres of electrical load. Before that, in the early days of public electricity supplies, these were DC systems with the source of generation, of necessity, close to the point of loading.

In power systems, distribution transformer is electrical equipment which distributes power to the low-voltage users directly, and its operation condition is an important component of the entire distribution network operation. Operation of distribution transformer under rated condition(as per specification in their nameplate) guarantees their long life .However, theirlife is significantly reduced if they are subjected to overloading, resulting in unexpected failures and loss of supply to a large number of customers thus effecting system reliability. Overloading and ineffective cooling of transformers are the major causes of failure in distribution transformers[2]-[4]. The monitoring devices or systems which are presently used for monitoring distribution transformer exist some problems and deficiencies

This chapter describes an improved approach for transformer differential protection using using by global system of mobile comunication.The approach ensures security for external faults, inrush, and overexcitation conditions, and provides dependability for internal faults. It combines harmonic restraint .This is monitoring and alarting system all time monitor and communicate authoriz person .

1.2 Background study

Abnormality in distribution transformer is accompanied with variation indifferent parameters like Winding temperature,Top and bottom oil temperatures, Ambient temperature, Load current, in oil level Dissolved gas in oil, Bushing condition, LTC monitoring, Oil level. However, we are dealing with oil temperature and load current.

Online monitoring system consists of embedded system, GSM modem, mobile-users and GSM networks and sensors installed at transformer site Sensors are installed on transformer side which reads and measures the physical quantity from the distribution transformer and then it converts it into the analog signal.

The embedded module is located at the transformer site. It is utilized to acquire, process, display, transmit and receive the parameters to/ from the GSM modem.

The second is the GSM module. It is the link between the embedded system andthe public GSM network. The third is utility module that has a PC-based -serverlocated at the utility control center. The server is attached to GSM modem and received transmits SMS from/to the transformer site via the GSM module.

1.3 Objectives

The main objectives of power supply are given below. Ensure enough essential for plant growth. Provide crop insurance against short duration drought. Oil level and temprature to provide a suitable surrounding.

1.4 Project Organization

In this report, Chapter one covers introduction, background, objectives. Chapter two represents theory, description of the microcontroller, Transformer,GSM MODULE 800 , sensor and other components. Chapter three describes and working principle of the project. In chapter four we have discussed result and discussion, cost estimation, future modification, conclusion.

CHAPTER II

THEORY OF THE PROJECT

2.1 Introduction

This chapter includes the total over view of the device. In this chapter we have followed-up the theory of the microcontroller, Transformer, GSM MODULE 800 , sensor , describe of Microcontroller (ATMEGA 328P), Vero board, and other components. Here we can know that the total system overview of the projects. And we will also know that how the equipment are working with each other.

2.2 Theory

We've developed the system that can handle this critical switching situation perfectly. The current sensor to measure any over, under voltage. Our system will switch to very low voltage. When the moisture sensor falls on the soil of the tree, it transmits Arduino. Arduino passes a

2.2.1Arduino Uno

Arduino is an open-source prototyping platform based on easy-to-use hardware and software. Arduino boards are able to read inputs - light on a sensor, a finger on a button, or a Twitter message - and turn it into an output - activating a motor, turning on an LED, publishing something online. You can tell your board what to do by sending a set of instructions to the microcontroller on the board. To do so you use the Arduino programming language and the Arduino Software (IDE), based on Processing.

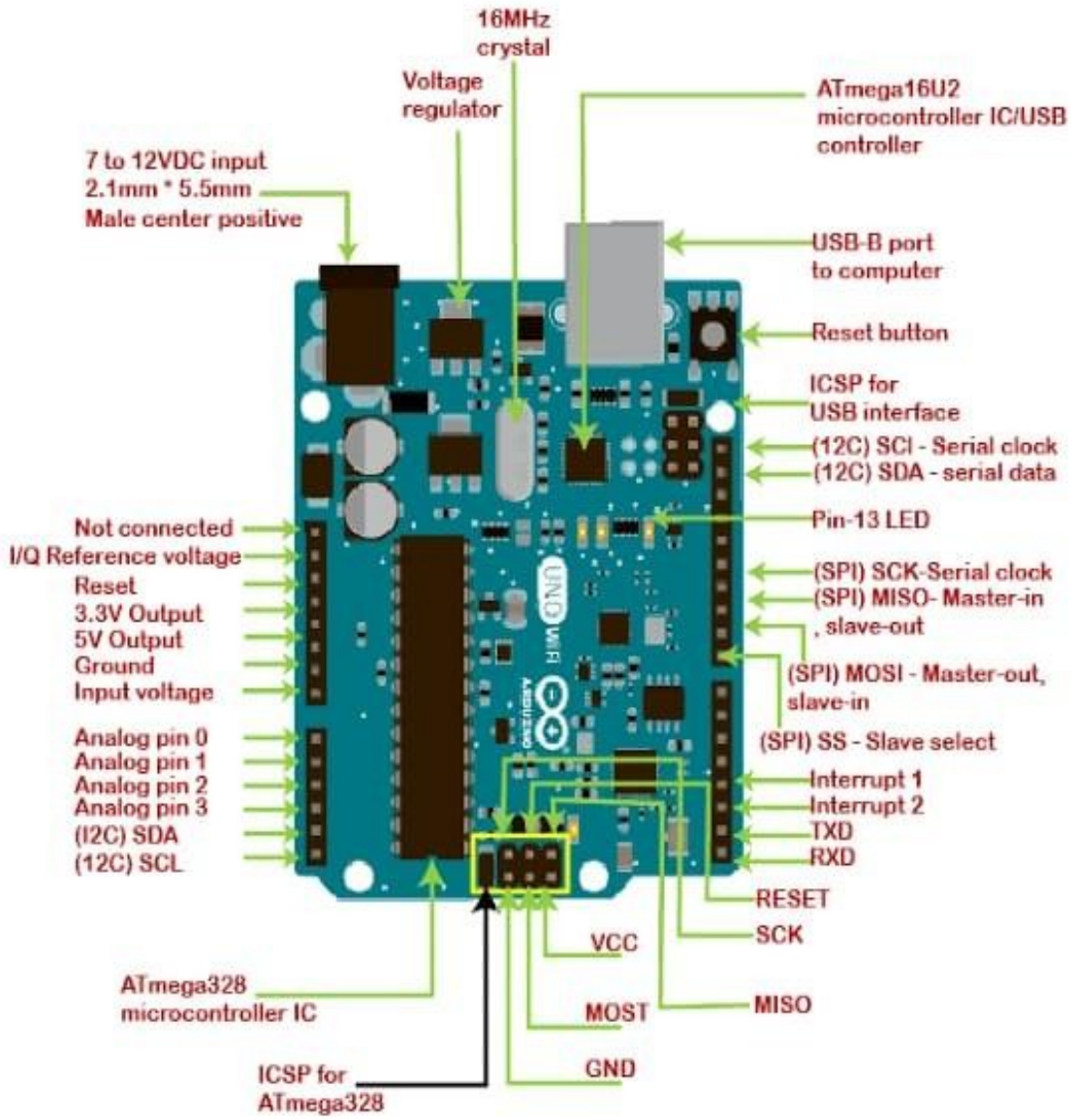


Fig: 2.2.1.1 Arduino UNO Pin Diagram

Technical specifications:

Table 2.1: Technical specifications of Arduino UNO

Microcontroller	ATmega328P
Operating Voltage	5V
Input Voltage (recommended)	7-12V
Digital I/O Pins	14 (of which 6 provide PWM output)
PWM Digital I/O Pins	6
Analog Input Pins	6
DC Current per I/O Pin	20 mA
DC Current for 3.3V Pin	50 mA
Flash Memory	32 KB (ATmega328P) of which 0.5 KB used bybootloader
SRAM	2 KB (ATmega328P)
EEPROM	1 KB (ATmega328P)
Clock Speed	16 Hz

2.2.2 Microcontroller ATMEGA328P

The Atmel® picoPower® ATmega328/P is a low-power CMOS 8-bit microcontroller based on the AVR® enhanced RISC architecture. By executing powerful instructions in a single clock cycle, the ATmega328/P achieves throughputs close to 1MIPS per MHz. This empowers system designer to optimize the device for power consumption versus processing speed.
The Atmel AVR® core combines a rich instruction set with 32 general purpose working registers. All the 32 registers are directly connected to the Arithmetic Logic Unit (ALU), allowing two independent registers to be accessed in a single instruction executed in one clock cycle. The resulting architecture is more code efficient while achieving throughputs up to ten times faster than conventional CISC microcontrollers. The ATmega328/P provides the following features: 32Kbytes of In-System Programmable Flash with Read-While-Write capabilities, 1Kbytes EEPROM, 2Kbytes SRAM, 23 general purpose I/O lines, 32 general purpose working registers, Real Time Counter (RTC), three flexible Timer/Counters with compare modes and PWM, 1 serial programmable USARTs , 1 byte-oriented 2-wire Serial Interface (I2C), a 6- channel 10-bit ADC (8 channels in TQFP and QFN/MLF packages) , a programmable Watchdog Timer with internal Oscillator, an SPI serial port, and six software selectable power saving modes. The Idle mode stops the CPU while allowing the SRAM, Timer/Counters, SPI port, and interrupt system to continue functioning. The Power-down mode saves the register contents but freezes the Oscillator, disabling all other chip functions until the next interrupt or hardware reset. In Power-save mode, the asynchronous timer continues to run, allowing the user to maintain a timer base while the rest of the device is sleeping. The ADC Noise Reduction mode stops the CPU and all I/O modules except asynchronous timer and ADC to minimize switching noise during ADC conversions. In Standby mode, the crystal/resonator oscillator is running while the rest of the device is sleeping. This allows very fast start-up combined with low power consumption. In Extended Standby mode, both the main oscillator and the asynchronous timer continue to run. Atmel offers the QTouch® library for embedding capacitive touch buttons, sliders and wheels functionality into AVR microcontrollers. The patented charge-transfer signal acquisition offers robust sensing and includes fully debounced reporting of touch keys and includes Adjacent Key Suppression® (AKS™) technology for unambiguous detection of key events. The easy-to-use QTouch Suite toolchain allows you to explore, develop and debug your own touch applications. The device is manufactured using Atmel’s high density non-volatile memory technology. The On-chip ISP Flash allows the program memory to be reprogrammed In-System through an SPI serial interface, by a conventional nonvolatile memory programmer, or by an On-chip Boot program running on the

AVR core. The Boot program can use any interface to download the application program in the Application Flash memory. Software in the Boot Flash section will continue to run while the Application Flash section is updated, providing true Read-While-Write operation. By combining an 8-bit RISC CPU with In-System Self-Programmable Flash on a monolithic chip, the Atmel ATmega328/P is a powerful microcontroller that provides a highly flexible and cost effective solution to many embedded control applications. The ATmega328/P is supported with a full suite of program and system development tools including: C Compilers, Macro Assemblers, Program Debugger/Simulators, In-Circuit Emulators, and Evaluation kits.

2.2.3 LCD dISPLAY 16×4

RC1604A is 16 characters x 4 lines monochrome LCD display with module dimension 87.0 x 60.0 mm. Default interface of RC1604A 16x4 LCD Display module is 6800 with built-in IC ST7066; if you require interface such as SPI or I2C, they're available as well, but the IC will be replaced with RW1063.

Default power supply of RC1604A LCD display 16x4 is 5V (3V is optional). Negative voltage version is available for 3V power supply. Raystar provides various LED backlight combinations for RC1604A 16 characters x 4 lines LCD display module, such as yellow-green and white . You can choose module with LED backlight or without it.

LED backlight can be driven by PIN1, PIN2, PIN15, PIN16 or A and K. The RC1604A module offers a selection of fonts, including English/Japanese, Europe and Cyrillic (Russian), etc. If you'd like to obtain full datasheet of RC1602A LCD 16 characters x 4 lines,



Fig:2.2.3.1 LCD Display 16×4

2.2.4 GSM Monitoring system

A customised Global System for Mobile communication (GSM) module is designed for wireless radiation monitoring through Short Messaging Service (SMS). This module is able to receive serial datafrom radiation monitoring devices such as survey meter or area monitor and transmit the data as text SMS to a host server. It provides two-way communication for data transmission, status query, and configuration setup. The module hardware consists of GSM module, voltage level shifter, SIM circuit and Atmega328P microcontroller. Microcontroller provides control for sending, receiving and AT command processing to GSM module. The firmware is responsible to handle task related to communication between device and host server. It process all incoming SMS, extract, and store new configuration from Host, transmits alert/notification SMS when the radiation data reach/exceed threshold value, and transmits SMS data at every fixed interval according to configuration. Integration of this module with radiation survey/monitoring device will create mobile and wireless radiation monitoring system with prompt emergency alert at high-level radiation .

High-temperature superconducting materials with its excellent performance have increasingly been valued by industries, especially in the field of electronic information. The superconducting material has almost zero surface resistance, and the filter made of it has the characteristics of low insertion loss, highedge steepness and good out-of-band rejection. It has higher selectivity for the desired signal and thus less interference from adjacent channels Signal interference, and noise reduction coefficient can improve the ability to detect weak signals. This design is suitable for high temperature superconducting filter of GSM-R communication system, which can overcome many shortcomings of the traditional GSM-R. The filter is made of DyBCO, a high temperature superconducting thin film material based on magnesium oxide (MgO) substrate with the dielectric constant of 9.7, the center frequency at 887.5MHz,bandwidth of 5MHz.

Mobile phones are two-way radios that emit electromagnetic radiation in microwave range. As the number of mobile phone users has reached 6 billion, the bioeffects of exposure to mobile phone radiationand mobile phone electromagnetic interference with electronic equipment have received more attention, globally. As self-monitoring of blood glucose can be a beneficial part of diabetes control, home blood glucose testing kits are very popular. The main goal of this study was to investigate if radiofrequency radiation emitted from a common GSM mobile phone can alter the accuracy of home blood glucose monitors. Forty five female nondiabetic

students aged 17-20 years old participated in this study. For Control-EMF group (30 students), blood glucose concentration for each individual was measured in presence and absence of radiofrequency radiation emitted by a common GSM mobile phone (HTC touch, Diamond 2) while the phone was ringing. For Control- Repeat group (15 students), two repeatedmeasurements were performed for each participant in the absence of electromagnetic fields. The This project is about producing a prototype to feed fishes at fish ponds of remote location with the use of GSM mobile phone. An automatic fish feeder is an electric device that has been designed to give out the right amount of pellets at the designed time. In this project, the automatic feeder designed consists of photovoltaic solar cells that are used to generate electricity and storing it into batteries. Solar charge controllers can be used to determine the rate of which current is drawn and added from the batteries. GSM cellular communication is used to allow user to control from a distance. Commands or instructions are sent to the operating system which in return runs the servomotor and blower by blowing certain amount of fish pallets into the pond to feed the fishes.

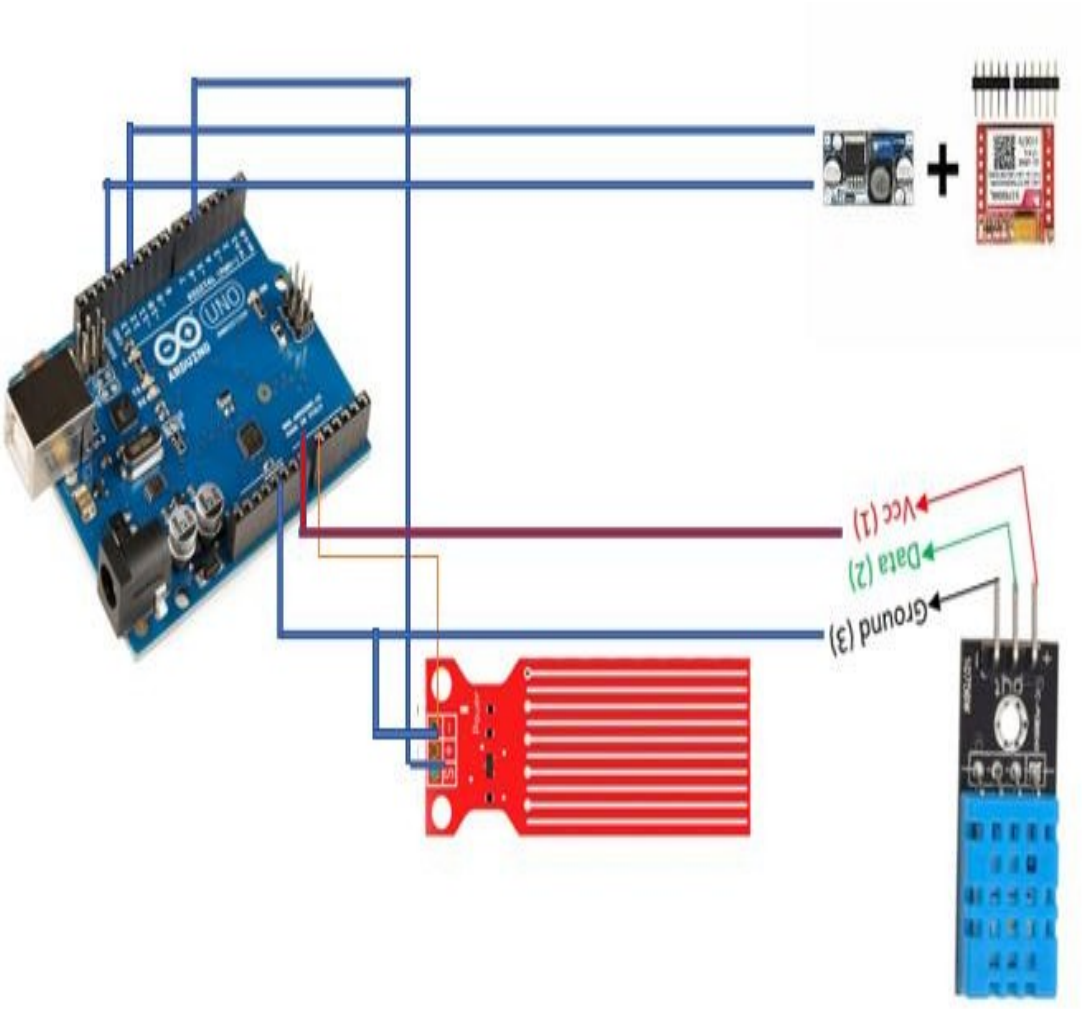
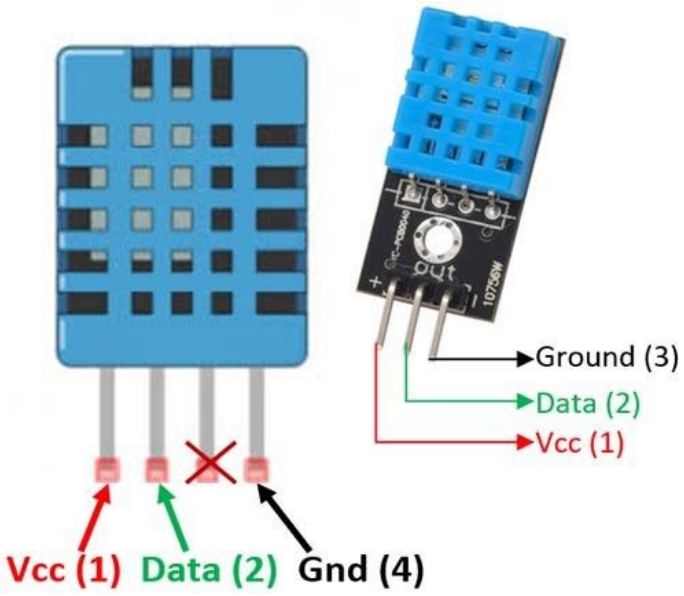
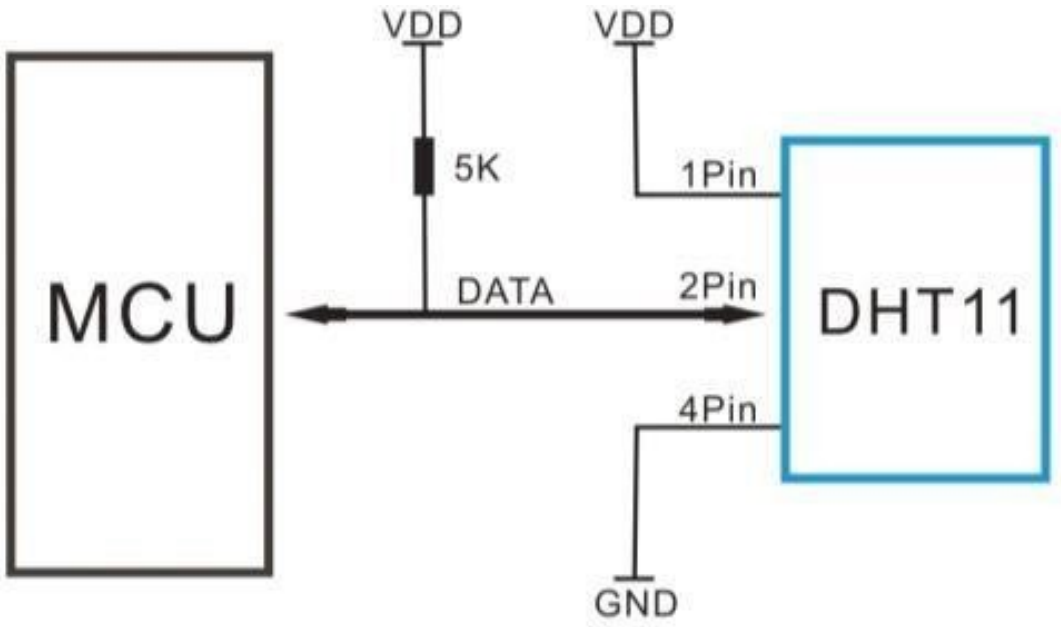


Fig: 2.2.4.1: GSM Monitoring

2.2.5 DHT Sensor

The humidity sensing capacitor has two electrodes with a moisture holding substrate as a dielectric between them. Change in the capacitance value occurs with the change in humidity levels. The IC measure, process this changed resistance values and change them into digital form.





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Fig: 2.2.5.1: DHT11 Block diagram

2.2.6 Relay Module

A power relay module is an electrical switch that is operated by an electromagnet. The electromagnet is activated by a separate low-power signal from a micro controller. When activated, the electromagnet pulls to either open or close an electrical circuit.

A simple relay consists of wire coil wrapped around a soft iron core, or solenoid, an iron yoke that delivers a low reluctance path for magnetic flux, a movable iron armature and one or more sets of contacts. The movable armature is hinged to the yoke and linked to one or more set of the moving contacts. Held in place by a spring, the armature leaves a gap in the magnetic circuit when the relay is de-energized. While in this position, one of the two sets of contacts is closed while the other set remains open.

When electrical current is passed through a coil, it generates a magnetic field that in turn activates the armature. This movement of the movable contacts makes or breaks a connection with the fixed contact. When the relay is de-energized, the sets of contacts that were closed, open and breaks the connection and vice versa if the contacts were open. When switching off the current to the coil, the armature is returned, by force, to its relaxed position. This force is usually provided by a spring, but gravity can also be used in certain applications. Most power relays are manufactured to operate in a quick manner.

For distribution of power in high current applications, GEP Power Products is the industry leader in high power relay module design and manufacturing.

Rated up to 70 amps, GEP's power relay modules are designed for seamless integration in high power distribution applications. The convenient integral mounting brackets provide easy installation and accessibility. With endless options such as terminal position assurance available for wire retention, GEP Power Products' power distribution solutions and off-road industry knowledge are second to none.
Contact GEP Power Products for your custom designed power relay module quote today.

2.2.7: Grove Level sensor：

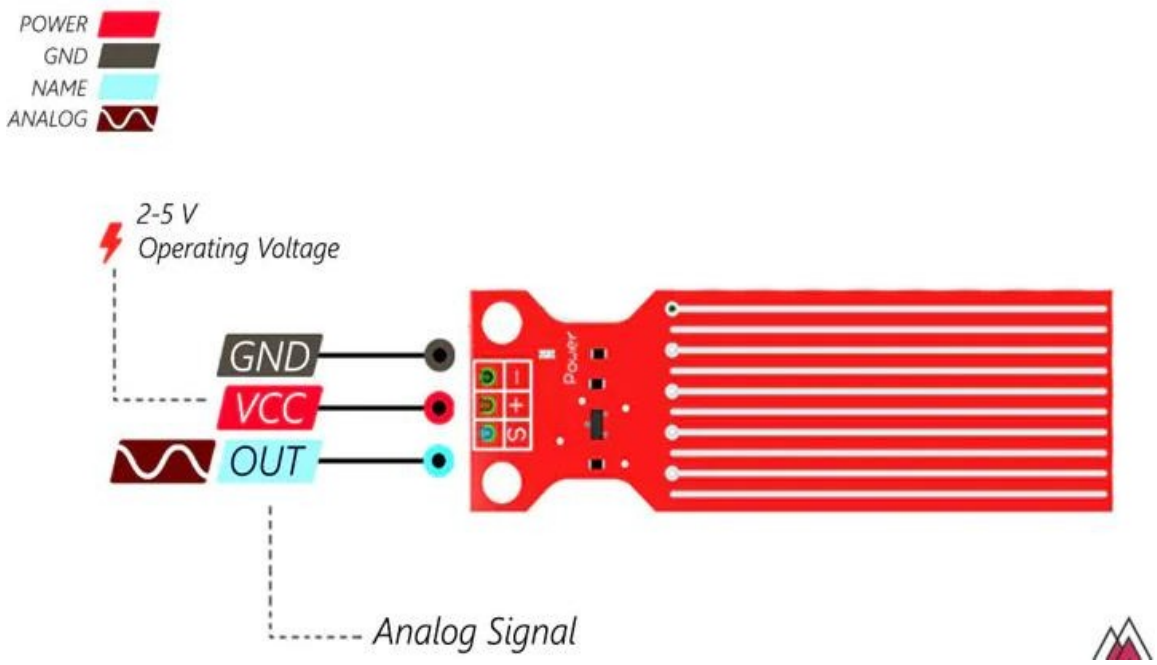


Fig: 2.2.7.1: Grove label sensor

Grove water sensor module is part of the Twig system. This sensor works by having a series of exposed traces connected to ground and interlaced between the grounded traces are the sens traces. The sensor traces have a weak pull-up resistor of 1 MΩ. The resistor will pull the sensor trace value high until a drop of water shorts the sensor trace to the grounded trace. Believe it or not this circuit will work with the digital I/O pins of your Arduino or you can use it with the analog pins to detect the amount of water induced contact between the grounded and sensor traces.

Features

- Grove compatible interface
- Low power consumption
- 2.0cm x 2.0cm twig module
- High sensitivity
-

Applications Ideas

- Rainfall detecting
- Liquid leakage
- Tank overflow detector

2.2.8 12V DC Power supply (Rectifier)

A bridge rectifier circuit is a common part of the electronic power supplies. Many electronic circuits require rectified DC power supply for powering the various electronic basic components from available AC mains supply. We can find this rectifier in a wide variety of electronic AC power devices like home appliances, motor controllers, modulation process, welding applications, etc.

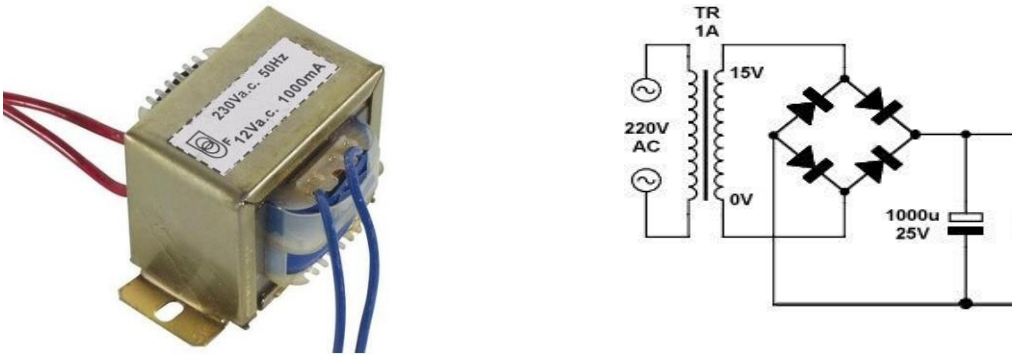


Fig: 2.2.8.1: 220/12V rectifier

The bridge rectifier circuit diagram consists of various stages of devices like transformer, Diode Bridge, filtering and regulators. The first stage of the circuit is a transformer which is a step-down type that changes the amplitude of the input voltage. Most of the electronic projects uses 230/12V transformer to step-down the AC mains 230V to 12V AC supply. Next stage is a diode-bridge rectifier which uses four or more diodes depending on the type of bridge rectifier. Choosing a particular diode or any other switching device for a corresponding rectifier needs some considerations of the device like Peak Inverse Voltage (PIV), forward current If, voltage ratings, etc. It is responsible for producing unidirectional or DC current at the load by conducting a set of diodes for every half cycle of the input signal.

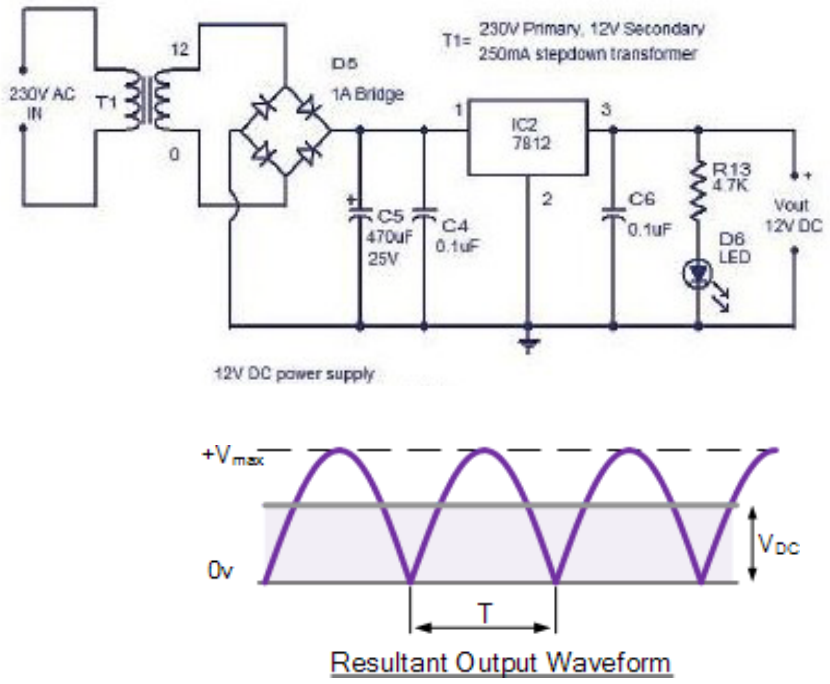


Fig: 2.2.8.2: Output Waveforms of 220V/12V rectifier

2.2.9 12 Volt dc to dc Buck converter :

The working principle of the DC-to-DC converter is very simple. The inductor in the input resistance has an unexpected variation in the input current. If the switch is kept as high (on), then the inductor feeds the energy from the input and stores the energy in the form of magnetic energy.



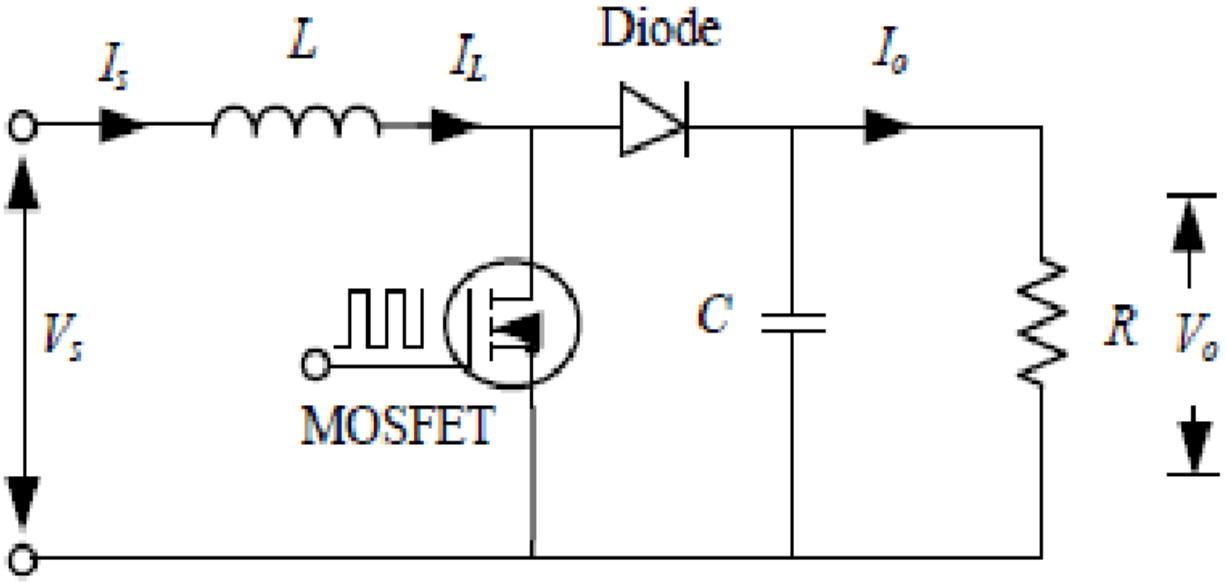


Fig: 2.2.9.1: 12 VOLT DC TO DC Buck converter circuit diagram

2.2.10 Wire and Connector

We endeavor to align our product range to the desired repute by presenting a wide range of quality tested Cable Assembly, Electrical Connectors and Electrical Terminal and Switches. Our efforts to achieve the pioneering stature reflect in our highly beneficial product range which is high in demand for its industry proven designs, smooth finish, high flexibility, durable quality construction and remarkable corrosion resistance.

Our line of products is cherished by diverse industrial verticals; hence we take special consideration to the current and upcoming market trends. We strive to develop products with clients' best interest in mind, which is why we believe in the philosophy of improvisation that makes us accountable to develop products that answer to the unmet client needs. Our capability to assess the clients' anticipations made us
We also deal in all types of electronics as wells as robotic components like.. SMD and DIP Microcontroller , SMD and TH Resistors , SMD and TH Capacitors , SMD and TH Diodes , Antennas , Relays , Network resistors , MOV , Hi-LInk Power Supply AC-DC Convertors , LCD Displays , Switchs , Antenna Connectors , Arduino Boards , Sensors , SMD and TH IC's , HDMI Displays , Mosfits and Transistors , Trimpots , DC-DC Convertors , Buzzers , GSM Modules and Boards , Raspberry pi Boards and Displays , Coin Acceptor Modules , RFID Modules , Buletooth Modules and many more



Fig: 2.2.10.1 Wire and Connector

CHAPTER III

DESIGN & FEBRICATION

3.1 Introduction

In this chapter fully cover with discuss design and fabrication of this project. Here we will discuss about developed block diagram and briefly describe about the circuit description and also learn about working principle. Total project flow chart is also available in this chapter.

3.2 Block Diagram

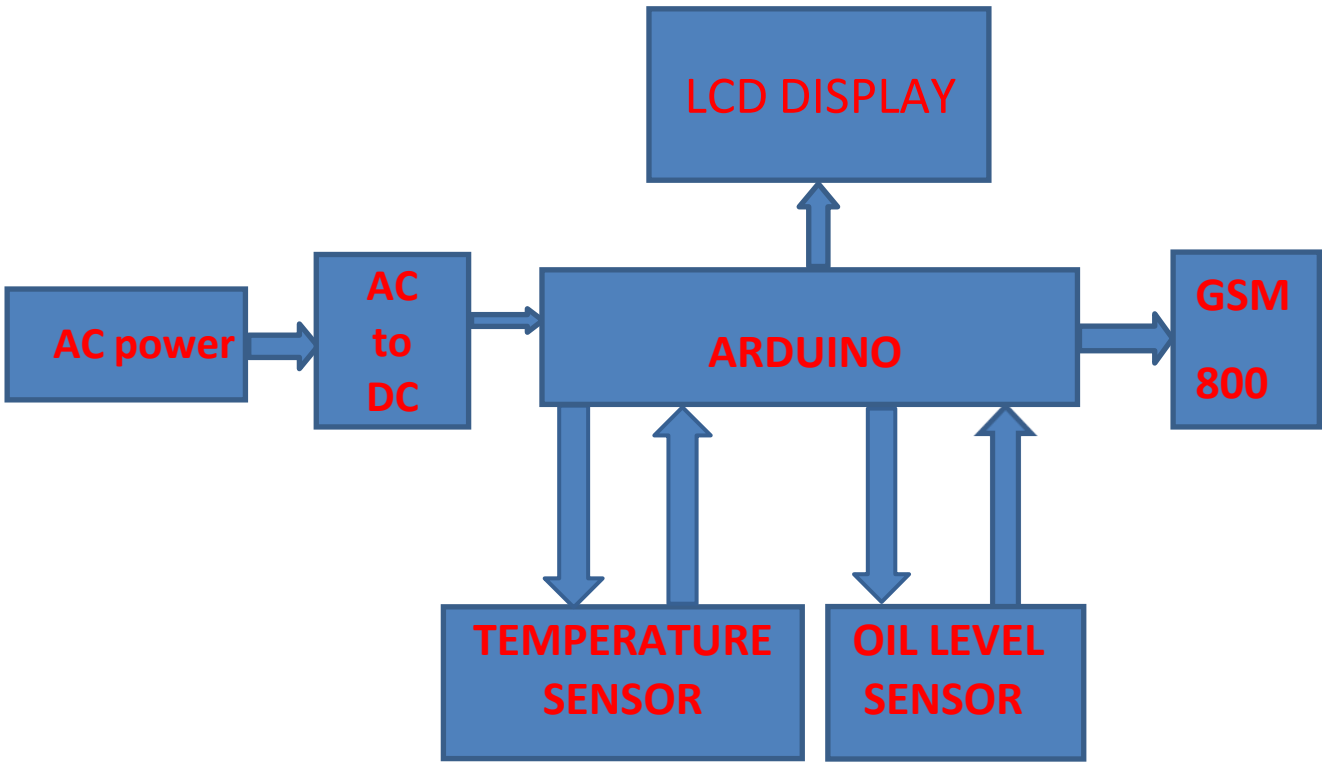
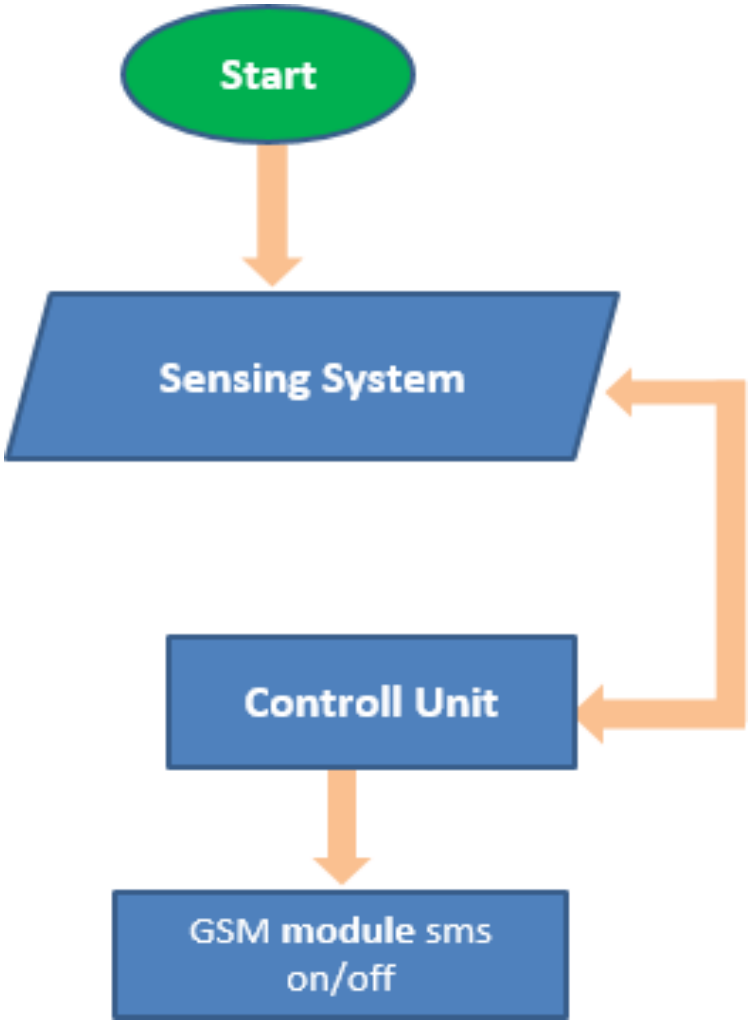


Fig: 3.2.2.1: Block diagram of project

Here's the block diagram of our Microcontroller Based Integration of Renewable Energy system. We can clearly describe the working process through this block diagram. Firstly we have a power supply unit which provide to 12volt dc power for aurduino on .

3.3 Flow Chart



In this flowchart we can easily determine the working process of our system. Starting with some control initializations our control system reads/measures the voltage and current of both energy sources. The voltage and current is shown & updated every second in a LCD display. The control system continuously checks if the supply voltage is less than the threshold voltage set by us on the program. If the supply voltage gets down below the threshold voltage, it switchesthe supply line to the other source. Or if both sources drops the threshold voltage, then the controller combines those two sources. For example if somehow solar source drops the threshold voltage, the controller switches the supply line to the wind source. The sensing system sence pass the controll unit & Controll unit pass signal GSM MODULE 800 for mobile sms .

3.4 Circuit Diagram :

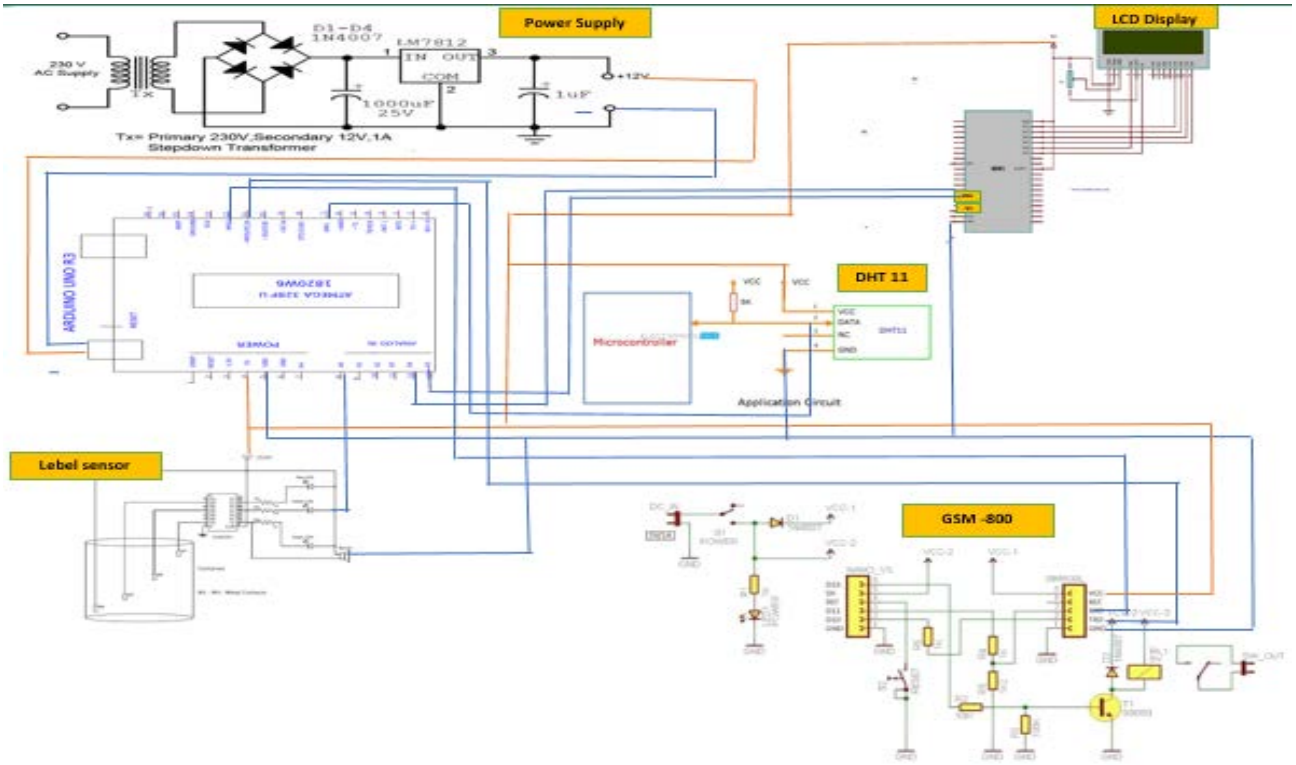


Fig: 3.3.3.2: Circuit diagram of the Project

In our circuit, we've used an Arduino as the controller, 2 voltage sensors to measure the source voltages. A current sensor is used to measure the load current. A voltage stabilizer is also used to provide a stable voltage to the loads. We made the voltage sensors using opto-cupler and 2 voltage dividing resistors.

After power up everything, the voltage sensor continuously read the source voltage and sends the data to the controller. The controller analyses the data and check if any of those voltage is under threshold voltage or not. If any of those sources drops their voltage under threshold voltage, the controller then immediately switches to the source that is stable and has no problems. It happens immediately.
The current sensor continuously measures the load current and voltages shows it to the LCD display.

We've used pin 7 is out put of level sensor & A0 is output OF DHT11 temperature & Huminidity sensor .

The GSM is connect to 11 & 12 pin of Aurduino .

Two optocuplers with voltage dividing resistors is used to measure the source voltages. Optocuplers are used to completely isolate the source circuit from the control circuit. When theoutput voltage of the LM317 increases, the LED of the input port of optocupler gets brighter. The light hits the base of photo transistor at the output of the optocupler. The current flow through collector to emmitter increases so the voltage at the middle of the voltage divider resistor also increases. The controller (Arduino) reads the analog data from the voltage dividerand calcuate the actual voltages and sends those to the LCD display.

The current sensor senses the current flow of the load and sends an analog data to tha controller.The controller then calculates the data and measures the actual current and showes to the LCDdisplay. It is connect A4 & A5 .

Total 5 DPDT relays are used to switching the load line. The relays are labeled as PWR_RL (Power Relay), GND_RL (Ground Relay), COMB_RL (Combine Relay).

3.5 Overview of Using GSM system

GSM stands for **G**lobal **S**ystem for **M**obile Communication. It is a digital cellular technologyused for transmitting mobile voice and data services. Important facts about the GSM are givenbelow −

- The concept of GSM emerged from a cell-based mobile radio system at Bell Laboratories in the early 1970s.
- GSM is the name of a standardization group established in 1982 to create a common European mobile telephone standard.
- GSM is the most widely accepted standard in telecommunications and it is implementedglobally.
- GSM is a circuit-switched system that divides each 200 kHz channel into eight 25 kHztime-slots. GSM operates on the mobile communication bands 900 MHz and 1800 MHz in most parts of the world. In the US, GSM operates in the bands 850 MHz and 1900 MHz.
- GSM owns a market share of more than 70 percent of the world's digital cellular subscribers.
- GSM makes use of narrowband Time Division Multiple Access (TDMA) technique for transmitting signals.
- GSM was developed using digital technology. It has an ability to carry 64 kbps to 120Mbps of data rates.
- Presently GSM supports more than one billion mobile subscribers in more than 210 countries throughout the world.
- GSM provides basic to advanced voice and data services including roaming service. Roaming is the ability to use your GSM phone number in another GSM network.
  GSM digitizes and compresses data, then sends it down through a channel with two other streams of user data, each in its own timeslot.

3.6 Working Principle

When the sensor arrangement senses the Heat & temperature of the transformer , it sends thesignal to the microcontroller by using a comparator. Here, comparator acts as an interface between the sensing arrangement and the microcontroller. The Aurduino pass the signsl for mobile sms alert to GSM 800 Module system .The module pass the alert message to Mobile operator .

3.7 Real Image of Project :

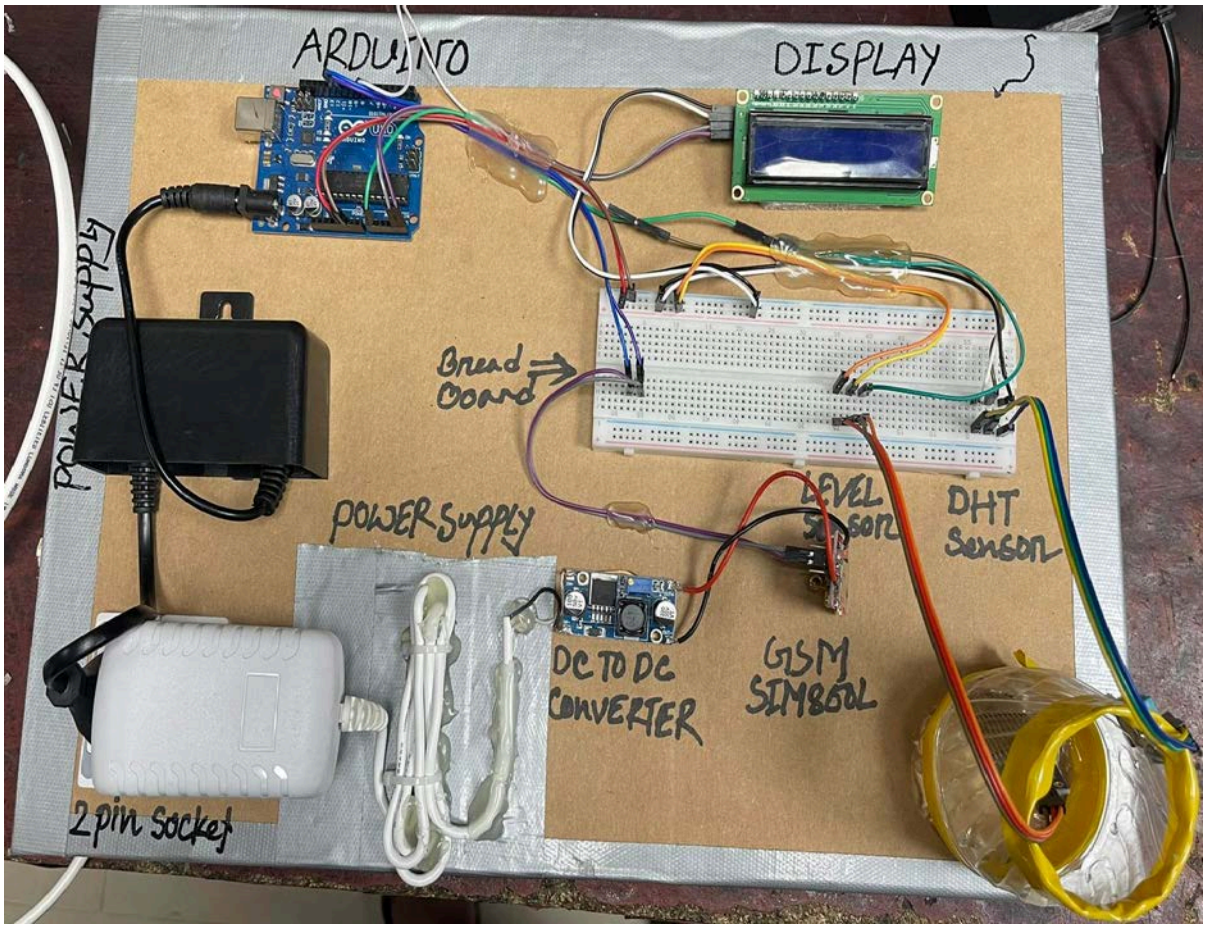
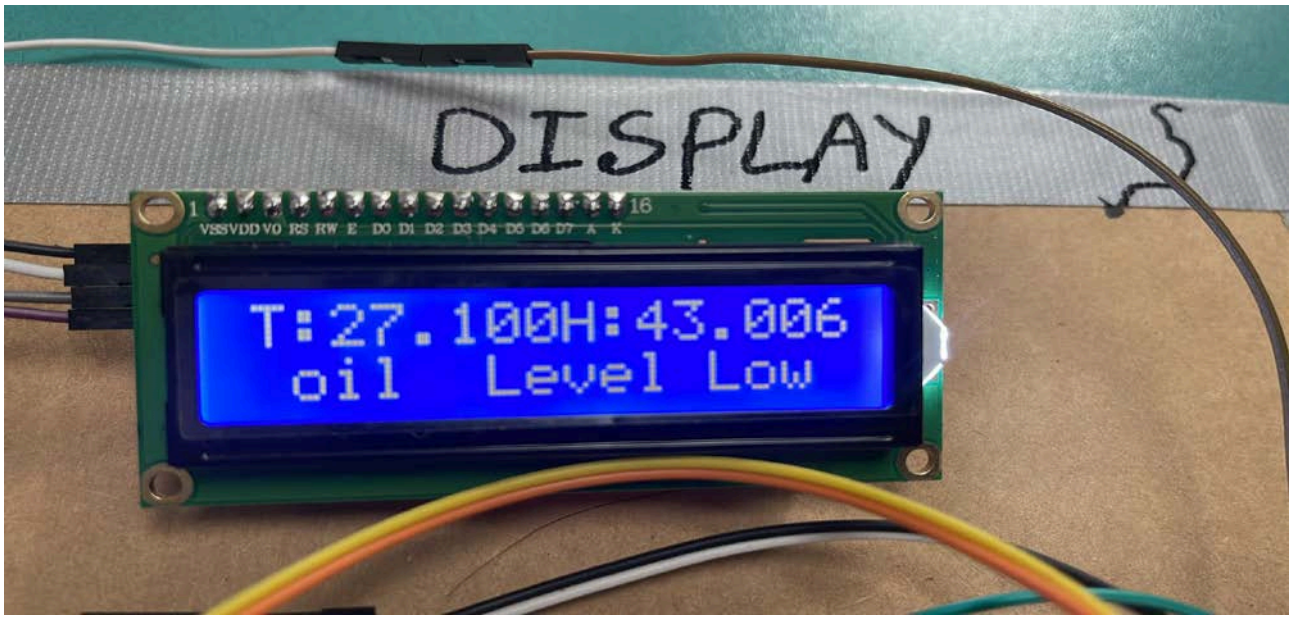


Fig: 3.6.1: Real image of the project

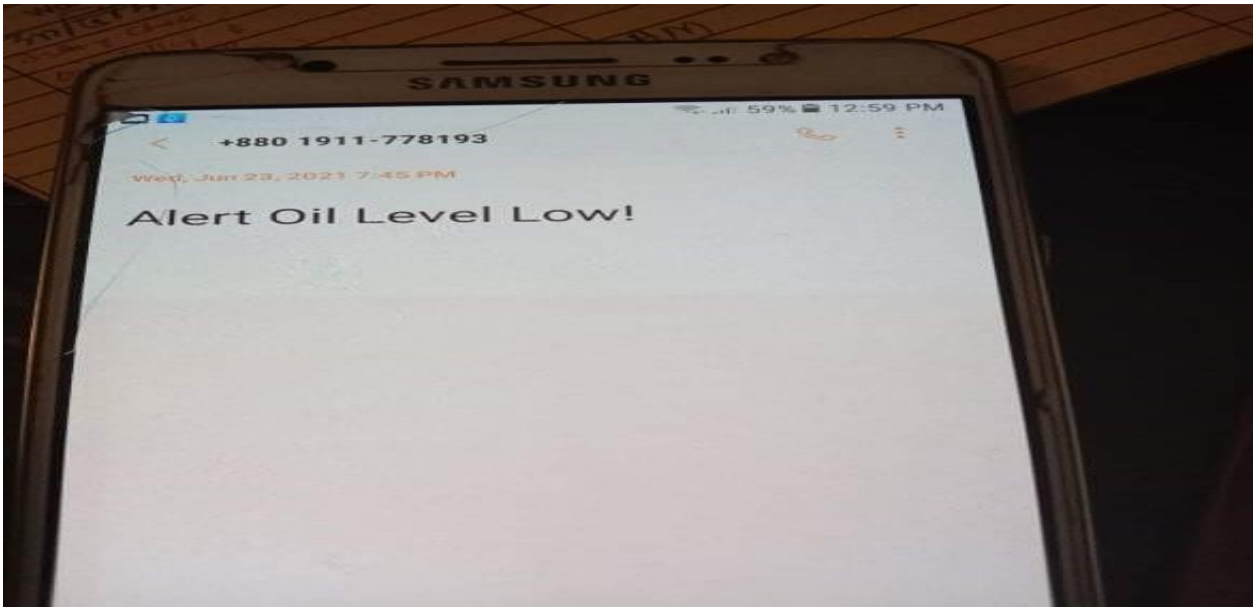
LCD Display Alert picture :







Mobile SMS picture :





3.6 Used Materials

1. Microcontroller (Arduino)	- 1 pcs
2. Socket	- 2 pcs
3. Power sources (12v) power supply	- 2 pcs
4. Connector	- 2 pcs
5. LebeL sensor	- 1 pcs
6. DHT11 sensor	- 1pcs
7. Power sourse plug	- 1 pcs
8. GSM MODULE SIM 800	- 1 pcs
9. Wires	-As per needed
10. Bread Boad	- 1 pcs
11 LCD DISPLAY	- 1pcs
12. 12 VOLT DC TO DC Boost converter	- 1pcs

3.7 Conclusion

In this chapter we have discussed the block diagram,circuit discription, working principle, flow chart also show the real image of the project and others. In the later part of this paper we discussed the result & discussion of the project to make the concept clear to anyone.

Chapter IV

RESULT & DISCUSSION

4.1 Introduction

This chapter contains the results obtained and discussion about the project. We have also covered discussions about advantages, disadvantages and limitation of current version of the protection system.

4.2 Result

- Humidity & Temperature can also be measured through this system.
- Oil level as example- high , mid & low can be measure equally.

4.3 Advantags of GSM Montoring

1. More suitable network with robust features.
2. No roaming charges on International calls.
3. Worldwide connectivity and extensive coverage.
4. SAIC and DAIC techniques used in GSM provide very high transmission quality.

4.4 The following are some disadvantages of GSM:

- Electronic interference. Because GSM uses a pulse-transmission technology, it is known to interfere with electronics like hearing aids.
- Bandwidth lag.
- Limited rate of data transfer.
- Repeaters.

4.5 Discussion

By implementing above systems there are various benefits.

- By continuously monitoring the status of load, we can control the selection of powersources.
- Conservation of labor: Since the systems are automatic, they do not requirecontinuous monitoring by labor.
- The design is low cost, small size, robust and highly versatile.
- This system use microcontroller which make it more convenient than conventionalsystem.
- The main advantage is that the system's action can be changed according to thesituation Low power consumption of load .

4.6 Cost Estimation

SL NO	Item Name	Specification	Unit	Unit Price	Total Amount
1	ARDUINO UNO	UNO	1	810	810
2	Power Supply	12 volt , DC	2	450	900
3	DC TO DC booster coveryer	0 -12 volt, DC	1	410	410
4	Socket	220 v, 12 AMP	2	30	60
5	GSM Module sim 800	SIM800	1	450	450
6	Board		1	280	280
7	Carton		1	150	150
8	Cable	0.5 MM	2	30	60
9	Male to malre cable , female to female cable		90	200	200
10	Band Costape		2	200	200
11	Gun Gule stick		2	100	200
12	Two Plug		1	35	35
13	Core Cable		2	30	60
14	Lebel sensor	5 volt	1	320	320
15	DHT11 sensor	3.7-5 volt	1	370	370
16	Conveyance				200
				Total =	**4505**

4.7 Applications

The monitoring of GSM system is apply to transformer & large project which get easy to use to process running . GSM technology is being mostly used for talking to family, friends and business colleagues. we use communication feature of Telephone landlines for internet, e-mail, data connectivity, remote monitoring, computer to computer communication, security systems.

4.8 Conclusion

Conclusion. The development of GSM is the first step towards a true personal communication system that will allow communication anywhere, anytime, and with anyone.

Chapter V

CONCLUSION

GSM was developed using digital technology. It has an ability to carry 64 kbps to120 Mbps of data rates. Presently GSM supports more than one billion mobile subscribers in more than 210 countries throughout the world. GSM provides basic to advanced voice and data services including roaming service.

5.1 Future Work

Global mobile subscribers are demanding richer, global and open IP-based messaging experiences from mobile network operators, according to a new report called 'The Future of Mobile Communications,' released today by the GSMA. The research, which was commissioned by the GSMA and conducted by research firm Context Consulting, surveyed 4,045 participants from China, India, Spain and the United States about their use of traditional mobile operator voice and SMS services, as well as internet-based messaging services

.

References

[1] Conference of European Posts and Telegraph (CEPT) establishes a GSM group to widenthe standards for a pan-European cellular mobile system, 1982.

[2] A list of recommendations to be generated by the group is accepted, 1985.

[3] Executed field tests to check the different radio techniques recommended for the airinterface, 1986.

[4] Time Division Multiple Access (TDMA) is chosen as the access method (with Frequency Division Multiple Access [FDMA]). The initial Memorandum of Understanding (MoU) issigned by telecommunication operators representing 12 countries, 1987.

[5] GSM system is validated, 1988.

[6] The European Telecommunications Standards Institute (ETSI) was given the responsibilityof the GSM specifications, 1989.

[7] Phase 1 of the GSM specifications is delivered, 1990.

[8] Commercial launch of the GSM service occurs. The DCS1800 specifications are finalized, 1991.

[10] The addition of the countries that signed the GSM MoU takes place. Coverage spreads tolarger cities and airports, 1992.

[11] Coverage of main roads GSM services starts outside Europe, 1993.

[12] Data transmission capabilities launched. The number of networks rises to 69 in 43 countriesby the end of 1994.

[13] Phase 2 of the GSM specifications occurs. Coverage is extended to rural areas, 1995.

[14] June− 133 network in 81 countries operational, 1996.

[15] July− 200 network in 109 countries operational, around 44 million subscribers worldwide, 1997.

[16] Wireless Application Protocol (WAP) came into existence and became operational in 130 countries with 260 million subscribers, 1999.

[18] General Packet Radio Service(GPRS) came into existence, 2000.

[19] As of May 2001, over 550 million people were subscribers to mobile telecommunications, 2001.

Appendix

Code:

```
#include <SoftwareSerial.h>
#include <Wire.h>
#include <LiquidCrystal_I2C.h>
LiquidCrystal_I2C lcd(0x3F,16,2);
#include "DHT.h"
#define DHTPIN 7
#define Sensor A0
#define DHTTYPE DHT11
int flag = 0;
int barzzer = 6;
DHT dht(DHTPIN, DHTTYPE);
SoftwareSerial mySerial(11, 12);
void setup() {
  Serial.begin(9600);
  mySerial.begin(9600);
  pinMode(barzzer, OUTPUT);
  lcd.init();
  lcd.backlight();
  lcd.setCursor(0, 0);
  lcd.print("Initializing.... ");
  delay(15000);
  dht.begin();

}
```

```
void loop() {

  float h = dht.readHumidity();
  float t = dht.readTemperature();
  if (isnan(h) || isnan(t)) {
    Serial.println(F("Failed to read from DHT sensor!"));
    return;
  }
  //Serial.print(F("Humidity: "));
  //Serial.print(h);
  //Serial.print(F("%  Temperature: "));
  //Serial.print(t);
  Serial.println(analogRead(A0));
  lcd.print("T:");
  lcd.print(t);
  lcd.setCursor(8, 0);
  lcd.print("H:");
  lcd.print(h);
  if(analogRead(A0) > 490){
    lcd.setCursor(0, 1);
    lcd.print("Oil Level High");
  }
  else if(analogRead(A0) > 300){
    lcd.setCursor(0, 1);
    lcd.print("Oil Level Mid"  );
  }
```

```
    else{
   lcd.setCursor(0, 1);
   lcd.print(" oil  Level Low" );
   digitalWrite(barzzer, HIGH);
   if(flag == 0){
   send_sms1();
   flag = 1;
    }
  }
  if(t>24){
   digitalWrite(barzzer, HIGH);
   send_sms();
  }
  delay(1000);
  digitalWrite(barzzer,LOW);
}



{
  mySerial.println("AT");
  updateSerial();

  mySerial.println("AT+CMGF=1");
  updateSerial();
  mySerial.println("AT+CMGS=\"+8801785007227\"");
  mySerial.print("Alert High Temperature!" );
  updateSerial();
  mySerial.write(26);
```

```
 }

void send_sms1()
{
  mySerial.println("AT");
  updateSerial();

  mySerial.println("AT+CMGF=1");
  updateSerial();
  mySerial.println("AT+CMGS=\"+8801785007227\"");
  updateSerial();
  mySerial.print( "Alert Oil Level Low! ");
  mySerial.write(26);
}
void updateSerial()
{
  delay(500);
  {


    mySerial.write(Serial.read());
  }
  while(mySerial.available())
  {
    Serial.write(mySerial.read());
  }
}
```