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Urban underground drainage monitoring system using IoT

D. Deepak Kumar

dupatideepakkumar1159@gmail.com

Sreenidhi Institute of Science and Technology (SNIST),
Hyderabad, Telangana

R. Bhavya

bhavyarangu333@gmail.com

Sreenidhi Institute of Science and Technology (SNIST),
Hyderabad, Telangana

N. Indrajith

indrajithn17@gmail.com

Sreenidhi Institute of Science and Technology (SNIST),
Hyderabad, Telangana

Dr. V. Jayaprakasan

jprakasan@gmail.com

Sreenidhi Institute of Science and Technology (SNIST),
Hyderabad, Telangana

ABSTRACT

The additional volume of waste water entering the pipes, can cause backups which can lead to the sewer system to overflow. The Monitoring of urban underground infrastructure, it is important to control the current flow from the external water is in the pipe line. By wireless to connect underground communication, and sensor solutions, you can follow the development of the urban underground IoT applications, such as for the monitoring of wastewater and stormwater overflow in real-time with the help of Flow sensors with respect to Arduino and NodeMCU. This paper presents an analysis of the loss of a wireless underground utility services in the urban underground IoT for waste water monitoring and control. It is shown that the communication range is 4 km away and can be reached from an underground channel of communication by means of a 10 cm-thick layer of asphalt. The urban waste water and is responsible for the collection and the treatment of wastewater in the waste water treatment plants, treatment of the many millions of litres of water per day. Cities and towns in the need for the monitoring of the quantity and quality of wastewater discharged into the system the collection and the achievement of these structures. The volume of water in the pipes and could cause back-ups, which in turn can lead to sewer overflows.

Keywords: Drainage and Sewage Monitoring System, Node MCU, Arduino

1. INTRODUCTION

The underground drainage system is an important component of the urban infrastructure. It is considered to be the lifeline from the city centre. The majority of the executive board, through the tunnel, the drainage is in the manual, so it is not very efficient in order to have a clean and smooth surface and underground system in the large cities, with the government's people find it hard to get the exact manhole, that is the problem. Most of the cities and towns which have adopted an underground sewer system, and it is the responsibility of the station manager, and the carrier-to-maintain the location of the towns and cities. If the drain is used improperly, water will pollute the water and infectious disease and can spread it. The Drainage is blocked during the rainy season this will lead to problems in everyday life, for example, the traffic may be blocked, and the environment will be polluted, and this is totally going wrong in the society. If the object is in the city of The company's management station that the government officials will learn about it immediately after the drain is blocked, in the field, and in what position it is locked. Therefore, it is necessary to develop a system that you can support the underground drainage, the 3-without the need of human intervention. Underground drainage and contains a plumbing, gas pipeline networks, water pipes, and manholes. This project describes the functions that can be used to support and follow-up of the underground sewers. This results in a system of that is, it is in order to check the level of the water. If the drains become clogged, and the water is starting to run out of the room, it can be detected with the aid of the sensor system. And for this, the sensor sends the information to the sensor, which is located in their this area, with its control station. The present drainage system is a high-tech applications. So, every time it's busy, it's difficult to determine the exact location of the castle. In addition, there are no early warnings about the blocks. Therefore, the detection and removal of a lock at the time. It will be very difficult for you to deal with the situation when your tubes are completely blocked. Because of such a failure in one of the drains, cable, people are facing a lot of problems. Clean cities, towns, and intelligent drainage management in the city. The determination of the waste water level, and the drain is clogged. A constant control of the water flow rate, as well as sending an automated e-mail, and display it on the monitor, when the water level is outside of the expected normal range. The main goal is to provide an efficient, low-cost, and flexible the solution for the monitoring and management of the infrastructure of the city.

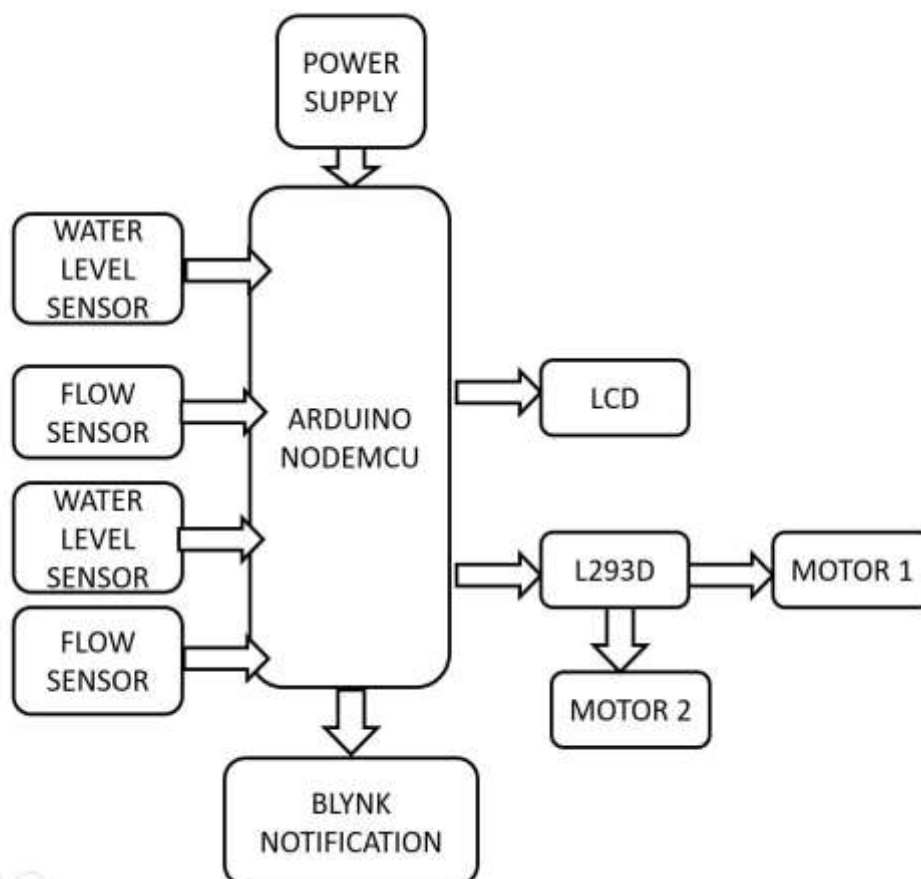
2. LITERATURE REVIEW

Naveen G Haswani , Pramod J. Deore ; the Drainage is in a retrieval system, or process in which water, waste water, or other the liquids can be connected from any location, and in order to maintain the normal drainage of the function, its condition must be checked at a regular interval. However, it is very difficult to manually control the whole of the region in which a person is not able to achieve it. This has an impact on the clogging underground pipe lines, water and transfers it to life. In order to alleviate all of these problems have, right here we have designed and implemented the system using a wireless sensor network. It is composed of small pieces of equipment that can be used to the collection of information. These are the devices that are sensitive to the so-called nodes, and devices. The proposed low-value system, and has a smaller capacity, high durability and it is a real-time system, the updates to the city in the official text message, as when a manhole, cross using a cut-off . This system has a direct impact on the health of the problems of the citizens, and for the work that was the underground drainage. - Effective mitigation of direct and indirect lightning discharges and is a very important aspect of the safe operation of a mining enterprise. A systematic protection plan can be carried out with respect to the easy above-ground actions, in underground mining, the situation is more complex. In addition, the underground mines are of an even more serious problem, due to the risk of methane is burned. In this article the most important variables as well as the transmission mechanisms, which are related to the underground workings, and a few of the examples the calculations have been carried out to quantify the risk of a blockage can cause, in the underground coal mines. The most important factors that is, increasing the risk of lightning strikes is removed in underground mining operations are identified, mitigation options have been identified, and the a practical mitigation strategy that can be used for gas drainage, the activities described.

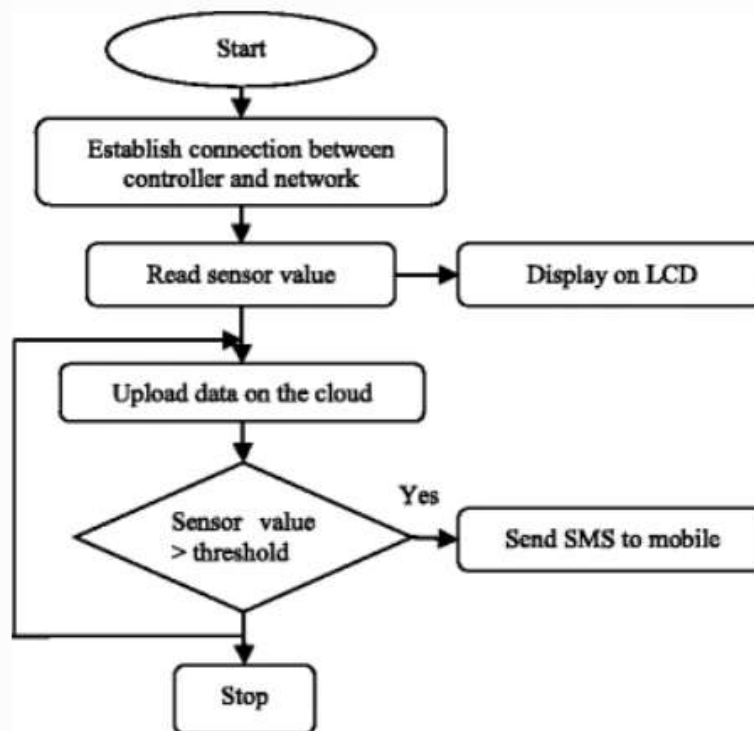
3. OBJECTIVE

Our main objective is to establish Resident and Urban People assisting features for the helpful aid of their Civilization . The main requisites for these are to establish a connection between the NodeMCU as well as to detect the sign and Flow sensing unit .Also establishing alerting feature for prevention of blockage and Malfunctioning of Waterflow. Our bot is a combination of all these factors Working together. We will now use a process MQTT protocol to create a message Queueing in orderly to notify plumbers and working staffs to involve with the fixtures of errors in system. MQTT involves storing the information obtained and using that information to solve and proceed with the reading of protocol. This program will train the SQL to tranceive the data and work setting protocol . IoT consists of networks of sensors attached to objects and communication devices providing data that can be analysis and used to propagate automated actions IoT came into existence because, without human need computers were able to access data from objects and but it was aimed to complement the human entered dataset as a limiting factor, and to achieve cost, accuracy and generality factors.WSN is a key enabler for IoT paradigm and Our aim is to monitor an underground drainage and manhole monitoring system The system is with major considerations of this design are low cost, low maintenance, fast deployment, and high number of sensors, long lifetime and accurate results

4. BLOCK DIAGRAM



5. FLOW CHART



6. HARDWARE AND SOFTWARE

WIFI Module

The technology is an alternative to wired technologies, which are often used to connect devices wirelessly. Wi-Fi refers to the IEEE 802.11 b wireless standard for the wireless network . The Wi-Fi network connect computers to the Internet via a wi-fi network. Wi-Fi access point that is created by setting up an Internet access point. The access point acts as a base station. When a Wi-Fi enabled device encounters an access point, can connect to the wireless network . The access point can support up to 30 users and can be used in the range of 100 to 150 feet indoors and 300 feet outdoors. Many access points can be connected to each other with the help of the Ethernet cable to create a large-scale network.



L293D Motor driver

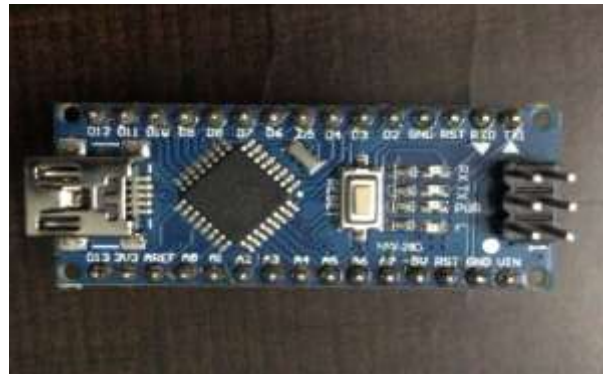
Working: It has a 4-contact areas for the L293D, get in touch with us 2.7 on the left, and the 15-pin ,10 to the right, as shown in the contact graph. To the left is the input to the pins to fit the rotational SPEED of the engine is connected to the left-hand side and the right-hand side of the engine-in the right-hand side. The motors are rotated based on the areas that are on the input pins, in the form of a LOGIC 0 or a LOGIC 1. In the simple case, you will need to have the logic 0 or 1 is the input pin for the engine to turn over.

Definition: The L293D IC is typically a standard 16-pin DIP (dual in-line package). IC motor driver that is in use at the same time, the control of two small motors, in either direction, forwards or backwards, but only using the 4 pins of the microcontroller, And make sure that Enable pin is logic 1



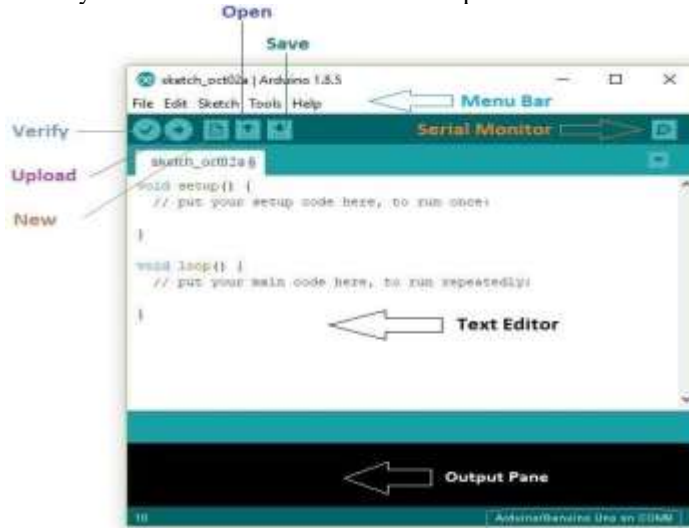
Arduino Nano Microcontoller ATMEGA 328

The Arduino / Genuino Uno is an ATmega328P based microcontroller board. It has 14 digital input /output ports (of which 6 can be used as PWM outputs), 6 Analog inputs, a 16 MHz quartz crystal, a USB port, a power jack, an ICSP header. It has everything you need to support your microcontroller; simply connect it to your computer with a USB cable, or to put it in with a AC-to-DC adapter or battery pack to get you started, you can play it with your UNO without worrying too much about what you're doing wrong, in the worst case scenario, you can replace the chip for a few dollars and start over again.



Arduino IDE

Arduino Integrated Development Environment (IDE) is a cross-platform application (for Windows, Mac OS, Linux) written with functions from C and C ++. It is used to record and upload programs to respected Arduino boards, but also, with the help of third-party cores, other vendor development boards. The IDE source code is issued under the GNU General Public License, version 2. Arduino IDE supports languages C and C ++ using special code editing rules. Arduino IDE provides a software library from the Wiring project, which provides many common installation and removal processes.



LCD Display

A liquid crystal display (LCD) is a thin, flat electronic visual display that uses the light-modulating properties of liquid crystals. A liquid crystal display, it is a very important device in an integrated system. The hotel offers a high degree of flexibility for the user as they can on the screen with the required information. They are used in a wide range of applications, including computer monitors, satellite, displays, aircraft, instrument panels, cockpit displays, signage, etc., etc.



Power supply

The power supply system has an input of AC and DC, as well as for our calls, and a DC output. This DC output is used for the power of the electronic components.

The input signal can be supplied from a 240 V, 50 Hz or DC current from a battery to a car (or a bus power from an existing circuit).

Flow Sensor

The Flow sensor constitute of a valve which is of plastic type from which water can pass. A water rotor along with a hall effect sensor is present and able to sense and measure the flow of the water. When water flows through it rotates the rotor. Hence, we can conclude the change in the speed of the motor.



Water Level Sensor

The level sensors are used to monitor and control the concentration of the active circulation of the materials in a confined space. These are substances that are generally smooth, but the level of the sensor can also be used for the monitoring of certain substances, such as powdered substances. The level sensor is widely used in the industry. A car's brake fluid sensors and to control various liquids, including fuels, oils, and other times there are special fluids, including power steering fluid. They can also be found in the field of industrial liquid storage tanks, and household appliances such as coffee-makers. Basic-level sensors are used to detect where the liquid level drops below the minimum level, or rises above the maximum level. A lot of sensors in detail, and a certain amount of liquid in a container, with respect to the minimum or maximum levels, to ensure a constant volume test.



Motor

The Function of an electric motor is based on simple electromagnetism. A current-carrying conductor creates a magnetic force in an external magnetism, a force which is directly proportional to the current in the conductor and to the strength of the magnetic field. Each motor consists of six main parts: the rotor and the shaft (armature), stator winding, the collector, magnets, and brushes. Many of the most popular engines, and an external magnetic field to create high-strength permanent magnets.



BLYNK Application

Blynk was designed for the Internet of Things. The remote control of equipment, and display data from sensors, the storage of the data, visualize it, and do many other interesting things.

The platform has three main components, For the Blynk app that allows you to create amazing user interface for your project by using a variety of widgets. Blynk server and is responsible for all the communications between the smartphone and the hardware. You can also take advantage of our blynk cloud or run your private blynk server locally. The open-source code

easy to handle thousands of devices, and it can even run on a raspberry pi. You need to have the Blynk library for all popular platforms to communicate with the server, and to process all of the inbound and outbound orders.



7. EXPERIMENTAL RESULT



8. ALGORITHM

Introduced with Our system, The proposed system has the following features.

1. Determine the specific discharge, where the block occurs.
2. Instant lock-out details.
3. It is a system that regulates the flow rate of the waste water out of the pipes.
4. The use of flow sensors to detect changes in the flow rate.
5. You will receive prior notice of the checkpoint, and you can find them with the help of IOT.

9. EXPERIMENTAL RESULTS AND CONCLUSION

Results

The project consists of an driver assisting features which is dependent of a human but takes his commands as an input.. While on the way, to overcome obstacles it uses ultrasonic sensors placed at a right angle to the bot. And the other two aligning at 25 degrees sideways, if the middle sensor detects the an obstacle it the car stops there itself, if the side sensors detect the obstacle the car turns to the other side and moves on, these movements are pre-programmed. To follow rules at traffic signs we used image processing that detects boards using Raspberry Pi and camera. To mobility of the car L298N motor driver is used for all the four side shaft motors. All these are interfaced by Arduino MEGA, Raspberry Pi and Raspberry Pi camera.

Future Enhancements

The Sensor networks can be considered as a major contributing factor to the development of the Internet of Things paradigm. However, as a result of the increasing range of applications it's getting harder and harder in order to define common requirements for the WSN-locations and platforms. This project aims to solve all automation tasks. The Internet of Things for Underground water Drainage of the stages in the practical development of underground drainage and monitoring system (UDMS), the use of the " application of Internet of Things in the city. As a point of reference for the guide, and then select the program for which you are using the app. Aspects of the sensor network, a platform can be seen as a platform to structure, flexibility and re-usability, the sensor node optimization, optimization, communication, connection, and the node is in the solving of problems, and the high availability of the service, in any the levels of application, server reliability, and interact with the IoT applications. This is a project that can be used to provide the service specification the optimization and development of a sensor-network-platforms-for other kinds of applications.

10. CONCLUSION

Monitoring of surface water drainage is a complex task. Various the methods used for monitoring and control of an underground sewage system for this project. It explains the various uses, such as subsurface drainage, as well as real-time, manhole identification. A number of parameters such as water consumption, and the water level can be controlled updated online by using the Internet of Things. This could be the responsible person will need to take the necessary action against the same person. With the help of this design, we can reduce the cost on the human time and energy in order to check the sewer, and underground drainage pipe and avoid the hazards involved. If the responsible person does not have to have a smartphone in order to access the app blynk or may not be able to check e-mail frequently, we will send you a notification via TEXT message notice, however, we have not yet added to it, the SMS module to the project, Sensory networks are seen as an activator of the words to be the paradigm IOT. This article explains all about it an intelligent, real-time, drainage and monitoring system with the help of an IoT application in a large urban area. With a variety of sensors, such as gas detection, the water-level of detection and the lock-detection, we are able to control the whole of the sewer system in real-time to detect have a problem with the water drainage system. By doing so, we can have some action on the matter, if we are to we are going to receive early warnings of the block, as well as changes. This article may be used for the development of the property the effect of drainage and monitoring system as also, to solve the problems.

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