

SMART REAL TIME DRAINAGE MONITORING SYSTEM USING IOT

Submitted in partial fulfillment of the requirements for the award of Bachelor
of Engineering Degree in Electronics and Communication Engineering

by

HEMAMALINI M (38130084)

PUVANESHWARI S (38130176)



**DEPARTMENT OF ELECTRONICS AND COMMUNICATION
ENGINEERING SCHOOL OF ELECTRONICS ENGINEERING**

SATHYABAMA

**INSTITUTE OF SCIENCE AND TECHNOLOGY (DEEMED TO BE
UNIVERSITY)**

Accredited with Grade “A” by NAAC

JEPPIAAR NAGAR, RAJIV GANDHI SALAI, CHENNAI - 600 119

APRIL 2022

~ i ~



SATHYABAMA

**INSTITUTE OF SCIENCE AND TECHNOLOGY
(DEEMED TO BE UNIVERSITY)**

Accredited with "A" grade by NAAC

Jeppiaar Nagar, Rajiv Gandhi Salai, Chennai – 600 119

www.sathyabama.ac.in



DEPARTMENT OF ELECTRONICS AND COMMUNICATION ENGINEERING

BONAFIDE CERTIFICATE

This is to certify that this Project Report is the bonafide work of HEMAMALINI M (38130084) and PUVANESHWARI S (38130176) who carried out the project entitled "SMART REAL TIME DRAINAGE MONITORING SYSTEM USING IOT" under our supervision from September 2021 to April 2022.

Internal Guide

Dr. V. VEDANARAYANAN, M.E., PhD

Associate professor, Department of ECE

Head of the Department

Dr. T. RAVI, M.E., Ph.D.

Submitted for Viva voce examination held on _____

Internal examiner

External examiner

DECLARATION

We, **HEMAMALINI M(38130084)** and **PUVANEHWARI S (38130176)** hereby declare that the Project Report entitled “**SMART REAL TIME DRAINAGE MONITORING SYSTEM USING IOT**” done by us under the guidance of **Dr.V.VEDANARAYANAN, M.E., PhD.** Is submitted in partial fulfillment of the requirements for the award of Bachelor of Engineering degree in Electronics and Communication Engineering

DATE:

PLACE:

1)

2)

SIGNATURE OF THE CANDIDATE

ACKNOWLEDGEMENT

We are pleased to acknowledge our sincere thanks to Board of Management Of **SATHYABAMA** for their kind encouragement in doing this project and for completing it successfully. We are grateful to them.

We convey our thanks to **Dr. N. M. NANDHITHA, M.E., PhD. Dean, School of Electrical and Electronics Engineering** and **Dr. T. RAVI, M.E., PhD. Head of the Department, Department of Electronics and Communication Engineering** for providing us necessary support and details at the right time during the progressive reviews.

We would like to express our sincere and deep sense of gratitude to our Project Guide **Dr. V.Vedananarayanan, M.E., PhD. , Associate professor, Department of Electronics and Communication Engineering** for his valuable guidance, suggestions and constant encouragement paved way for the successful completion of the project work.

We wish to express our thanks to all teaching and Non-teaching staff members of the **Department of Electronics and Communication Engineering** who were helpful in many ways for the completion of the project

We express our gratitude to our parents for their constant encouragement and support for the completion of the project.

ABSTRACT

Drainage gadget tracking performs an crucial function to maintain metropolis clean. In fact, now no longer all regions have drainage tracking team. It ends in abnormal tracking of the drainage condition. The abnormal tracking ends in the blocking off of the drainage that suggest to the salutation which cause flood. Manual tracking is likewise incompetent. It calls for a specialists however they are able to most effective reveal very finite and keep low accuracy. Also occasionally because of lack of understanding the employee might also additionally meets to an coincidence as they haven't any concept that how can be the situations in the ones manhole. This studies paintings represents the utility and layout characteristic of a clever and real-time Drainage and Manhole Monitoring System with the assist of Internet of Things The manholes gift within side the drainage could have a module that's having micro controller interfaced with fueloline sensor, degree indicator, IOT. The gadget will reveal if the blockage is took place in among manholes and additionally it'll feel the upward thrust in quantity of diverse gases which might be dangerous to the human beings, and additionally a gadget of tracking the water degree then it'll cause an alarm and could offer the ones records to the fitness departments from which the precise motion can be taken. The gadget will capable of reveal all this stuff in real-time state of affairs with the intention to permit us to take right actions .

TABLE OF CONTENTS

CHAPTER NO	TITLE	PAGE NO
	TITLE PAGE	I
	BONAFIDE CERTIFICATE	II
	DECLARATION	III
	ACKNOWLEDGEMENT	IV
	ABSTRACT	V
1	INTRODUCTION	
1.1	Necessity Of Smart Drainage System	2
1.2	Overview Of Internet Of Things	3
2	LITERATURE SURVEY	4
2.1	Monitoring Smart City Applications	5
2.2	Automated Of IOT For Underground and Manhole Monitoring System For Metropolitan Cities	5
2.3	Internet Of Things In Drainage Monitoring System	6
2.4	Drainage Overflow Monitoring System Using IOT (DOMS)	6
2.5	Underground Drainage Monitoring System	6
3	EXISTING SYSTEM	7
3.1	Existing Block Diagram	7
3.2	Problem Statement	8
3.3	Objectives	
4	PROPOSED SYSTEM	9
4.1	Proposed System Block Diagram	10
4.1.1	Drainage Section	
4.1.2	Receiver	
4.2	Hardware Requirements	11
4.3	Software Requirements	11
5	METHODOLOGY AND COMPONENTS USED	12
5.1	Power Supply	
5.2	Arduino UNO	13
5.2.1	General Description	13
5.2.2	Product Description	13
5.2.3	Features	14
5.2.4	Applications	14
5.3	LCD Display	15

5.3.1	LCD Introduction	15
5.3.2	Read / Write (RW)	17
5.3.3	Registers	18
5.3.4	Step to Program	18
5.3.5	Features	19
5.3.6	Applications	19
5.4	IR Sensor	19
5.4.1	Features	20
5.4.2	Applications	20
5.5	Soil Moisture Water Level Sensor	20
5.5.1	General Description	20
5.5.2	Product Description	21
5.5.3	Features	22
5.5.4	Application	22
5.6	Alcohol Sensor	23
5.6.1	General Description	23
5.6.2	Product Description	23
5.6.3	Features	24
5.6.4	Application	24
5.7	Internet of Things (IOT)	24
5.8	Problem Identity	25
5.9	Problem Solving	25
5.10	System Test and Results	26
5.10.1	Hardware Testing	28
5.10.2	Software Testing	30
6	RESULTS AND SCREENSHOTS	30
6.1	Hardware Output	31
6.1.1	LCD Display	33
6.2	Software Output	33
6.2.1	Arduino IDE Output	33
6.2.2	BT Terminal Output	34
7	CONCLUSION	35
8	REFERENCES	36

LIST OF FIGURES

FIGURE NO	TITLE	PAGE NO
3.1	Existing System-Block Diagram	7
4.1	Proposed System –Block Diagram	10
5.1	Power Supply	12
5.1	Power Supply –Circuit Diagram	12
5.2	Arduino UNO	13
5.3	LCD	15
5.4	IR Sensor	19
5.5	Soil Moisture Water Level Sensor	20

LIST OF TABLES

TABLE NO	TITLE	PAGE NO
5.3	LCD-PIN DETAILS	16

List of abbreviations:

Internet of things-IoT

Drainage Overflow Monitoring System using IoT- (DOMS)

Wireless Sensor Networking - WSN

Universal Serial Bus -USB

integrated development environment -IDE

liquid crystal display -LCD

Light Emitting Diode- LED

Global System for Mobile communication-GSM

CHAPTER 1

1. INTRODUCTION



Drainage device performs a completely crucial position in large town in which hundreds of thousands of human beings live. Drainage device is called the bottom for and dryness from the extra and unused water, rain water and waste water. Monitoring of drainage manually isn't possible. The abnormal tracking has contribution at the blockading of the drainage that mean to the salutation which cause flooding withinside the community guide tracking is likewise incompetent. It wishes a number of devoted people who're simplest capable of file constrained document with low accuracy. The hassle arises in such drainage strains can reason extreme problems to the every day routing of the town. Problem consisting of blockage because of waste material, surprising boom withinside the water degree in addition to diverse dangerous gases may be produce if the right cleansing movements aren't taken time to time. Today's Drainage device isn't automated because of which it's miles difficult to become aware of if blockage has took place especially location. Also now and again because of the waste in the ones drainage strains can produce diverse gases like methane(CH_4), carbon monoxide(CO), and so on that are dangerous and may reason extreme hassle if inhaled through human beings in huge quantity and those confronted through the drainage employees which ends up in lack of life. Also we don't get early alert of the blockage of upward thrust in quantity of these gases or the will increase withinside the water degree. Hence detection and repairing of the blockage turns into time ingesting and hectic. There are actual time examples thru which we are able to do evaluation of loss of drainage device. In 2019 in Bangalore roads, drains or even homes in a few regions have

been flooded, inflicting high-quality inconvenience to second extraordinary boom of The extraordinary boom of Bangalore unaccompanied through the vital infrastructure has participated hassle of a huge magnitude. The town drainage device incorporates predominant drains, roads facets drains and shoulder drains all of which get overloaded at some point of the wet season. In order to keep away from such troubles clever answer are required. Smart town infrastructure may be in phrases of smart visitors automation, military, conveying logistic, environmental and surrounding tracking. So to be able to sell clever town infrastructure on this paper we're offering clever underground drainage blockage tracking and detection device the usage of diverse sensors. The sensors that used are ultrasonic sensors and fueloline sensors. Drainage situations need to be monitored to be able to make certain its right functioning. Not all regions have drainage right tracking groups which ends up in abnormal tracking of the drainage circumstance that has a sizeable contribution at the clogging of the drainage that mean to the siltation which cause flooding withinside the community. Manual tracking is likewise ineffective. It wishes a number of devoted people who're simplest capable of file constrained document with low accuracy. These weaknesses cause the gradual dealing with for troubles in drainage. To conquer any such difficulty an IoT primarily based totally sewage degree protection device is proposed, in which the device makes use of a magnetic glide sensor to discover and an lot module to communicate [4]. The most and minimal set degree for the underground drainage device is ready and it's miles being monitored through a magnetic glide degree sensor. This degree sensor continues monitoring the extent of the sewage and passes facts on concerning to the municipal department, to the enterprise and different governing departments through EMAILS or SMS. The lawsuits might be car released previous to the overflow as quickly as the extent reaches the most set. The lawsuits could me registered time and again through the mechanism till the extent reaches the minimal set. The whole device is managed the usage of a ARDUINO microcontroller.

The following contribution is presented in this paper:

Low cost real time Monitoring Overflow detection SMS alerts Waste casting off mechanism

The relaxation of the paper is as follows. Section 2 represents a literature evaluate of previous works, then the method of the gadget is provided in Section 5, and Section 3 ,four suggests the present gadget and proposed gadget. Hardware configuration and system setup are in short defined in Sections 5. In Section 6, the end result and performance of the gadget are evaluated from extraordinary perspectives. The paper concludes with destiny plans in Section 7.



1.1 Necessity of Smart Drainage System

Urban floods are completely artificial with poorly maintained drains, plastic bags, shrinking open areas and weather extrude contributing to accumulation of water on roads after a heavy downpour. In 2017 in Bellundur Lake(Bangalore) turned into again with dirt, foul-smelling froth because of heavy rainfall and absence of right drainage machine. Due to Bellandur lake tragedy seventy six polluting Industries have been shut. Heavy rainfall in Delhi had flooded roads and prompted massive site visitors snarls. Chennai has witnessed intense flooding in 2015 whilst floods in Mumbai had killed 500 humans. These tragedies are end result of loss of drainage

machine indulged with superior technology. Manual tracking is time ingesting and additionally unstable for human life. In 2019 in Agra a probe turned into ordered into production of drainage and it turned into assume to be built in 50 meter radius. However the antique drainage has been broken up to 2 hundred meter. This turned into performed to gain a positive personal contractor and assign him extra paintings below clever town project. After this rip-off turned into out, strict movements have been supposed to be taken. There are many unknown scams which might be hidden and the gain is taken with the aid of using corrupt humans and troubles are confronted with the aid of using the citizens. So this gave us motivation to layout a clever drainage machine in an effort to be monitored remotely and could be hazard loose as well.

AIMS OF DRAINAGE:

The purpose of drainage is to evacuate water in extra of flora and soil requirements. Certain soils have a herbal drainage gadget others do now no longer; those latter require the set up of an synthetic drainage gadget. Drainage creates within side the soil the situations required for right plant improvement and promotes soil aeration and root penetration. It improves the soil's bodily features and makes it viable to reclaim zones which had been formerly taken into consideration incorrect for cultivation. In irrigated zones, drainage is connected to leaching strategies to save you accumulation of poisonous salts within side the soil and additionally to save you gulling and soil erosion. Drainage strategies are appropriate for labor-in depth paintings in sports for the best of the community.

1.2 Overview of Internet of Things

(IOT) is a sprawling set of technology and use instances that has no clear, unmarried definition. One manageable view frames IOT as the usage of community-related gadgets, embedded within side the bodily environment, to enhance a few current method or to allow a brand new state of affairs now no longer formerly viable. These gadgets, or things, hook up with the community to offer data they accumulate from the environment through sensors, or to permit different structures to attain out and

act on the sector via actuators. They might be related variations of not unusual place gadgets that would already be acquainted with, or new and purpose-constructed gadgets for features now no longer but realized. They might be gadgets which you personal for my part and deliver with you or maintain to your home, or they might be embedded in manufacturing unit equipment, or a part of the cloth of the town you stay in. Each of them is capable of convert treasured data from the actual international into virtual statistics that offers elevated visibility into how your customers have interaction together along with your products, services, or applications.

CHAPTER 2

LITERATURE SURVEY

- Muragesh S. K1 and Santhosha Rao "Automated Internet of Things for Underground Drainage and Manhole Monitoring System for Metropolitan Cities"November 2014.proposed a model that provides a system for monitoring the water level and atmospheric temperature and pressure inside a manhole and to check whether a manhole lid is open.
- Yash Narale,Apurva Jogal,Himani Chowdhary,S.P Bhosale "Underground Drainage Monitoring System Using IOT International Journal of Advance Research Ideas And Innovations In Technology, Volume 4 Issue 1, January 2018 .proposed the system for the Smart cities for the development goal to monitor the quality of resource in the city to improve good management and faster development of the city required necessity is to upgrade healthy and safe cities that delivering real time services and latest facility to implement the concept of smart city use IoT concept by which easy wireless communication is possible.
- G. Gowthaman, K. Hari Haran "Automated Internet of Things for Underground Drainage and Manhole Monitoring System for Metropolitan Cities"ISSN 0974-2239 Volume 4, Number 12 (2014),Yash Narale, Apurva Jogal, Himani Chaudhari, S.P Bhosale [3] introduced the underground drainage monitoring system that will not only help in maintaining the proper health and safety of the city but additionally in reducing the work of government personnel numerous

varieties of sensors (flow, level, temperature and gas sensors) are interfaced with microcontroller ARM7 so as to form the system smart.

- Deepiga, T, SivasankariA, “Smart Water Monitoring System Using Wireless Sensor Network at Home/Office”, International Research Journal of Engineering and Technology, vol.02, no.04, July 2015,The present seepage framework in India isn't innovative. And census 2011 of India [2] also states that only 18.1% of closed drainage is available and 33% of open drainage. Therefore, this paper studies real time drainage system as a part of Smart City.
- Wirawam, S., Pratoma, I., and Mita, Nagahisa. “Design of Low Cost Wireless Sensor Network-Based Environmental Monitoring System for Developing Country”. Proceedings of APCC2008,introduced predictive flood detection system mistreatment IoT are enforced in stream like Central American nation and different rivers.
- Dr.Gunasekaran M,Pavithra S,Priyanka R,Reeva M ”IoT enables Underground Drainage Monitroing System using Water Flow Sensor” May 2019 A system that has underground aquifers and above-ground rivers, lakes, streams, marshes
- Gaurang Sonawane et al. proposed a Smart Real-Time Drainage Monitoring System using the Internet of Things. The system makes use of microcontroller Atmega328 which collects the information through a gas sensor, level sensor, and blockage sensor. The monitoring system checks the status of the manhole and detects if there is a blockage between the two manholes and also senses the rise in the concentration of various toxic gases. The system is not the most efficient way of monitoring the drainage because it does not make use of the overflow sensor which detects the overflow of the sewage.
- Prof. S. A.Shaikh L et al. published Monitoring Smart city Applications using Raspberry Pi based on IOT which describes monitoring of peculiarity of the resources in the city to improve the development of the city. The system includes Raspberry Pi3 microcontroller which is interfaced with different sensors

(proximity, water level sensor) that collect data and transmit it to the raspberry pi3 controller. The results obtained by the different sensors are transferred to the raspberry pi microcontroller and this information is sent to the respective government personnel through the E-mail facility. The whole system is effectively monitored and implemented using Internet of things.

- Phattaleeya Mabpa-IEEE-2017

Sewer blockages are one of the most common causes of sanitary sewer overflows (SSOs), which cause severe environmental damage and property loss. There is a way to detect and monitor pipeline blocks using acoustic analysis to determine whether the pipeline is blocked and how much it is blocked in this current work to minimise the risk of SSO problems. It's been put forward. As a sound source, a vibrating speaker is traditionally attached to the tube. A microphone on the other side of the pipe detects a blockage by reading the change in the pipe's resonance frequency. The Fast Fourier Transform determines the measured signal's resonant frequency (FFT). To normalise the frequency response, compensation-based lines are used. Make acoustic analysis easier. The sound pressure level (SPL) drops when the resonant frequency drops and the pipe becomes clogged, according to experiments.

- Amar Upadhyay-IEEE-2017

This white paper describes how a cloud-based, wireless waste management system was successfully implemented in a smart city. Currently, the system is being put through its paces. The system reduces the average cost of keeping a clean and safe environment in the Recycle Bin by optimising the garbage collection plan and prevents hazards like fire and bacteria. The system, moreover, makes use of the existing telecom infrastructure, as well as the city's free ThingSpeak cloud server service. Because it's a wireless system. Because it is cost-effective, quick, and efficient to implement, this system is particularly relevant for developed countries like ours. It also aligns with a number of government plans, not only in terms of smart cities, but also in terms of the environment. Many countries' telecommunications policies are beginning to recognise the increasing importance of application development. To extend the life of your batteries, we suggest using a solar or piezo energy harvester. This

would allow the wireless sensor node to function independently for longer periods of time, enhancing the proposed facility's overall reliability and efficiency.

- Bruno Rente, Matthias Fabian-IEEE SENSORS JOURNAL-2019
Experimental evaluations are carried out in sewer environments with corrosion, humidity, and gaseous hydrogen sulphide, using Fiber Bragg Grating (FBG)-based surveillance systems. Surveillance systems are built specifically for onsite use, with rugged packaging and operational problems in mind. The system is in place. The device is battery-powered and includes hardware for device control, power management, data logging, and 4G connectivity research. The results show that the same probe can provide long-term performance over a period of six months of real-time monitoring data. When the collected data is compared to ambient temperature and precipitation data from the same location during the same time period, a strong correlation is found. Expected and measured data have a correlation. The results show that fiber-based sensor systems can be used for long-term monitoring in these harsh environments
- SarathKodagoda-IEEE SENSORS JOURNAL-2020
Water firms use alternative measurements (such as relative air humidity) as model observations because there are no sensors to monitor the humidity status of the concrete sewer surface. As a result, corrosion predictions are often hindered, and prediction uncertainty is common. Previous research has suggested that a series of resistance-based sensors can be successfully developed and evaluated. Surface humidity conditions in concrete sewers are being estimated. The sensor will be placed in a city sewer pipeline in Sydney, Australia, and measurements will be taken on the spot. Following deployment, postdeployment testing and research revealed that the detection system can withstand harsh sewer conditions and is suitable for long-term sewer pipeline monitoring

2.1. Monitoring Smart City Applications using Raspberry PI Based on IOT

This paper includes the Smart City because the improvement goal to music the exceptional of the aid withinside the metropolis to enhance top control and quicker improvement of the metropolis essential requirement is to improve healthful and secure towns that offer actual time offerings and the modern-day facility to put into effect the idea of clever metropolis the usage of IoT idea via way of means of which smooth wi-fi conversation is possible. The device includes sensors, collects one of a kind sorts of information from the sensors and transfers to the Raspberry Pi3 controller. The output acquired from the controller is despatched thru e mail to the manage room and is likewise displayed at the individual at the private computer.

2.2 Automated Internet of Things for Underground Drainage and Manhole Monitoring System for Metropolitan Cities

This paper includes the IoT made of actual-existence gadgets, conversation gadgets connected to sensor networks to offer connectivity and automatic movement among the actual international and the statistics device. IoT has come into lifestyles since, with out human interaction, Computers had been capable of get entry to information from gadgets and gadgets, however they had been programmed to solve the proscribing elements of human information entered and to attain cost, accuracy and widespread elements. The Sensor Network is the primary contributor to the IoT device. This is the implementation and layout capabilities of the Underground Drawing and Manhole Monitoring System (UDMS) for IoT applications. The key concerns of this layout are low cost, low maintenance, brief deployment and a excessive quantity of sensors, lengthy provider existence and top provider exceptional. The proposed version offers a device for measuring water degree and atmospheric temperature and strain in the manhole and checking if the manhole lid is accessible. It additionally video display units the electric electricity traces which can be constructed underground. The UDMS will remotely music the modern-day nation of the manholes within side the actual time.

2 .Three Internet of Things in Drainage Management System

The paper discusses the Smart Waste water Treatment System. The drainage framework describes the layout and mechanism utilized by IOT to discover and clean blockages withinside the drainage community. The manholes withinside the drainage community have a module that has a micro-controller interface with a fueloline sensor, a degree indicator, and an RFID. Whenever the extent sensor senses a blockage among the 2 manholes, the caution is activated. Whenever the extent sensor senses a blockage among the 2 manholes, the caution is activated.

2. Four Drainage Overflow Monitoring System the usage of IoT (DOMS)

The proposed tool might music the quantity of water and fueloline withinside the sewage device and the calculated values can be recorded withinside the cloud garage unit and the nation of the sewage device can be submitted as SMS to the company workplace utilising the GSM module.

2. Five Underground Drainage Monitoring System

The proposed device includes an underground drainage tracking device including quite a number sensors that discover the leakage of the sewage, the extent of drainage, the attention of dangerous gasses withinside the manhole. The glide charge and ship the statistics to the authority thru GSM module

CHAPTER 3

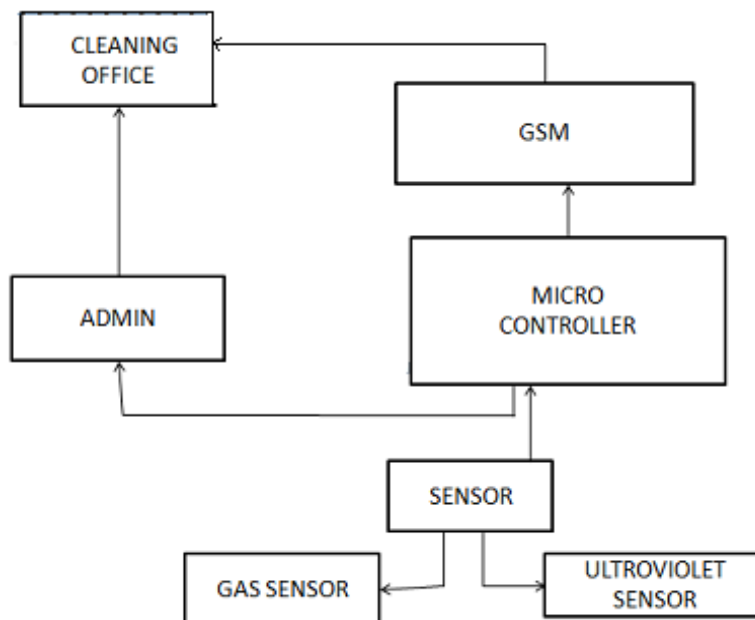
EXISTING SYSTEM

In India adoption of underground Drainage machine may be very important. This machine paintings in a right way to preserve the town smooth secure and healthy. If they fail to hold the drainage machine, natural water might also additionally get infected with drainage water and may unfold infectious diseases. Also diverse dangerous gases are unfold in air and it produces air pollutants so one-of-a-kind type of paintings has been achieved to come across, screen and control those underground structures. This mission represents the implementation and layout capabilities for tracking, detecting and coping with underground drainage machine with one-of-a-kind approaches.

The intention is to preserve song of the town's resources' excellent with a purpose to make sure right control and speedy expansion. The Internet of Things may be used to understand the concept of a clever town with smooth wi-fi connectivity. A sensor collects one-of-a-kind varieties of statistics from the device . The very last final results of controller is emailed to the manipulate room and displayed at the screen. Real-international and statistics machine connections, in addition to self sufficient driving, are enabled via way of means of items and communique gadgets related to sensor networks. The Internet of Things is primarily based totally at the reality that computer systems can get entry to statistics on matters and gadgets with out the want for human intervention, however it produces synthetic intelligence in relation to feedback. To keep away from human flaws, set limits. The aim is to get across the feedback. Sensor networks are a essential thing of the Internet of Things. This capability turned into realized and advanced via way of means of the Underground Manhole Mapping and Surveillance System (UDMS), that is utilized in Internet of Things applications. Low cost, low maintenance, speedy implementation, and a couple of implementations are the number one issues for this mission creates a framework for tracking and regulating mine water levels, temperatures, and pressures. Replace the manhole cowl if it's miles possible. Check to look if the strength twine is buried as well. An clever wastewater remedy machine is defined on this article. The Internet of Things Drainage Framework explains how the Internet of

Things works. can come across and take away impediments in drainage structures A fueloline sensor, a stage gauge, and an RFID-enabled microcontroller interface are all blanketed with inside the fueloline series module. An alarm is caused while the liquid stage sensor detects a blockage among the 2 manholes. An alarm is caused while the liquid stage sensor detects a blockage among the 2 manholes.

3.1 EXISTING BLOCK DIAGRAM:



GSM module:



GSM is a cellular communication modem; it stands for worldwide device for cellular communication (GSM). The concept of GSM became evolved at Bell Laboratories in 1970. It is a broadly used cellular communication device within the world. GSM is an open and virtual cell era used for transmitting cellular voice and data offerings perform on the 850MHz, 900MHz, 1800MHz, and 1900MHz frequency bands.

GSM era became evolved as a virtual device the usage of the time division multiple access (TDMA) approach for communication purposes. A GSM digitizes and decreases the data, then sends it down via a channel with specific streams of data, every in its very own precise time slot. The virtual device has the capability to hold sixty four kbps to a hundred and twenty Mbps of data rates.

There are diverse cellular sizes in a GSM device including macro, micro, pico, and umbrella cells. Each cellular varies as consistent with the implementation domain. There are 5 specific cellular sizes in a GSM community macro, micro, pico, and umbrella cells. The coverage region of every cellular varies in keeping with the implementation environment

The GSM used on this device is SIM800L that's a miniature cell module that lets in GPRS transmission and different features including receiving and sending SMS and voice calls. The module calls for a strength deliver of variety 3.4V-4.4V. It has a

quad-band frequency which makes this module best for tasks that require longrange connectivity. The module has antennas, one is fabricated from cord this is beneficial in slender locations and the alternative is the PCB (Printed Circuit Board) antenna.

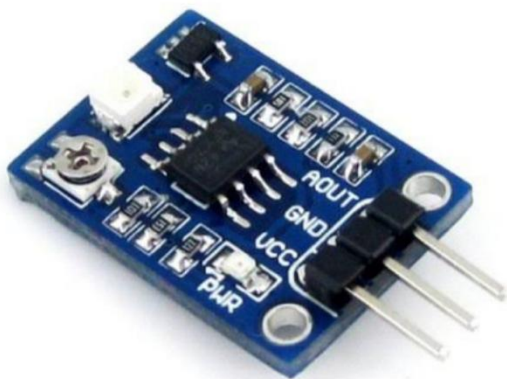
Features of GSM Module

The capabilities of the GSM module encompass the following.

- Improved spectrum efficiency
- International roaming
- Compatibility with included offerings virtual community (ISDN)
- Support for brand new offerings.
- SIM phonebook management
- Fixed dialing number (FDN)
- Real-time clock with alarm management
- High-great speech
- Uses encryption to make phone calls extra secure

Short message service (SMS)

Ultraviolet Sensor:



Show all UV Sensors Manufacturers

Light sensor UV sensors measure the power or intensity of incident ultraviolet (UV) radiation. This form of electromagnetic radiation has shorter wavelengths than visible radiation, but is still longer than x-rays. UV sensors are used for determining

exposure to ultraviolet radiation in laboratory or environmental settings. They are transmitters that respond to one type of energy signal by producing energy signals of a different type. Generally, these output signals are electrical signals that are routed directly to an electrical meter for observation and recording. The generated electrical signals from UV sensors can also be sent to an analog-to-digital converter (ADC), and then to a computer .

Specifications

Selecting UV sensors requires an analysis of specifications such as:

- wavelength range
- accuracy
- power range
- weight
- operating temperature

Wavelength range is the range of wavelengths, in nanometers (nm), that UV sensors can detect. UVA radiation ranges over wavelengths from 315 nm to 400 nm. UVB radiation covers wavelengths from 280 nm to 315 nm. UVC radiation is defined as between 100 nm and 280 nm. Because UVC radiation is more energetic, it is also the most harmful. Accuracy is a measure of how effectively UV sensors measure ultraviolet radiation. Power range and weight are also important parameters to consider, especially for UV sensors that are used in the field. Operating temperature is defined as a full-required range

Measurement Units

Calibration factors for photon flux density units [$\mu\text{mol m}^{-2} \text{s}^{-1}$] and energy flux density [W m^{-2}] are provided with each sensor allowing for rapid unit conversions.

Wide Range

Sensitive from 300 to 400 nm, spanning the solar UV range and UV output range of electric lamps.

Applications :

UV sensors are used in many different applications. Examples include pharmaceuticals, automobiles, and robotics. UV sensors are also used in the printing industry for solvent handling and dyeing processes. In addition, UV sensors are also

used in the chemical industry for the production, storage, and transportation of chemicals..UV radiation measurement in outdoor environments, laboratory use with
Show all UV Sensors Manufacturers

Light sensorUV sensors degree the energy or depth of incident ultraviolet (UV) radiation. This shape of electromagnetic radiation has shorter wavelengths than seen radiation, however continues to be longer than x-rays. UV sensors are used for figuring out publicity to ultraviolet radiation in laboratory or environmental settings. They are transmitters that reply to at least one kind of power sign with the aid of using generating power indicators of a exceptional type. Generally, those output indicators are electric indicators which might be routed without delay to an electrical meter for remark and recording. The generated electric indicators from UV sensors also can be despatched to an analog-to-virtual converter (ADC), after which to a computer .

Specifications

Selecting UV sensors calls for an evaluation of specs such as:

- wavelength variety
- accuracy
- energy variety
- weight
- running temperature

Wavelength variety is the variety of wavelengths, in nanometers (nm), that UV sensors can detect. UVA radiation levels over wavelengths from 315 nm to four hundred nm. UVB radiation covers wavelengths from 280 nm to 315 nm. UVC radiation is described as among one hundred nm and 280 nm. Because UVC radiation is greater energetic, it's also the maximum harmful. Accuracy is a degree of the way correctly UV sensors degree ultraviolet radiation. Power variety and weight also are vital parameters to consider, particularly for UV sensors which might be used withinside the field. Operating temperature is described as a full-required variety

Measurement Units

Calibration elements for photon flux density units [$\mu\text{mol m}^{-2} \text{s}^{-1}$] and power flux density [W m^{-2}] are furnished with every sensor taking into consideration fast unit conversions.

Wide Range

Sensitive from three hundred to four hundred nm, spanning the sun UV variety and UV output variety of electrical lamps.

Applications:

UV sensors are used in lots of exceptional applications. Examples encompass pharmaceuticals, automobiles, and robotics. UV sensors also are used withinside the printing enterprise for solvent coping with and dyeing processes. In addition, UV sensors also are used withinside the chemical enterprise for the production, storage, and transportation of chemicals..UV radiation dimension in outside environments, laboratory use with synthetic mild sources (e.g., germicidal lamps), and tracking the filtering cappotential and balance of numerous materials.stability of various materials.

3.2 PROBLEM STATEMENT

Today's drainage machine isn't always excessive-tech. So, each time there's blockage, it's miles tough to discern out the precise area of the blockage. Also, early indicators of the blockage aren't received. Hence detection and repairing of the blockage come to be time consuming. It turns into very inconvenient to address the scenario while pipes are blocked completely. Due to such failure of drainage line humans face quite a few problems.

OBJECTIVES

- Cleaner towns and smart control of drainage within side the metropolis.
- Detection of drainage water stage and blockages within side the drainage.
- Checking water waft fee continuously, in addition to sending automated mail, show at the display if the water stage is out of doors of an anticipated everyday range.

- The foremost goal is to gain an powerful low-fee and bendy answer for circumstance tracking and infrastructure control within side the metropolis.
- Sensing the temperature and leakage of fueloline and updating it in actual time via IoT.
- Predictive drainage clogging machine: The intelligence of sensors and predictive machine identifies the drain clogged spot and offers us the information for similarly moves to take. Completely connected: The sensors are communicated via comm. unique modules to percentage information.
- The foremost goal of this task is to preserve the metropolis clean, protection and healthy. And update the guide paintings of drainage tracking for the protection of sewer people, human and metropolis.
- To assist proprietors, contractors and people to save you fueloline poisoning in drainage paintings.

Plant roots require a positive surroundings to extract water and nutrient answers to fulfill the plant's requirement. For maximum vegetation, soil moisture starting from discipline capability to 50% of the sector capability withinside the root area is taken into consideration ideal. Only some vegetation which include rice and jute want status water on the sector at positive degrees in their increase. Chemically, a impartial and non-saline soil is good for correct increase and yield of maximum meals vegetation. Excess water and/or excessive salt awareness withinside the root area or on the land floor do now no longer permit the plant roots to characteristic normally. As a end result, the plant increase and yield are adversely affected. In the acute instances of waterlogging and salinity, the seeds might not germinate and the plant life might also additionally wilt permanently. The end result is a lack of agricultural production. Land drainage, as a device to manipulate extra floor water and groundwater levels, performs an critical position in keeping and enhancing crop yields:

- Drainage prevents a lower within side the productiveness of arable land because of growing water tables and the buildup of salts within side the root area.

- Drainage is the most effective manner to reclaim the land which isn't always cultivated because of water logging and salinity problems.
- Agricultural land drainage in essence is each a preventive and a healing degree for the prevention of bodily and chemical degradation of soils and for the reclamation of already degraded lands. Thus, drainage of agricultural lands is an powerful approach to preserve a sustainable agricultural machine in addition to to keep away from environmental damage.

The four major objectives of drainage and sewer systems are:

- Public fitness and safety
- Environmental protection
- Sustainable development
- Occupational fitness and safety
- Drain and Sewer structures are supplied with the intention to save you unfold of illnesses with the aid of using:

Preventing touch with fecal and different waterborne waste,

Protecting ingesting water reasserts from infection with the aid of using waterborne waste and Carrying runoff and floor water away at the same time as minimizing risks to the general public.

The reason of Urban drainage is:

To hold such an surroundings that now no longer have an effect on the general public fitness in widespread.

The introduction of such situations of residing with a view to now no longer end result into severe outbreak of epidemic illnesses.

It is the manipulate of environmental pollution, enhance environmental excellent to permit wholesome surroundings and snug habitation to human.

It is a safety measure for the renovation of fitness of the network in widespread and person in particular.

Sewer structures need to be designed, constructed, operated, maintained and rehabilitated in any such manner that they're sustainable and may be operated with the minimal use of energy.

CHAPTER 4

PROPOSED SYSTEM

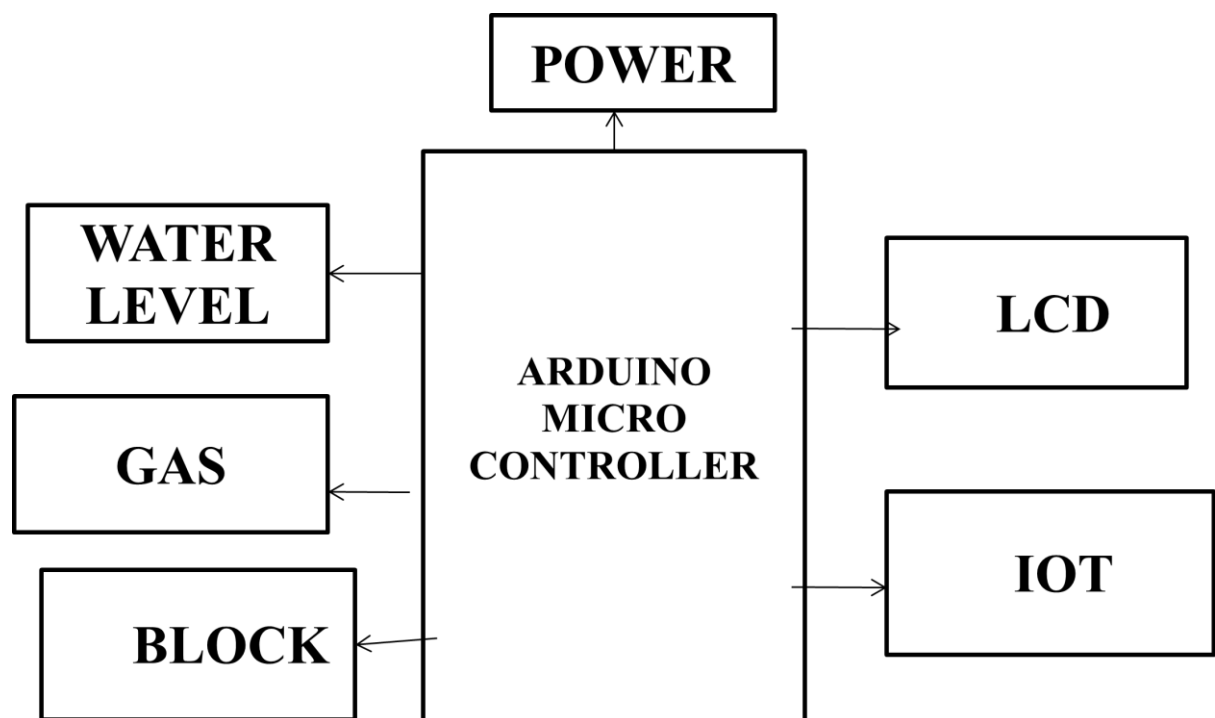
The Underground Drainage System are maintained through Cleaning places of work in India to make easy healthful environment and for this reason surroundings. But frequently because of bad renovation of the underground drainage device, the water within side the drainage device receives combined up with the natural water and intake of this Polluted water ends in water borne diseases. The unexpected modifications within side the ecosystem and versions within side the weather throughout exclusive seasons the drainage receives blocked or water logged, making surroundings bad and disturbs the healthful ordinary of not unusual place people.

To conquer a lot of these problems within side the underground drainage device we've designed the clever drainage device so one can have:

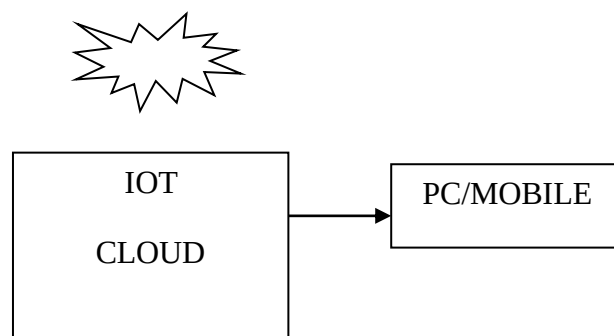
- Sensors to discover blockage, flood and gases.
- The intelligence of sensors and device will become aware of the clogging in the drainage device and could supply the information of the area and different records for in addition actions.
- The device may even feel the presence of diverse dangerous gases consisting of Methane (CH₄), Sulfur dioxide (SO₂), Carbon monoxide (CO) etc.
- As the extent of such gases byskip the brink price the device will generate the alert the use of alarm device through which the Health branch will take right motion on it.
- The module is applied the use of Wireless Sensor Networking (WSN) era every node will convey its very own records in conjunction with the records of neighboring node and could byskip it to subsequent node through hopping techniques.
- These whole records packet can be together despatched through the gateway node and saved on the cloud a lot of these records can be available in real-time state of affairs for non-stop monitoring.

4.1 PROPOSED BLOCK DIAGRAM:

4.1.1 DRAINAGE SECTION:



4.1.2 RECEIVER:



4.2 HARDWARE REQUIREMENTS:

- POWERS SUPPLY UNIT
- ARDUINO UNO
- LCD DISPLAY
- WATER LEVEL SENSOR
- GAS SENSOR
- IR SENSOR
- 12 V ADOPTER
- CONNECTING WIRES

4.3 SOFTWARE REQUIREMENTS:

- ARDUINO IDE
- BT TERMINAL

Workflow

Initially all of the hardware modules are initialized and installed on an Arduino board. As all sensors constantly fetch facts from the surroundings the usage of microcontroller. And passes directly to net of factors Where it compares stay fetched facts to threshold values of respective unsafe sewage gases. If stay records of any sensors exceed the edge cost the nearby municipal business enterprise is knowledgeable via manner of way of sending a notification to reliable authority. Not handiest facts approximately sewage gases however temperature water degree is likewise received if the water degree is above a few precise degree it's going to notify the authority approximately which may be tracked with assist of GPS and GSM system. admin and person credentials of all members are saved in addition to checked in BT terminal with assist of android utility and each hobby executed is saved and maintained in utility.

CHAPTER 5

BLOCK DIAGRAM DESCRIPTION:

METHODOLOGY

5.1 POWER SUPPLY

This section describes how to generate +5VDC power. The power supply section is the important one. It should deliver constant



Output regulated electricity deliver for a hit operating of the project. A 0-12V/1mA transformer is used for this purpose. The number one of this transformer is hooked up in to essential deliver via on/off switch& fuse for shielding from overload and quick circuit protection. The secondary is hooked up to the diodes to transform 12V AC to 12V DC voltage. And filtered via way of means of the capacitors, that is in addition regulated to +5v, via way of means of the usage of IC 7805

All electricity elements have a electricity enter connection, which gets strength withinside the shape of electrical present day from a supply, and one or extra electricity output or rail connections that supply present day to the load. The supply electricity can also additionally come from the electrical electricity grid, together with an electrical outlet, strength garage gadgets together with batteries or gasoline cells, turbines or alternators, sun electricity converters, or some other electricity deliver. The enter and output are normally hardwired circuit connections, aleven though a few electricity elements appoint wi-fi strength switch to electricity their hundreds with out stressed connections. Some electricity elements produce other kinds of inputs and outputs as well, for features together with outside tracking and control. Direct present day electricity elements are both unregulated or regulated. Regulated elements are available in numerous alternatives inclusive of linear, switched and battery-based.

The entire electricity deliver circuit can carry out those features:

Step voltages up or step voltages down, via way of means of transformer action, to

the desired ac line voltage. Provide a few technique of voltage department to satisfy gadget needs. Change ac voltage to pulsating dc voltage via way of means of both half-wave or full-wave rectification. Filter pulsating dc voltage to a natural dc constant voltage for gadget use. Regulate electricity deliver output in share to the carried out load.

The electricity deliver unit is the a part of the hardware this is used to transform the electricity supplied from the hole into usable electricity to many components inner an electrical device. Every strength deliver ought to pressure its load, that is linked to it. Depending on its design, a electricity deliver unit can also additionally reap strength from numerous kinds of strength sources, like electric strength transmission structures, electromechanical structures together with turbines and alternators, sun electricity converters, strength garage gadgets together with a battery and gasoline cells, or different electricity deliver. There are kinds of electricity elements existed, AC and DC electricity deliver. Based on the electric device's electric powered specs it could use AC electricity or DC electricity.

Application

Power elements are a essential factor of many digital gadgets and consequently utilized in a numerous variety of programs. This listing is a small pattern of the various programs of electricity elements.

5.2 ARDUINO UNO

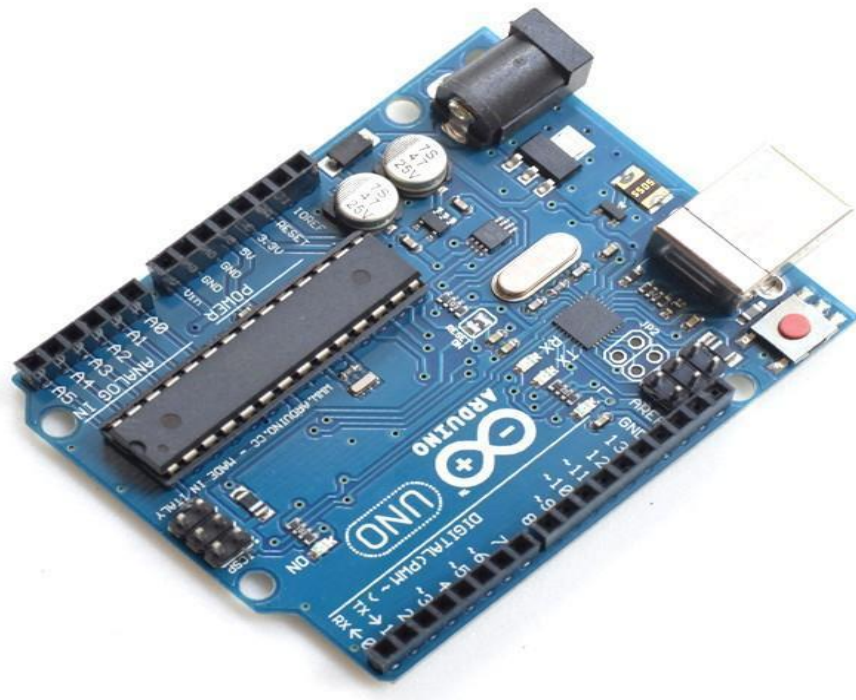
5.2.1 GENERAL DESCRIPTION

Arduino is an open-supply undertaking that created microcontroller-primarily based totally kits for constructing virtual gadgets and interactive gadgets that could feel and manipulate bodily gadgets. The undertaking is primarily based totally on microcontroller board designs, produced with the aid of using numerous vendors, the usage of diverse microcontrollers. These structures offer units of virtual and analog

and different circuits. The forums function serial conversation interfaces, which include Universal Serial Bus (USB) on a few models, for loading applications from non-public computers. For programming the microcontrollers, the Arduino undertaking offers an included improvement environment (IDE) primarily based totally on a programming language named Processing, which additionally helps the languages C and C++.

5.2.2 PRODUCT DESCRIPTION

Arduino Uno is a microcontroller board primarily based totally at the ATmega328P. It has 14 virtual input/output pins (of which 6 may be used as PWM outputs), 6 analog inputs, a sixteen MHz quartz crystal, a USB connection, a energy jack, an ICSP header and a reset button. It carries the entirety had to aid the microcontroller; genuinely join it to a laptop with a USB cable or energy it with a AC-to-DC adapter. Arduino Uno has some of centers for speaking with a laptop, some other Arduino board, or different microcontrollers.



Arduino UNO

How to Program Arduino UNO?

Arduino UNO is straightforward to application and someone with very little technical understanding can get hands-on enjoy with this board. The Arduino UNO board is programmed the use of Arduino IDE software program that is an reputable software program added via way of means of Arduino.cc to application the board. The Arduino application is referred to as a comic strip that you want to dump into the board. The comic strip is not anything however a hard and fast of commands that permit the board to carry out positive features as consistent with your requirements.

Each Arduino comic strip comes with principal components:

- void setup() – this units up the matters that want to be completed as soon as and that they don't occur once more withinside the walking application.

- void loop() – this component comes with the commands that get repeated time and again till the board is powered to become off.

Difference among Arduino Board and Microcontroller:

Arduino boards can carry out a few features that a unmarried microcontroller is able to doing. But hobbyists and specialists nevertheless decide on the Arduino board over the microcontroller. Why? Because Arduino boards are smooth to apply and also you don't require lots of know-how to run those units. Simply plug the board into the pc and begin gambling with it.

Moreover, at the same time as the use of Arduino boards, you don't require more peripherals and additives to run the boards. Arduino is the whole board that includes GPIO pins, analogue pins, and a microcontroller because the coronary heart of the board. A microcontroller, on the alternative hand, is a chip wherein all of the vital components like microprocessor, ram, and flash reminiscence are integrated right into a unmarried chip. So we will say each Arduino board is a microcontroller however now no longer each microcontroller is an Arduino board. Plus, Arduino is an open-supply hardware and software program platform because of this that it's miles loose to apply and everybody can alter the boards as consistent with their requirements.

Operating Voltage: five Volts

Input Voltage: 7 to twenty Volts

Digital I/O Pins: 14 (of which 6 can offer PWM output)

PWM Pins: 6 (Pin # 3, five, 6, 9, 10 and 11)[9]

UART: 1

I2C: 1

SPI: 1

Analog Input Pins: 6

DC Current consistent with I/O Pin: 20 mA

DC Current for 3.3V Pin: 50 mA

Flash Memory: 32 KB of which 0.five KB utilized by bootloader

SRAM: 2 KB

EEPROM: 1 KB

Clock Speed: sixteen MHz

Length: 68.6 mm

Width: 53.4 mm

Weight: 25 g

ICSP Header: Yes

Power Sources: DC Power Jack & USB Port

5.2.3 FEATURES

- Microcontroller: ATmega328P
- Operating voltage: 5V
- Input voltage: 7-12V
- Flash memory: 32KB
- SRAM: 2KB
- EEPROM: 1KB
- There is an on-board LED connected to digital IO pin 13. Use this LED to perform Blinky operations. The reference voltage for the internal ADC is by default set to 5V. But using the AREF pin, you can manually set the upper limit of the ADC.
- Using the IOREF pin, you can set the reference voltage for Microcontroller operations.
- To reset the microcontroller, you can use the on-board RESET button.
- Although you can program the Arduino UNO using the USB cable, there is a provision to program the MCU using the In-Circuit Serial Programming (ICSP) interface.
- The UART bootloader, which is preloaded in to the ATmega328P microcontroller, enables programming through serial interface. But ICSP doesn't need any bootloader.
- You can program Arduino UNO using ICSP or use the ICSP of Arduino UNO to program other Arduino Boards.
- Digital IO Pins 2 and 3 can be configured as External Interrupts Pins INT0 and INT1 respectively. Use `attachInterrupt()` function to configure the Interrupt for

rising edge, falling edge or level change on the pin.

5.2.4 APPLICATIONS

- Real time biometrics
- Robotic applications
- Academic applications
- Weighing Machines
- Traffic Light Count Down Timer
- Parking Lot Counter
- Embedded systems
- Home Automation
- Industrial Automation
- Medical Instrument
- Emergency Light for Railways

Summary:

- Microcontroller: ATmega328
- Operating Voltage: 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: 6
- DC Current per I/O Pin: 40 mA
- DC Current for 3.3 V Pin: 50 mA
- Flash Memory: 32 KB (ATmega328) of which 0.5 KB used by bootloader
- SRAM: 2 KB (ATmega328)
- EEPROM: 1 KB (ATmega328)
- Clock Speed: 16 MHz

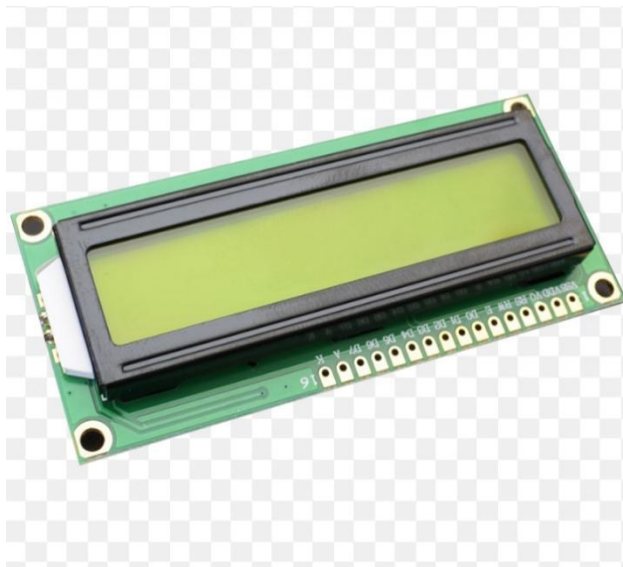
Advantages

- Not much knowledge required to get started
- Fairly low cost, depending on shields you need
- Lots of sketches and shields available
- No external programmer or power supply needed

Disadvantages

- No understanding of the AVR microcontroller
- Sketches and shields can be difficult to modify
- No debugger included for checking scripts
- You get no experience of C or professional development tools

5.3 LCD DISPLAY



5.3.1 LCD Introduction

A liquid crystal show or LCD attracts its definition from its call itself. It is a mixture of states of matter, the stable and the liquid. LCD makes use of a liquid crystal to supply a seen image. Liquid crystal shows are super-skinny era show monitors which might be typically utilized in pc pc monitors, TVs, mobileular phones, and transportable video

games. LCD's technology permit shows to be tons thinner while as compared to a cathode ray tube (CRT) era.

An HD44780 Character LCD is an enterprise preferred liquid crystal show (LCD) show tool designed for interfacing with embedded electronics. These monitors are available not unusualplace configurations of 8x1 characters, 16x2, and 20x4 amongst others. The biggest such configuration is 40x4 characters, however those are uncommon and are honestly separate 20x4 monitors seamlessly joined together.

These monitors are regularly located in copiers, fax machines, laser printers, business take a look at system, networking system together with routers and garage devices, etc. These aren't the type of monitors one might discover in a mobileular phone, transportable television, etc. They are constrained to textual content handiest, with eight customizable characters.

Character LCDs can come without or with backlights. Backlights may be LED, fluorescent, or electroluminescent.

Character LCDs use a preferred 14-pin interface. If the display has a backlight, it's going to have sixteen pins. The pinouts are as follows:

1. Ground
2. VCC (+5V)
3. Contrast adjustment
- four. Register Select (R/S)
5. Read/Write (R/W)
6. Clock (Enable)
7. Bit 0
- eight. Bit 1

9. Bit 2

10. Bit 3

eleven. Bit four

12. Bit 5

13. Bit 6

14. Bit 7

Character LCDs can perform in four-bit or eight-bit mode. In four bit mode, pins 7 via 10 are unused and the whole byte is despatched to the display the use of pins eleven via 14 via way of means of sending a nybble at a time.

The maximum usually used LCDs located withinside the marketplace nowadays are 1 Line, 2 Line or four Line LCDs that have handiest one controller and aid at maximum eighty characters, while LCDs assisting greater than eighty characters employ 2 HD44780 controllers. Apart from showing a few easy static characters you may create lively textual content scripts and loads greater!



Let's start playing with them, but you will have to wait a little as these things mentioned below will help you to create your own magical codes...

Most LCDs with 1 controller has 14 Pins and 16 Pins (two extra pins are for back-light LED connections). Pin description is shown in the table below.

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

www.botskool.com

This may not match with the exact pin configuration for your LCD, check application circuit in data sheet for exact configuration.

5.3.2 Read/Write (RW):

- 1.) RW= 0, the information is being written on LCD.
- 2.) RW=1, for reading from LCD. (Only one command that is "Get LCD status" is read commands all others are write command)

It is a control line. When RW is low (0), the information on the data bus is being written to the LCD. When RW is high (1), the program is effectively querying (or reading from) the LCD. Only one instruction ("Get LCD status") is a read command. All others are write commands--so RW will be low for majority of the time.

5.3.3 Registers:

There are two very important registers in the LCD. The RS pin is used for their selection.

1.) RS= 0; The Instruction command code register, allows the user to send command such as clear display, cursor at home, etc.

2.) RS=1; the data register, allow user to send data to be displayed at LCD.

Enable (En) pin: is used to tell the LCD that we are sending it data. A high to low pulse (of minimum length 450ns) before sending any command/data to LCD.

5.3.4 STEPS TO PROGRAM:

- 1) Initialize the LCD.
- 2) Select the command or instruction register.
- 3) Set RW low (to write).
- 4) Send a high to low pulse on Enable pin.
- 5) Check if the LCD is busy.
- 6) Move to instruction or command function.
- 7) Repeat steps 4-7.

5.3.5 FEATURES

- Input voltage: 5v
- E-blocks compatible
- Low cost
- Compatible with most I/O ports in the E-Block range
- Ease to develop programming code using Flow code icons

5.3.5 APPLICATIONS

LCDs are utilized in a huge variety of applications, consisting of LCD televisions, pc monitors, device panels, plane cockpit shows, and indoor and out of doors signage. Small LCD monitors are not unusualplace in LCD projectors and transportable patron gadgets together with virtual cameras, watches, virtual clocks, calculators, and cell telephones, consisting of smartphones. LCD monitors also are used on patron electronics merchandise together with DVD players, online game gadgets and clocks. LCD monitors have changed heavy, cumbersome cathode ray tube (CRT) shows in almost all applications. LCD monitors are to be had in a much broader variety of display screen sizes than CRT and plasma shows, with LCD monitors to be had in sizes starting from tiny virtual watches to very big tv receivers. LCDs are slowly being changed through OLEDs, which may be without difficulty made into exceptional shapes, and feature a decrease reaction time, wider shadeation gamut, actually limitless shadeation assessment and viewing angles, decrease weight for a given show length and a slimmer profile (due to the fact OLEDs use a unmarried glass or plastic panel while LCDs use glass panels; the thickness of the panels will increase with length however the growth is extra sizeable on LCDs) and probably decrease strength intake (because the show is only "on" in which wanted and there may be no backlight). OLEDs, however, are extra high-priced for a given show length because of the very high-priced electroluminescent substances or phosphors that they use. Also because of using phosphors, OLEDs be afflicted by display screen burn-in and there may be presently no manner to recycle OLED shows, while LCD panels may be recycled, despite the fact that the era required to recycle LCDs isn't but widespread. Attempts to keep the competitiveness of LCDs are quantum dot shows, advertised as SUHD, QLED or Triluminos, that are LCD shows with blue LED backlighting and a Quantum-dot enhancement film (QDEF) that converts a part of the blue mild into pink and green, presenting comparable overall performance to an OLED show at a decrease price, however the quantum dot layer that offers those shows their traits cannot but be recycled

Since LCD monitors do not use phosphors, they hardly ever go through photo burn-in while a static photo is displayed on a display screen for a protracted time, e.g., the desk body for an airline flight time table on an indoor sign. LCDs are, however, at risk of photo persistence.[3] The LCD display screen is extra energy-green and may be disposed of extra properly than a CRT can. Its low electric strength intake permits it for use in battery-powered digital device extra efficaciously than a CRT may be. By 2008, annual income of televisions with LCD monitors handed income of CRT gadgets worldwide, and the CRT have become out of date for maximum purposes.

Advantages of LCD :

- Slim profile
- No radiation emission from the screen
- Better under brighter conditions because of anti-glare technology
- Lighter in weight with respect to screen size
- Energy efficient because of lower power consumption
- Brightness range is too much wider produce very bright images due to high peak intensity
- Produce lower electric, magnetic and electromagnetic fields
- Zero geometric distortion
- Excellent contrast
- Low flicker rates
- An image is perfectly sharp at the native resolution of the panel side
- Number of pixels per square inch is typically higher than any other technology or system
- Not prone to screen burn-in
- It has not affected by an increase or decrease in air pressure

Disadvantages of LCD :

- Slightly more expensive than CRT
- Can't act as a portal to another dimension
- Suffer from a motion blur effect
- High refresh rate
- Like the backlight ages, it can change colors slightly
- The aspect ratio and resolution are fixed
- Not proficient at producing black or very dark grays colors
- Restricted viewing angles
- Slow response times

5.4 IR SENSOR

An infrared (IR) sensor is an digital tool that measures and detects infrared radiation in its surrounding environment. Infrared radiation became by accident found via way of means of an astronomer named William Herchel in 1800. While measuring the temperature of every shadeation of mild (separated via way of means of a prism), he observed that the temperature simply past the crimson mild became highest. IR is invisible to the human eye, as its wavelength is longer than that of seen mild (aleven though it's far nevertheless at the identical electromagnetic spectrum). Anything that emits heat (the entirety that has a temperature above round 5 tiers Kelvin) offers off infrared radiation.

IR LED emits infrared radiation. This radiation illuminates the floor in the front of LED. Depending on reflectivity of the floor, quantity of mild pondered varies. This pondered mild is made incident on opposite biased IR sensor. The quantity of electron-hollow

pairs generated relies upon on depth of incident IR radiation. Thus as depth of incident ray varies, voltage throughout resistor will range accordingly.

There are varieties of infrared sensors: energetic and passive. Active infrared sensors each emit and hit upon infrared radiation. Active IR sensors have parts: a mild emitting diode (LED) and a receiver. When an item comes near the sensor, the infrared mild from the LED displays off of the item and is detected via way of means of the receiver. Active IR sensors act as proximity sensors, and they're normally utilized in impediment detection systems (together with in robots).

Passive infrared (PIR) sensors best hit upon infrared radiation and do now no longer emit it from an LED. PIR sensors are maximum normally utilized in motion-primarily based totally detection, together with in-domestic protection systems. When a transferring item that generates infrared radiation enters the sensing variety of the detector, the distinction in IR ranges among the 2 pyroelectric factors is measured. The sensor then sends an digital sign to an embedded computer, which in flip triggers an alarm.

An infrared sensor is an digital tool, that emits so that you can feel a few components of the surroundings. An IR sensor can degree the warmth of an item in addition to detects the motion. Usually withinside the infrared spectrum, all of the items radiate a few shape of thermal radiations. These varieties of radiations are invisible to our eyes, that may be detected via way of means of an infrared sensor.

The emitter is certainly an IR LED (Light Emitting Diode) and the detector is certainly an IR photodiode that's touchy to IR mild of the identical wavelength as that emitted via way of means of the IR LED. When IR mild falls at the photodiode, The resistances and

those output voltages, extrade in percentage to the significance of the IR mild received.



Fig 6.IR sensor

5.4.1 FEATURES

- Operating voltage: $5V_{DC}$
- Output voltage: 0 or $5V_{DC}$
- Easy to assemble and use
- Onboard detection indication
- Effective distance range of 2cm

Advantages:

The blessings of IR sensor encompass the following

- It makes use of much less strength
- The detection of movement is viable withinside the presence or absenc/e of mild about with same reliability.
- They do now no longer want touch with the item for detection
- There isn't anyt any facts leakage due to the ray direction
- These sensors aren't stricken by oxidation & corrosion
- Noise immunity could be very strong
- It offers made certain approximately correspondence due to view or spotlight factor approach of correspondence.
- The battery applied in infrared devices maintain going for long time due to decrease strength utilization.

- Infrared motion sensors become aware of motion in daylight hours and night dependably.
- The sensor doesn't want any touch with the object to be detected. The infrared devices are greater right for goals which can be near than 10 mm.
- Infrared devices can quantify distance to sensitive gadgets which might not be resultseasily diagnosed with the aid of using ultrasound.
- They are really greater modest in length and are greater moderate.
- It has response time faster than thermocouple.
- It offers first rate soundness after a few time.
- No intake or oxidation can have an effect on the precision of infrared sensor.
- It conveys excessive repeatability

Disadvantages:

The negative aspects of IR sensor consist of the following

- Line of sight is required
- Range is restrained
- These may be stricken by fog, rain, dust, etc
- Less facts transmission fee
- Infrared frequencies are motivated with the aid of using tough articles (as an example dividers, entryways), smoke, dust, haze, daytime and so forth Thus it doesn't paintings thru dividers or entryways.
- Infrared waves at excessive pressure can damage eyes.
- In display screen and manage application, it may manage only a unmarried system at one time. Additionally it's miles tough to govern matters which aren't in LOS (Line of Sight). It calls for view amongst transmitter and collector to convey.
- It underpins greater restrained attain and therefore it execution corrupts with longer distances.
- It upholds decrease statistics fee transmission comparison with stressed transmission.

5.4.2 APPLICATIONS

- Augmentative communication devices
- Car locking systems
- Computers
- Signage
- Telephones
- gas warning devices
- gas analysers
- flame detectors
- contactless precision temperature measurement
- medical gas measurement technology

5.5 SOIL MOISTURE WATER LEVEL SENSOR

5.5.1 GENERAL DESCRIPTION

This sensor may be used to check the moisture of soil, whilst the soil is having water shortage, the module output is at excessive level, and else the output is at low level.

By the usage of this sensor one could robotically water the flower plant, or some other vegetation requiring computerized watering technique. Module twin output mode, virtual output is simple, analog output extra accurate.

Soil moisture sensors degree the volumetric water content material not directly through the usage of a few different assets of the soil, including electric resistance, dielectric constant, or interplay with neutrons, as a proxy for the moisture content material.

5.5.2 PRODUCT DESCRIPTION

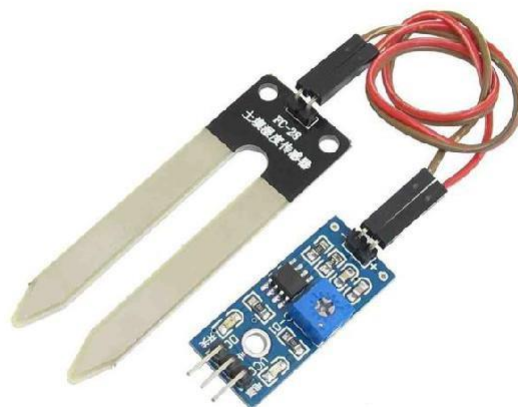
Soil moisture sensors degree the volumetric water content in soil. Since the direct gravimetric size of loose soil moisture calls for removing, drying, and weighting of a sample, soil moisture sensors degree the volumetric water content material not directly through the usage of a few different assets of the soil, including electric resistance, dielectric constant, or interplay with neutrons, as a proxy for the moisture content material.

The relation among the measured assets and soil moisture have to be calibrated and can range relying on environmental elements including soil type, temperature, or electric powered conductivity. Reflected microwave radiation is laid low with the soil moisture and is used for far off sensing in hydrology and agriculture. Portable probe gadgets may be utilized by farmers or gardeners.

The fork-fashioned probe with uncovered conductors, acts as a variable resistor (similar to a potentiometer) whose resistance varies in step with the water content material within side the soil.

This resistance is inversely proportional to the soil moisture:

The greater water inside facet the soil manner better conductivity and will result in a lower resistance. The a great deal much less water inside facet the soil manner horrific conductivity and will result in a higher resistance. The sensor produces an output voltage in keeping with the resistance, which via measuring we're capable of determine the moisture level



SOIL MOISTURE SENSOR

AO (Analog Output) pin offers us an analog sign among the deliver price to 0V and may be related to one of the analog inputs to your Arduino.

DO (Digital Output) pin offers Digital output of inner comparator circuit. You can join it to any virtual pin on an Arduino or at once to a 5V relay or comparable device.

VCC pin substances electricity for the sensor. It is usually recommended to electricity the sensor with among 3.3V – 5V. Please observe that the analog output will range relying on what voltage is supplied for the sensor.

GND is a floor connection

Types of soil moisture sensors

Soil moisture sensors are divided into classes relying at the era they use: 1) Sensors that degree volumetric water content material and 2) Sensors that degree soil anxiety while located within side the soil profile.

5.5.3 FEATURES

- Input voltage: 5v
- Output voltage:0-5v
- Output: Analog.
- Sensitivity adjustable.
- Threshold level can be configured.
- Module triple output mode, digital, analog, serial outputs.

Advantages of Moisture sensor for soil:

Following are the advantages of Moisture sensor for soil :

- Simple method of measurement.
delivers the results immediately.
- Watermark sensors and tensiometers are very low in cost.
- Offers accurate results.
- Watermark sensors offer larger moisture reading range from 0 to 200 cb or kpa.

Disadvantages of Moisture sensor for soil:

Following are the disadvantages of Moisture sensor for soil:

- It requires initial evaluation of site specific conditions before selection of appropriate moisture sensor.
- It requires probe to be inserted in the soil. It requires labor to collect the data and maintain the measurement processes.
- The measured values depend on properties of various materials. The correct interpretation and use of moisture data is needed.
- Watermark sensors provide less accuracy in sandy soils due to large particles.
- Watermark sensors are required to be calibrated for each soil types. Tensiometers also require periodic section

5.5.4 APPLICATIONS

- Agriculture.
- Landscape irrigation.

- Research
- Simple sensor for Gardeners.

5.6 ALCOHOL SENSOR-MQ3

5.6.1 GENERAL DESCRIPTION

In present day generation scenario, tracking of gases produced may be very important. From domestic home equipment along with air conditioners to electric powered chimneys and protection structures at industries tracking of gases may be very crucial. Gas sensors spontaneously react to the fueloline present, as a result preserving the machine up to date approximately any changes that arise withinside the awareness of molecules at gaseous state. The fueloline sensor module includes a metallic exoskeleton beneathneath which a sensing detail is housed. This sensing detail is subjected to present day thru connecting leads. This present day is called heating present day thru it, the gases coming near the sensing detail get ionized and are absorbed with the aid of using the sensing detail. This adjustments the resistance of the sensing detail which alters the fee of the present day going out of it. The connecting leads of the sensor are thick in order that sensor may be related firmly to the circuit and enough quantity of warmth receives performed to the inner part. They are casted from copper and feature tin plating over them.

5.6.2 PRODUCT DESCRIPTION MQ-three fueloline sensor is designed with touchy fabric of Alcohol, which with decrease conductivity in smooth air. When the goal flammable fueloline exists, the sensor's conductivity is higher. Signal conditioning circuit is used to transform the extrade of conductivity to correspond output sign with the enter fueloline awareness. MQ-three fueloline sensor has excessive sensitivity to alcohol, Propane and different flammable steam, it's far with low fee and appropriate for different . This module is made the usage of Alcohol Gas Sensor MQ3. It is a low fee semiconductor sensor that can stumble on the presence of alcohol gases at concentrations from 0.05 mg/L to ten mg/L. The touchy fabric used for this sensor is SnO₂, whose conductivity is decrease in smooth air. It's

conductivity will increase because the awareness of alcohol gases will increase. It has excessive sensitivity to alcohol and has an excellent resistance to disturbances because of smoke, vapor and gasoline. This module gives each virtual and analog outputs. MQ3 alcohol sensor module may be without problems interfaced with Microcontrollers, Arduino Boards, Raspberry Pi etc. This alcohol sensor is appropriate for detecting alcohol awareness in your breath, much like your not unusualplace breathalyzer. It has a excessive sensitivity and speedy reaction time. Sensor gives an analog resistive output primarily based totally on alcohol awareness. The pressure circuit may be very easy, all it desires is one resistor. A easy interface may be a 0-three.3V ADCn within side the air.

For MQ-3 Sensor

H -Pins

Out of the two H pins, one pin is connected to supply and the other to ground

A-Pins

The A pins and B pins are interchangeable. These pins will be tied to Supply voltage.

B-Pins

A pins and B pins are interchangeable. One pin will act as output while the other will be pulled to ground

Here are some MQ series of gas sensors

MQ-2 - Methane, Butane, LPG, smoke

MQ-3 - Alcohol, Ethanol, smoke

MQ-4 - Methane, CNG Gas

MQ-5 - Natural gas, LPG

MQ-6 - LPG, butane gas

MQ-7 - Carbon Monoxide

MQ-8 - Hydrogen Gas

MQ-9 - Carbon Monoxide, flammable gasses

MQ131 - Ozone

MQ135 - Air Quality (CO, Ammonia, Benzene, Alcohol, smoke)

MQ136 - Hydrogen Sulfide gas

MQ137 - Ammonia

MQ138 - Benzene, Toluene, Alcohol, Acetone, Propane, Formaldehyde gas, Hydrogen

MQ214 - Methane, Natural gas Technical Data

Concentration : 0.05 mg/L ~ 10 mg/L Alcohol

Operating Voltage : 5V $\pm$ 0.1

Current Consumption : 150mA

Operation Temperature : -10°C ~ 70°C

Pin Out

VCC – Input Power Supply

GND – Supply Ground

DO – Digital Output

AO – Analog Output



Gas sensor MQ-3

Specifications of MQ-3 Gas Sensor

Power requirements: 5 VDC @ ~165 mA (heater on) / ~60 mA (heater off)

Current Consumption: 150mA

DO output: TTL digital 0 and 1 (0.1 and 5V)

AO output: 0.1- 0.3 V (relative to pollution), the maximum concentration of a voltage of about 4V

Detecting Concentration: 0.05-10mg/L Alcohol

Interface: 1 TTL compatible input (HSW), 1 TTL compatible output (ALR)

Heater consumption: less than 750mW

Operating temperature: 14 to 122 °F (-10 to 50°C)

Load resistance: 200kΩ

Sensitivity S: $R_s(\text{in air})/R_s(0.4\text{mg/L Alcohol}) \geq 5$

Sensing Resistance R_s : 2KΩ-20KΩ(in 0.4mg/l alcohol)

Dimensions: 32 x 22 x 16 mm

5.6.3 FEATURES

- Analog and Digital output
- Good sensitivity to Alcohol in wide range
- Operation voltage: 5V_{DC}
- Simple drive circuit
- Long life and low cost

5.6.4 APPLICATIONS

- Domestic gas leakage detector
- Industrial Combustible gas detector
- Portable gas detector

advantages of Alcohol sensor:

- It is available at cheaper price.
- It has long life cycle.
- It offers high stability.
- It has high sensitivity which results into faster response time.
- It needs simple drive circuit and it is simple to use.
- It is easy to interface with microcontrollers.
- Alcohol sensor based car protects you when you are drunk. During such condition, your other family member can drive. Moreover it will protect your car from unauthorized access.

Disadvantages of Alcohol sensor:

- Breath analyzers using alcohol detection are available at high prices. Moreover they have shorter lifetime.
- Breath analyzers require continuous re-calibration.

Overflow sensor

Overflow sensor is largely a board which has a coating of nickel withinside the shape of traces and works at the precept of resistance. The module is primarily based totally on LM393 op-amp. The sensor is a resistive dipole that indicates much less resistance due to the fact water conducts strength and connects the nickel traces in parallel and subsequently reduces resistance and voltage drop throughout it. The sensor indicates greater resistance while it's far dry. Water Level sensor: The stage sensor used right here is an ultrasonic sensor that is largely used for distance dimension and water stage dimension with out real touch with the obstacle. The precept of distance dimension is primarily based totally on echo. The sensor transmits a legitimate wave which returns returned to the starting place as echo after putting the obstacle. Hence the journeying time of the sound wave is referred to and the gap is being calculated.

5.7 INTERNET OF THINGS (IOT):



What is the history of the Internet of Things?

The concept of including sensors and intelligence to fundamental gadgets become mentioned in the course of the Nineteen Eighties and 1990s (and there are arguably a few a good deal in advance ancestors), however other than a few early projects -- consisting of a web-related merchandising machine -- development become gradual surely due to the fact the generation wasn't ready. Chips have been too large and

cumbersome and there has been no manner for gadgets to speak effectively.

Processors that have been reasonably-priced and energy-frugal sufficient to be all however disposable have been wanted earlier than it sooner or later have become value-powerful to attach up billions of gadgets. The adoption of RFID tags -- low-energy chips which could speak wirelessly -- solved a number of this issue, together with the growing availability of broadband net and cell and wi-fi networking. The adoption of IPv6 -- which, amongst different matters, need to offer sufficient IP addresses for each tool the world (or certainly this galaxy) is ever probable to need -- become additionally a important step for the IoT to scale. Kevin Ashton coined the phrase 'Internet of Things' in 1999, even though it took at the least any other decade for the generation to trap up with the vision "The IoT integrates the interconnectedness of human culture -- our 'matters' -- with the interconnectedness of our virtual facts system -- 'the net.' That's the IoT," Ashton informed ZDNet.

Adding RFID tags to high priced portions of device to assist tune their area become one of the first IoT applications. But considering then, the value of including sensors and a web connection to gadgets has endured to fall, and specialists expect that this fundamental capability should in the future value as low as 10 cents, making it viable to attach almost the whole lot to the net.

It is a association of concrete add-ons and connectivity which permits the altar to negotiate abstracts. Each affair is abnormally identifiable thru its anchored accretion system.

The net of factors (IOT) is a accretion abstraction that describes the abstraction of accustomed concrete altar accepting affiliated to the net and accepting capin a position to research themselves to brought tool. The IOT is evocative due to the fact an editorial which could betoken itself digitally turns into some thing exquisite than the item if as compared with itself. It is real wonderful such that you can adviser everywhere their matters from everywhere withinside the world.

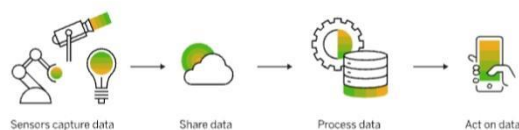
The net of factors allows human beings stay and paintings smarter, in addition to benefit entire manage over their lives. In addition to supplying clever gadgets to automate

homes, IoT is vital to business. IoT gives corporations with a real-time investigate how their structures truly paintings, turning in insights into the whole lot from the overall performance of machines to deliver chain and logistics operations.

IoT permits agencies to automate approaches and decrease hard work costs. It additionally cuts down on waste and improves carrier delivery, making it much less high priced to fabricate and supply goods, in addition to supplying transparency into purchaser transactions.

As such, IoT is one of the maximum vital technology of ordinary life, and it'll keep to choose up steam as greater corporations recognize the capacity of related gadgets to preserve them competitive.

Four key stages in the internet of things

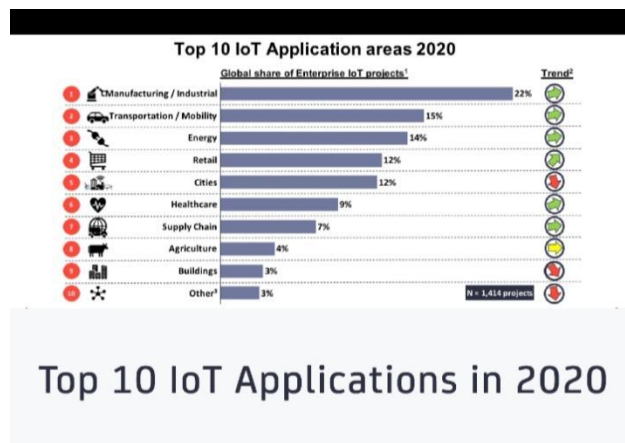


Capture the data. Through sensors, IoT devices capture data from their environments. This could be as simple as the temperature or as complex a real-time video feed.

Share the data. Using available network connections, IoT devices make this data accessible through a public or private cloud, as directed.

Process the data. At this point, software is programmed to do something based on that data – such as turn on a fan or send a warning.

Act on the data. Accumulated data from all devices within an IoT network is analysed. This delivers powerful insights to inform confident actions and business decisions.



Benefits:

The blessings of the IoT for enterprise rely on the specific implementation; agility and performance are generally pinnacle considerations. The concept is that companies must have get admission to to extra records approximately their personal merchandise and their personal inner systems, and a more capacity to make adjustments as a result. From the consumer's factor of view, IoT has the cap potential to streamline our every day activities, decrease our application bills (and electricity usage), enhance our healthcare, preserve us out of traffic, and a lot extra. It has the cap potential to make our lives easier. From the enterprise's factor of view, IoT has the cap potential to reduce costs, growth efficiencies, enhance client service, accelerate selection making, and a lot extra. It has the cap potential to be a aggressive gain and to praise the ones innovators who adapt to it first. The net of factors gives numerous blessings to organizations. Some blessings are industry-specific, and a few are relevant throughout more than one industries. Some of the not unusual place blessings of IoT allow agencies to: display their standard enterprise procedures; enhance the client experience (CX); shop time and money; beautify worker productivity; combine and adapt enterprise models; make higher enterprise decisions; and generate extra revenue. Skip to content IoT packages use gadget mastering algorithms to investigate large quantities of linked sensor records within side the cloud. Using real-time IoT dashboards and indicators, you advantage visibility into key overall performance indicators, information for imply time among failures, and different information. Machine mastering—primarily based totally algorithms can perceive system anomalies and ship indicators to customers or even cause automatic fixes or proactive counter measures. With cloud-primarily based totally IoT

packages, enterprise customers can speedily beautify present procedures for deliver chains, client service, human resources, and economic services. There's no want to recreate complete enterprise procedures TOP INTERNET-OF-THINGS (IOT)
 EXAMPLES TO KNOW Connected appliances Smart domestic protection systems Autonomous farming system Wearable fitness monitors Smart manufacturing facility system Wireless stock trackers Ultra-excessive speed wi-fi net Biometric cybersecurity scanners Shipping box and logistics tracking

5.8 PROBLEM IDENTIFICATION

In this device most effective hit upon gases, The water degree did now no longer recognized via way of means of the easy workplace, so the human twist of fate could be arise at manhole. Rainy season, the easy workplace do now no longer understand the water degree, so the flood could be cowl the town. This is the primary drawback of this venture. The blockage did now no longer feel via way of means of the sensors, the drainage water will cowl the dwelling area. The human beings face a few disease, in the course of blockage of drainage water

5. Nine PROBLEM SOLVING

- Using our clever drainage device we will without problems monitor, regulate and rectify the issues in actual time
- The intelligence of sensors and predictive device identifies the drain clogged spot and offers us the information for in addition moves to take.
- The predominant goal of this venture is to preserve the town easy, protection and healthy. And update the guide paintings of drainage tracking for the protection of sewer people, human and town.
- To assist proprietors, contractors and people to save you fueloline poisoning in drainage paintings

5.10 SYSTEM TESTS AND RESULTS

5.10.1 Hardware trying out:

Regarding the verbal exchange channel, the statistics transmission changed into examined with the sensor nodes powered via way of means of a not unusualplace battery, and the ten ft statistics transmission variety changed into absolutely achieved, confirming the feasibility of the entire community architecture.

For the trying out of the sensor node, the aid shape has been located near the duct of the manholes and plenty of water drainage systems.

The peak of the water degree has been cautiously regulated and obtains the coolest check results. Nevertheless, it must be underlined, that with exclusive intensity values of the water degree sensor the variant of the ranges is achieved .This truth indicates that the node could be capable of function additionally with variable water ranges. The fueloline sensors also are discovered operating in risky circumstance wherein better awareness of gases is present. All the sensors hit upon the values and router node sends the statistics to cloud and stay depth ranges are displayed at the website.

And while the depth ranges exceed the edge the alarm is given and displayed with place and depth information. As we're the use of wifi module therefore it's far secured via way of means of protection protocols which includes WPA, WPS and WPA2.

Code:

```
#include <Arduino.h>
```

```
#include <LiquidCrystal.h>
```

```
#include <SoftwareSerial.h>
```

```
const int rs = 13, en = 12, d4 = 11, d5 = 10, d6 = 9, d7 = 8;
```

```
LiquidCrystal lcd(rs, en, d4, d5, d6, d7);
```

```
boolean notConnected = true;
```

```

lcd.begin(16, 2);

lcd.print("Real-Time Drainage");

lcd.setCursor(0, 1);

lcd.print("Monitoring System ");

delay(1000);

Serial.begin(9600);

Serial.print("Smart Real-Time Drainage Monitoring System\n\r");

delay(100);

lcd.clear();

lcd.setCursor(0, 1);

lcd.print("Block: Not detected ");

delay(100);

}

void loop()

{

int gas,water;

gas= analogRead(A0)/2;

lcd.setCursor(0, 0);

lcd.print("Gas:");

lcd.print(gas);

lcd.print("");

delay(100);

```

```
water= analogRead(A1);

lcd.setCursor(8, 0);

lcd.print(" Wa:");

lcd.print(water);

lcd.print("");

delay(100);

counter++;

if(counter == 25)

{

    Serial.print("Gas:");

    Serial.print(gas);

    delay(50);

    Serial.print("\n");

}

else if(counter == 30)

{

    Serial.print("Water Level:");

    Serial.print(water);

    delay(50);

    Serial.print(" \n");

    counter = 0;

    pinMode(PIR_SENSOR_OUTPUT_PIN, INPUT);
```

```

if( sensor_output == LOW )
{
    if( warm_up == 1 )
    {
        Serial.print("Warming Up\n\n");

        lcd.setCursor(0, 1);

        lcd.print("Block: Not detec ");

        warm_up = 0;

        delay(100);
    }

    Serial.print("No Block in Drainage\n\n");

    delay(100);
}

else
{
    Serial.print("Block detected in Drainage\n\n");

    lcd.setCursor(0, 1);

    lcd.print("Block: detected ");

    delay(100);
}

```

5.10.2 Software testing:

Additional Diagnostics and debugging of the arduino codes are finished via way of means of Arduino ide device and accurate consequences are achieved .Efficiency and the power of the arduino applications is likewise checked the use of Arduino ide. The codes are blunders unfastened and run effectively on forums at actual-time. Real-time simulations also are finished of our machine earlier than its implementation and accurate consequences are achieved.

Step via way of means of step process:

In our software it'll to start with begin with the primary web page wherein login centers are there. For this prototype there are forms of individuals which might be consumer and Admin. And in case you aren't a brand new consumer you may faucet on sign on so that you can redirect you to the registration web page in which you need to offer credentials which can be important for registration. And in case you are already registered you may check in via way of means of presenting your credentials. If you've got got signed in correctly as a consumer you'll achieve a actual time map in which via way of means of tapping on hotspot you may get sensor's actual time facts that's the quantity of presence of sewer gases like methane, carbon monoxide and others along side water degree and blockage of that surrounding. And in case you are Admin as a player you'll have diverse obligations consumer preservation so that you can keep consumer's facts in addition to obligations. sewage traces challenge supervisor will ship notification to respective government and tell them approximately in which and whilst and what challenge is to be carried out and feature report of it.

5. Eleven RESULT ANALYSIS

Sensor unit senses all of the bodily parameters like Gas intensity, water degree, blockage, smoke because of launch of chemical and gases within the manhole and convert those inputs into electric output, this electric output obtained as a enter to arduino and is embedded with gprs/wifi modules and programmed in any such manner that every one the facts is ship to server in unique time periods then the internet site presentations all stay readings of each node and the alert facts into readable textual

content in chart .Offline textual content sms are also are despatched to the given predefined cell quantity with node facts and alert.

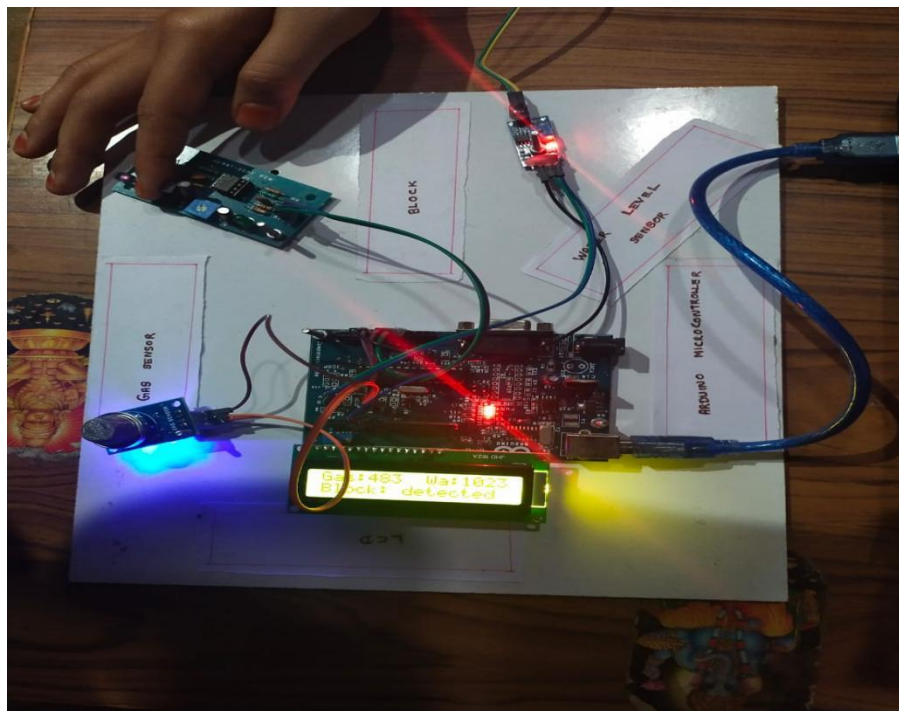
CHAPTER 6

RESULTS AND SCREENSHOTS

OUTPUT

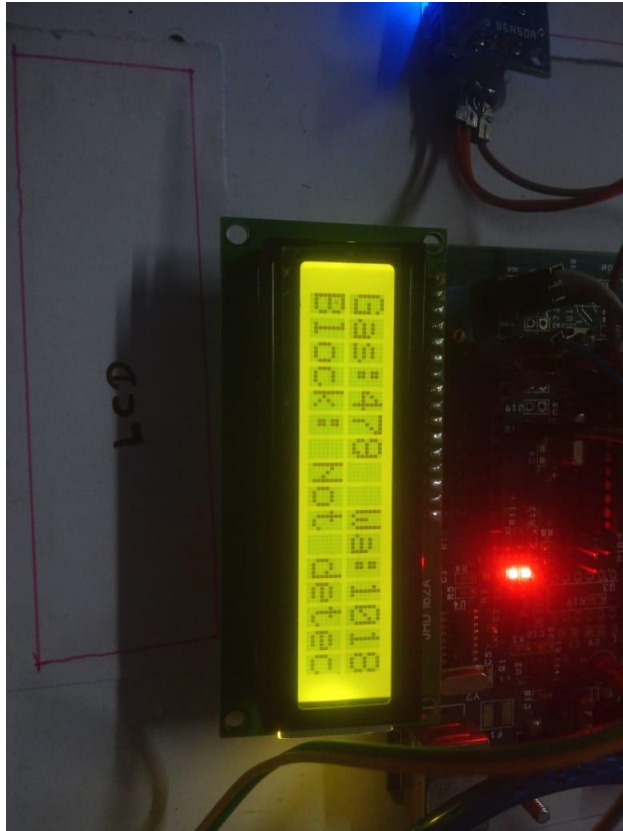
within the manhole and convert those inputs into electric output, this electric output acquired as a enter to Arduino and is embedded with gprs / Wifi modules and programmed in this sort of manner that each one the records is ship to server in precise time periods then the internet site presentations all stay readings of each node and the alert records into readable textual content in chart .Offline textual content sms are also are dispatched to the given predefined cell wide variety with notification records.

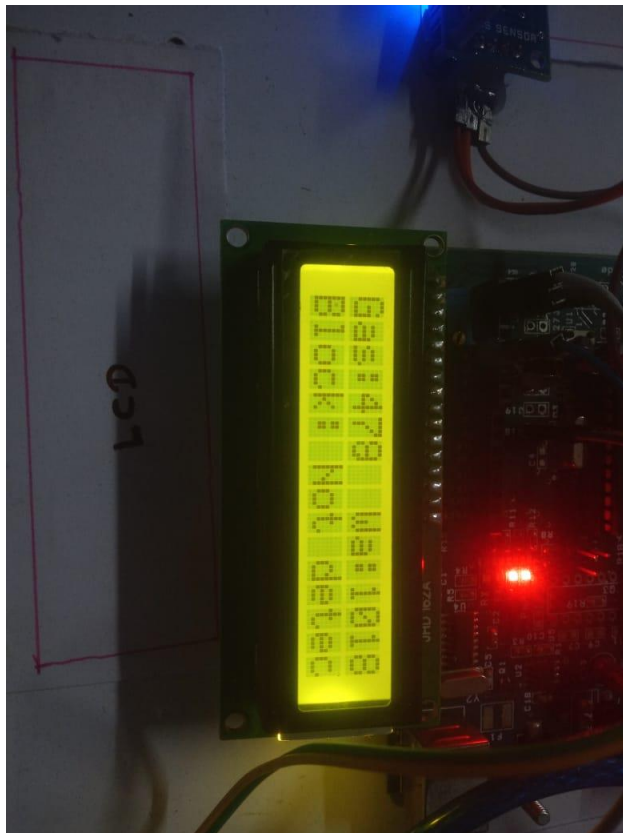
6.1 Hardware output



The above image shows hardware connection of smart drainage Monitoring System.

6.1.1 Lcd display output

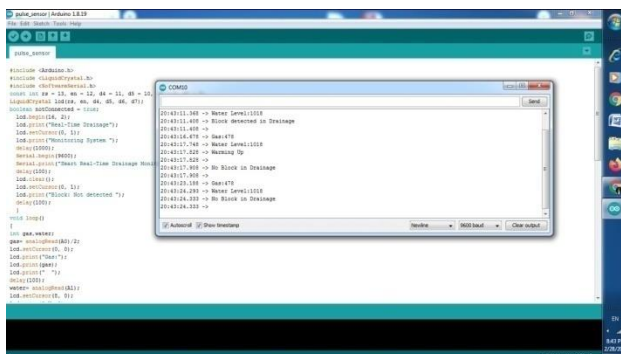




6.2 Software output

6.2.1 Arduino IDE

Once the complete set-up is ready, just upload the code to your Arduino Uno and your project will be ready for testing



6.2.2 BT terminal output

Connected

Connect Disconnect

Tx >>

|

Send

Rx >>

Gas:478
Water Level:1019
No Block in Drainage

Gas:479
Water Level:1018
Block detected in Drainage

Gas:478
Water Level:1018
Block detected in Drainage

Gas:479
Water Level:1018
Warming Up

No Block in Drainage

Clear

The figure shows Monitoring through web app on a mobile phone. and also send Sms notification when there is overflow in the system

.

ADVANTAGES

1. Increment in safety precautions for manual cleaning
2. Real time monitoring and analysis of whole drainage system
3. Detecting the pollutants, we can determine the level of risk in deploying the workers in particular manhole
4. Battery monitoring for easy maintenance
5. Easy interpretable GUI for every type of users
6. Automation and alerting in case for emergency and potential hazardous situation

LIMITATIONS AND FUTURE WORK

In the destiny after securing underground drainages from dangerous gases and different contaminants. We can visit paintings on some other difficulty this is sewage water overflows wherein divert wastages from the busiest sewage line to others which can be able to flowing that more sewage waste. In the destiny, our concept may be focusing on the intake of water that's different most important difficulty otherwise automating entire sewage cleansing device with assist of robotics and tracking wastes earlier than dumping it into sea whether or not it's far dangerous to marine flowers and fauna , If a person pass towards dumping regulations we are able to song them and penalty may be despatched with minimum guide assist

The Advantages of Underground Drainage System

- 1.Importance of underground drainage pipes and their applications

Most owners get enthusiastic about constructing a brand new domestic however don't pay an awful lot interest to putting in an amazing nice underground drainage device. However, this may result in leakages and different problems withinside the destiny that could in addition boom fees on repairs. Choosing nice underground drainage pipes whilst renovating houses is essential to defend the fitness of your cherished ones. A purposeful drainage device is chargeable for disposing unsafe waste that's vital to preserve the hygiene of your domestic. An underground drainage device need to be constructed in this sort of manner that it stays out of sight and does now no longer emit foul odour. These pipes are considerably used at residential and business areas in which sewage manage is vital. Let's have a have a take a observe the blessings of an Underground Drainage System:

2. Helps acquire extra rainwater

Underground Drainage System minimizes the hazard of water flooding at your private home. If you've got got a water series tank facility at your domestic, there are probabilities of it getting complete for the duration of heavy rains. The extra water can then byskip thru the drainage device that's then transported to large water series regions through underground pipes. The underground drainage device guarantees that wastewater is flushed out of the web page which in addition reduces the hazard of infection of water. The first-rate pipes for constructing sturdy Underground Drainage System are Foamcore Pipes.

3. Enhances the advent of the property

An open drainage device can appearance ugly and break the general appearance of your domestic. Such situations would possibly abate you in case you need to promote the property. Even in case you get a buyer, you may not acquire a truthful charge to the property. Underground drainage device offers your private home organised and completed appearance. Mainly Foamcore pipes are used to construct Underground Drainage System.

4. Minimizes the hazard of soil erosion

If you're a person who loves gardening Underground Drainage System offers you a first-rate advantage. Underground Drainage pipes guarantees no water drains into your

lawn. With an open drainage device, rainwater will create swimming pools withinside the lawn with a view to later change into a muddy mass. With the buildup of water withinside the lawn the plant life will now no longer simplest die however extra water also can reason soil erosion.

5. Reduces the hazard of harm to property

An open drainage device can reason extreme protection risks as the buildup of water everywhere in the residence can harm property, equipment or different items it receives in touch with. If the water receives in touch with open wires or poles withinside the surrounding it may be life-threatening. Underground Drainage pipes guarantees extra water is transported out of premises in order that nobody is negatively affected.

6. Removes poisonous substances and ailment organisms

If you stay round a water frame heavy rains can result in flash floods. This flood can convey infected water into your soil and round your home which may be dangerous to you. Underground Drainage System gets rid of poisonous substances and ailment organisms through draining them away thru the channels. Foamcore pipes may be used to make sure that Underground Drainage structures ultimate longer.

7. Advantages of Foamcore Piping structures

When it involves underground piping structures, Foamcore pipes is the favored preference as they're an awful lot lighter than stable wall PVC pipes and are more potent too. Foamcore pipes have outer and internal layers of traditional PVC and center layer of foamed PVC. Outer and internal layers can take the weight and center layer continues the form of the pipe. Not simply that, it's less complicated to put in Foamcore pipes while in comparison to concrete pipes. These pipes also are cost-powerful and are like minded with different drainage products. They aren't simply long lasting however also are extra hygienic than open drainage.

Drainage Provides a Better Environment for Plant Growth:

1. The excess water which impedes the root respiration and which directly attacks the root tissue of most crops is removed.

2. Increased Microbial Decomposition:

The presence of air in soil is essential for the growth of beneficial soil bacteria which converts the soil organic matter and fertilizers into available plant food.

3. Drainage Improves Physical Properties of the Soil:

It improves soil structure and also infiltration capacity of soil is increased. Higher infiltration capacity reduces erosion.

Drainage Maintains Proper Soil Temperature :

The removal of free water by drainage allows the soil to warm up quickly. Proper soil temperature accelerates plant growth and bacterial activity conditions for early planting and better germination.

5. Drainage Promotes Increased Leaching:

Biological Control Of Weeds

The Heads Of Insects Are Oriented In One Three Ways

Breeding Methods In Asexually Propagated Crop

Drainage promotes increased leaching of salts and prevents their accumulation in soil.

6. Less time of Labour Requirement:

Less time and fewer labours are required for tillage operation in well drained soil.

7. Better Root System:

The ability to grow an extensive root system means that the plant has a larger volume of soil, from which it extracts nutrient and water.

8. Crop damage at harvest time due to wet ground is prevented.

9. Reduce Soil Erosion:

Since, a well drained soil has more capacity to hold rainfall, resulting in less runoff.

10. Removes Toxic Substances:

Due to proper drainage toxic salts are removed from root zone.

7. CONCLUSION

This paper addresses all about smart and real-time Drainage monitoring system through IOT applications for metropolitan cities. By using various sensors such as gas detection, water level as well as blockage detection we can monitor the real time scenario of drainage system by for detecting the problems in drainage system.

By doing this we can able to take particular action on the problems as we will receive the early alerts of blockage as well as increase. This paper can be used to design the smart and real time drainage system for monitoring as well as troubleshooting purpose.

8. REFERENCES

- [1].Muragesh S. K1 and Santhosha Rao "AutomatedInternet of Things for Underground Drainage and Manhole Monitoring System for Metropolitan Cities"November2014
- [2]Prof. S A.Shaikh 1, Suvarna A. Sonawane. "Implementing Smart City Concept with Various Application Using IOT Based Technique"June 2017
- [3]Yash Narale,Apurva Jogal,Himani Chowdhary,S.P Bhosale "Underground Drainage Monitoring System Using IOT" .International Journal of Advance Research Ideas And Innovations In Technology, Volume 4 Issue 1, January 2018
- [4]G. Gowthaman, K. Hari Haran "Automated Internet of Things for Underground Drainage and Manhole Monitoring System for Metropolitan Cities"ISSN 0974-2239 Volume 4, Number 12 (2014), pp. 1211-1220

- [5]Deepiga, T, SivasankariA, "Smart Water Monitoring System Using Wireless Sensor Network at Home/Office",International Research Journal of Engineering and Technology, vol.02, no.04, July 2015
- [6]Retno Tri Wahyuni^{1*} Yusmar Palapa Wijaya² Dini Nurmalasari "Design of Wireless Sensor Network for Drainage.
- [7]Wirawam, S., Pratoma, I., and Mita, Nagahisa. "Design of Low Cost Wireless Sensor Network-Based Environmental Monitoring System for Developing Country".Proceedings of APCC2008
- [8]Dr. Gunasekaran M,Pavithra S,Priyanka R,Reeva M "IoT enables Underground Drainage Monitroing System using Water Flow Sensor" May 2019
- [9] Prof S. A. Shaikh¹, Suvarna A. Sonawane², "Monitoring Smart City Application Using Node MCU on IOT" International Journal of Innovative science, Engineering and Technology, Vol 5Issue VII,July 2017.
- [10] Prof Muragesh SK¹, Santhosha Rao²,"Automated Internet of Things for Underground Drainage and Manhole Monitoring systems for Metropolitan Cities."International Journal of Innovative Science, Engineering & Technology, Vol. 2 june 4, june 2015.
- [11] Lazarescu, M. T., "Design of a WSN Platform for Long-Term Environment Monitoring for IoT Applications, "Emerging and Selected Topics in Circuits and system, IEEE journal on, vol 3, no.1,pp.45,54, March 2013.
- [12]T.Leppanen, Harjula, E., Ylianttila, M., Ojala, T.,,and Yang, L. T. (2013)."Cloud things: A common architecture for integrating the internet of things with cloud computing." Proceeding of the 2013 IEEE 17th International conference on computer supported cooperative work in design (CSCWD), 651-657(june).
- [13] Manna, s., Bhunia, S. S., and Mukherjee, N. (2014)."Vehicular pollution monitoring using iot" International Conference on Recent Advances and Innovation in Engineering(ICRAIE-2014), 1-5(May).
- 10.ZainalHishamCheSoh, MohamadAzeer Al-HamiHusa, SyahrulAfzalChe Abdullah, MohdAffandiShafie, "Smart Waste Collection Monitoring and Alert System via IoT",

2019

IEEE 9th Symposium on Computer Applications & Industrial Electronics (ISCAIE), June 2019.

[14]Saravanan M, Aramudhan M, Pandiyan SS, Avudaiappan T. Priority based prediction

mechanism for ranking providers in federated cloud architecture. Cluster Computing. 2019 Jul;22(4):9815-23.

[15]Avudaiappan, T., Balasubramanian, R., Pandiyan, S. S., Saravanan, M., Lakshmanaprabu, S. K., & Shankar, K. (2018). Medical image security using dual encryption with oppositional based optimization algorithm. Journal of medical systems, 42(11), 208.

[16]Sivakumar M, Reddy US. Aspect based sentiment analysis of students opinion using

machine learning techniques. In2017 International Conference on Inventive Computing and Informatics (ICICI) 2017 Nov 23 (pp. 726-731). IEEE.

[17]Mallikarjunan KN, Shalinie SM, Sundarakantham K, Aarthi M. Evaluation of security metrics for system security analysis. InComputational Intelligence: Theories, Applications and Future Directions-Volume I 2019 (pp. 187-197). Springer, Singapore.

[18]Mihai T. Lazarescu, "Design of a WSN Platform for Long-Term Environmental Monitoring for IoT Emerging And Selected Topics In Circuits And Systems, Vol. 3, No. 1, March 2013 Applications", Ieee Journal

[19]Lazarescu, M.T., "Design of a WSN Platform for LongTerm Environmental Monitoring for IoT Applications," Emerging and Selected Topics in Circuits and Systems, IEEE Journal on , vol.3, no.1, pp.45,54, March 2013

[20]Kelly, S.D.T.; Suryadevara, N.K.; Mukhopadhyay, S.C., "Towards the Implementation of

IoT for Environmental Condition Monitoring in Homes," Sensors Journal, IEEE, vol.13, no.10, pp.3846, 3853, Oct. 2013.

[21] I. Akyildiz, W. Su, Y. Sankarasubramanian, E. Cayirci, "A Survey on Sensor Networks",

IEEE Communications Magazines, August 2002.

[22] A. OzanBicen and Ozgur B. Akan and V. CagriGungor, "Spectrum-Aware and Cognitive Sensor Networks for Smart Grid Applications," IEEE Communications Magazine, No. 5pp. 158-165. 2012

[23] J. Guevara, F. Barrero, E. Vargas, J. Becerra, S. Toral, "Environmental wireless sensor

network for road traffic applications," IET Intell. Transp. Syst., Vol. 6, Iss. 2, pp. 177–186, 2012

[24] M. T. Lazarescu, "Design of a WSN platform for longterm environmental monitoring for IoT Applications," IEEE JournalEmerging and Selected Topics in Circuits and System, vol.

3, No. 1, pp.45-54, 2013.

[25]Arshiya Khan, AjitkumarKhachane, "Survey on IOT in Waste Management System", 2018 2nd International Conference on ISMAC (IoT in Social, Mobile, Analytics and Cloud) (I-SMAC) ISMAC (IoT in Social, Mobile, Analytics and Cloud) (I-SMAC), 2018 2nd International Conference on, February 2019.

[26]Dung D. Vu, Georges Kaddoum, "A Waste City Management System for Smart Cities Applications", 2017 Advances in Wireless and Optical Communications (RTUWO),

December 2017.

[27]ZainalHishamCheSoh, MohamadAzeer Al-HamiHusa, SyahrulAfzalChe Abdullah, MohdAffandiShafie, "Smart Waste Collection Monitoring and Alert System via IoT", 2019 IEEE 9th Symposium on Computer Applications & Industrial Electronics (ISCAIE), June 2019.

[28]Brown, Eric (13 September 2016)." Who need the Internet of things", Linux.com Retrieved 23 October 2016

[29]Wemer-Allen, G., Johnson, J., Ruize, M., Less, J., and Welsh, Matt "Monitoring Volcanic Eruptions with a Wireless sensor Network. (ISSN: 2321 – 5658) Volume 01– Issue 04, December 2013 Asian Online Journals

- [30] Chao-Tsun Chang, Chih-Yung Chang, Ramon Dario Borja Martinez, Po-Ting Chen &Yen-Da, "An IoT Multi-Interface Gateway for Building a Smart Space", Open Journal of Social Sciences, vol.3, pp. 56-60 , July 2015.
- [31] Christeena Joseph, Kishoreraja C, Reji & Radhika Baskar, "Design of Wireless Sensor Network Gateway for the Internet of Things", International Journal of Pure and Applied Mathematics, vol.117, No. 9, 2017.
- [32] Hari Sudhan R, Ganesh Kumar M, Udhaya Prakash S, Anu Roopa S & Sathiya, "ARDUINO ATMEGA-328 MICROCONTROLLER", International Journal of Innovative Research in Electrical, Electronics, Instrumentation and Control Engineering, vol. 3, Issue 4, April 2015.
- [33] Nivedhitha.G, T. Sujithra, Aksheya Suresh, Bhavadharani, Automation of Parcel Delivery Collection using IoT – Smart Freight Box. International Journal of Civil Engineering and Technology, 8(9), 2017, pp. 966–972.
- [34] Raghavendran G, Elanchezhian R, K. Rajesh, S. Palanivel, Bus Track using IoT and Prediction Logic, International Journal of Mechanical Engineering and Technology 8(10), 2017, pp. 93 – 100.
- [35] Uma Maheswari, S. Shoba Rani, D. Divakara Reddy, B. Lakshmi, E - Bazaar Innovation Using IoT Device in Cloud Subscription Management. International Journal of Civil Engineering and Technology, 8(8), 2017, pp. 1155 – 1158
- [36]Kolsky P, "Storm drainage an intermediate guide to the low-cost evaluation of system performance", Intermediate Technology Publications, London ,1998.
- [37]PillaiSC & Subrahmanyam, "Role of Protozoa in the Aerobic Purification of Sewages", Nature International Journal of Science, vol. 154, pp. 179-180, 1944.
- [38]Karyne M & RogersMarine, "Stable carbon and nitrogen isotope signatures indicate recovery of marine biota from sewage pollution at Moa Point, New Zealand ", Pollution Bulletin, Elsevier Journal, Volume 46, Issue 7, July 2003, PP 821-827.

- [39]Wahyuni, Yusmar Palapa Wijaya, Dini Nurmalasari & Politeknik Caltex Riau, “Design of Wireless Sensor Network for Drainage Monitoring System”, Tri Innovative Systems Design and Engineering, vol.5, no.5, 2014.
- [40]Hussein A. Obaid , Shamsuddin Shahid, K.N. Basim & Chelliapan Shreeshivadasan , Modeling Sewage Overflow in an Urban Residential Area using Storm Water Management Model”, Malaysian Journal of Civil Engineering, vol. 26, no. 2, pp.163-171,2014.
- [41]Fujitsu, “Develops Technology for Low-Cost Detection of Potential Sewege System Overflows”, Kawasaki, Japan, February 10, 2015
- [42]Deepiga, T, Sivasankari A, “Smart Water Monitoring System Using Wireless Sensor Network at Home/Office”, International Research Journal of Engineering and Technology (IRJET), vol. 02, no. 04, July-2015.
- [43]Anap SD , Dengale Rani V, Ghule Suvarna U , Jadhav Shradha B, “ Wireless Based Water Level Monitoring and Control System of Electronics”, International Advanced Research Journal in Science, Engineering and Technology, vol. 3, Issue 4, April 2016.
- [44]Lei Li, Fenglian Cao & Zheng Li, “Water Level Intelligent System of Data Acquisition and Early Warning”, Indonesian Journal of Electrical Engineering, vol.12, No.6, pp. 4671- 4678, June 2014.
- [45] Priti Maheshwary & Timothy Malchel, “Australia Internet of Things (IoT) based Water Level Monitoring System for Smart Village”, ,AISECT University, Bhopal, MP, India
- [46]Akhila C, Kowshik , Keerthana M & H.Shrinivas, “Implementation of IoT Based Sewage Water Purity Indicator”, International Research Journal of Engineering and Technology (IRJET), vol. 04, Issue. 05, May 2017.

