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Blynk Web App Based underground Drainage Monitoring System using GPRS and Wi-Fi Module

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ABSTRACT

India has blazoned a design of making 100 smart metropolises. As utmost of the metropolises in India have espoused underground drainage system, it's veritably important that this system should work in a proper manner to keep the megacity clean, safe and healthy. So different kind of work has been done to descry, maintain and manage these underground systems. The proposed system represents the perpetration and design functions for monitoring and managing underground drainage system with different approaches.

This project represents the implementation and design functions for monitoring and managing underground/road-sided drainage system with different approaches. It also gives a detail regarding the safety issues like gases which adversely affects to the workers, temperature details weather it is suitable for the workers or not and also blocking parts are present or not. If the level exceeds beyond threshold, it shall send an alert through the blynk web app. Additionally provide the information about the flow through the blynk web app itself. To obtain the desired output ultrasonic sensor, flow sensor, wifi module ESP8266, Arduino Uno and blynk web app are used in the proposed model. Ultrasonic Sensor will detects the specific drain where the blockage occurs and immediate information of the blockage to room.

Keywords: Arduino UNO,GPS ,wifi module Esp8266, Ultrasonic Sensor, Gas,Flow Sensor, Blynk app

1. INTRODUCTION

It also gives a description of water wise system and discovery system to descry blockage in drainage channel. Also, some part of condition standing model for underground- structure Sustainable Water Mains and Intelligent system for underground channel assessment, recuperation and operation are explained. Drainage is the natural or artificial junking of a face's water and sub-surface water from an area with excess of water. These are carriers which carry water from swash, aqueducts and lakes. So, the generally set up wastes are factory waste, plastics and some scums. Function of the drainage system is to collect, transport and dispose of the water through outlet. It's a large network which is to be maintained and covered duly. The underground drainage system is an important element of civic structure(1). It's considered to be megacity's lifeline utmost operation on underground drainage is homemade thus it isn't effective to have clean and working underground system also in similar big metropolises, it's delicate for the government labor force to detect the exact manhole which is facing the problem.(

2). Thus, it's essential to develop a system which can handle underground drainage without mortal intervention. Underground Drainage involves drainage system, gas channel network, water channel, and manholes.(3). It describes about colorful functions used for conservation and monitoring of underground drainage system. It provides a system which is suitable to cover the water position, atmospheric temperature, water inflow ,toxic gasses and poisonous feasts. If drainage system gets blocked and water overflows it can be linked by the detector system. And that detector sends information via the transmitter which is located in that area to the corresponding managing station. Without a proper drainage operation system, our society can be exposed to expansive damage to our lives(4). Some of the areas to be concerned grounded on top of profitable, social aspects for maintaining sustainability in the drainage design are the conditions of energy and control of odor. The stability of similar structure is getting affected for numerous decades in India which has given the in explainable goods on mortal and profitable costs related for the infrastructural enhancement(5). This project describes various functions used for maintenance and monitoring of underground and road-sided drainage system.If drainage system gets blocked and water overflows it can be identified by the sensor system. And machine starts moving in the forward direction and clean all the blocking part of the drainage. Trace location using GPS and send SMS through GSM.

2. EXISTING SYSTEM

Drainage condition is generally assessed using unrestricted- circuit LCD(CCTV) examinations. In being system, they combine examination results, pipe attributes, network data, and data on pipe terrain to prognosticate pipe condition and to discover which factors affect it. DISADVANTAGES CCTV examination isn't suitable for drainage clogging vaticination in India.

3. PROPOSED SYSTEM

The real- world data is collected from colorful detectors(water inflow detector, water position detector, rain detector, gas detector & moisture detector) this all data is in analog signal and converted to digital signal. The digital signal is fed to the regulator which according to the set threshold, chooses whether there is need of action from its end i.e. if the detector data suggest a possible blockage in the inflow of conduit. Since all the data is available on the garçon it could be used to dissect and conclude the overall trend and induce further visionary medium which would be period dependent piecemeal from reliance on real time data, for illustration during the month of thunderstorm, on base of once detail of rush, moisture and feasts quantum detail an automatic signal would be transferred to the regulator to insure that any probability of blockage in averted by early operation of pressure boosting pumps. In this proposed system consists of water inflow detector, water position detector, rain detector, gas(methane) detector as indicated in figure 1 had been designed for use in- the-field in a remote position to measure water inflow rate, water position, gas position & moisture in a working drainage. The detector values are fed to PIC Microcontroller, which is 8 – bit programmable microcontroller.

This design aims at developing an affordable independent drainage system using IoT and without mortal intervention. For proper operation of drainage system real time data prognosticating the position of sludge and water is veritably Important. Advanced runoff volume, with large impervious ground, exponential population growth with violent rain has overwhelmed the drainage system causing alluvion and blockage, this all could be avoided the data entered by the regulator would also be transmitted to the garçon through IoT wireless communication module. The database will store the detailed data of colorful physical and environmental factors entered from the detectors, which is further anatomized to find the beginning relationship between colorful factors to blockage which ultimately leads to flooding, using a direct retrogression model. Artificial Intelligence, IOT principles and with applicable analysis of detector data, a smart system could be used that would give real time information monitoring and reporting the data to megacity or concerning authority. This will help homemade drain examination and enables immediate response without mortal intervention or detention. All the factors are attached to the manhole cover with the estimation similar that each part is suitable to perform its task rightly. The detector data would be collected to check 1. Blockage in the pipes. 2. Whether the feasts position

have risen to dangerous position. 3. Whether the water position has risen to dangerous situations. The regulator could be supplied with power either through battery or solar panel. The database part of the system will use Geographical Information System, It contains three types of data . Digital Map It includes the topographical chart of the megacity with drainage lines indicated. 2. Tabular Data This would include the knot(manhole) wise details of detector data collected, which would be used for data analysis .

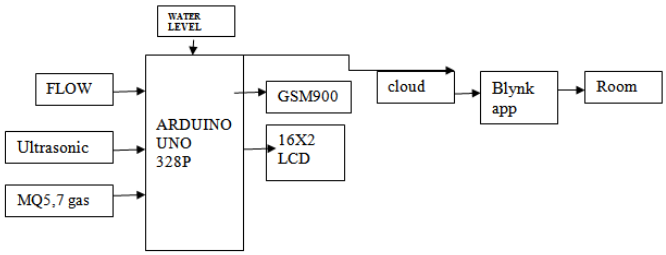

Fig1. Drainage monitoring system.

4. HARDWARE REQUIREMENTS

FLOW DETECTOR YFS201

Water inflow detector consists of a plastic stopcock body, a water rotor, and a hall- effect detector. When water flows through the rotor, rotor rolls. Its speed changes with a different rate of inflow. The hall- effect detector labors the corresponding palpitation signal. This bone is suitable to descry inflow in water dispenser or coffee machine. Features • Compact, Easy to Install • High Sealing Performance • High Quality Hall Effect Sensor • RoHS biddable position Detector position detectors descry the position of liquids and other fluids and fluidized solids, including slurries, grainy accoutrements , and greasepaint that parade an upper free face. Substances that flow come basically vertical in their holders(or other physical boundaries) because of graveness whereas utmost bulk solids pile at an angle of repose to a peak.

LEVEL SENSOR

Level sensors detect the level of liquids and other fluids and fluidized solids, including slurries, granular materials, and powder that exhibit an upper free surface. Substances that flow become essentially horizontal in their containers (or other physical boundaries) because of gravity whereas most bulk solids pile at an angle of repose to a peak.

LCD 16X2

LCD stands for Liquid Crystal Display. LCD is chancing wide spread use replacing LEDs(seven member LEDs or other multi member LEDs) because of the following reasons 1. The declining prices of LCDs. 2. The capability to display figures, characters and plates. This is in discrepancy to LEDs, which are limited to figures and a many characters.

ARDUINO UNO

The Arduino Uno is an open-source microcontroller board based on the microchip ATmega328P microcontroller. the board is equipped with sets of digital and analog input/output (I/O) pins that may be interfaced to various weable sensor /module . These circuit will be powered by the USB cable or by an external 9-volt battery, though it accepts voltages between 7 and 20 volts.

GAS Detector :

MQ 4- detects the presence of methane gas in the drainage. This semiconductor gas detector detects the presence of methane gas at attention from 300 ppm to 10,000 ppm. MQ 4-detects the presence of methane gas in the drainage. This semiconductor gas sensor detects the presence of methane gas at concentrations from 300 ppm to 10,000 ppm.

GSM MODULE 900

GSM Module is the module that supports communication in 900 MHz band. We're from India and utmost of the mobile network providers in this country operate in the 900 MHzband.However, you have to check the mobile network band in your area, If you're from another country. A maturity of United States mobile networks operate in 850 MHz bands(the band is either 850 MHz or 1900 MHz). Canada operates primarily in 1900 MHz band.

Wi- Fi module:

An ESP8266 Wi- Fi module is used for internet connectivity which sends the parking lot's data to a cloud where general public can view the data in real time. A power force module is employed which provides 5V and 3.3 V for Arduino, Ultrasonic detectors and ESP8266 Wi- Fi Module.

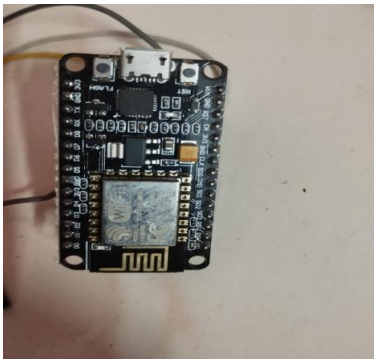

Fig. 1 Wi-Fi module

Ultrasonic Sensor: HC-SR04

An Ultrasonic Sensor is used to descry and avoid the obstacles comes in front of the robot. It's connected in the receiver side. Ultrasonic detector is used measure the distance within a wide range of 2 cm to 400 cm. The Ultrasonic transmitter transmits a surge, this surge peregrination in a Ultrasonic and when it gets expostulated by any material. There are three Ultrasonic detectors for detecting 3 vehicles on the parking spot, we're using Ultrasonic detectors rather of IR grounded detectors because if the parking lot is positioned outside, infrared light from sun may intrude with IR detectors and may give incorrect discovery of the vehicle, whereas Ultrasonic detector acts like a mini radar and environmental factors affecting its functionality is minimum .

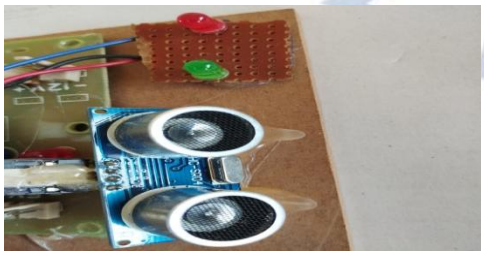

Fig. 2 Ultrasonic sensor

Blynk app:

Blynk was set up for the IOT. It can remotely track devices, display sensor data, store data, simulate and do a lot of other cool things. There are three major components on the platform

1. Blynk App - Lets you to create stunning interfaces for your projects using the various widgets that we provide. 2. Blynk Server - Responsible for all interactions between smart phones and equipment. You may either use our Blynk Platform or operate your own Blynk server locally. It's open-source, can accommodate thousands of devices quickly, and can even be installed on a uno. Blynk Libraries - All common hardware platforms enable contact with the server and process both incoming and out coming commands. Connection to the cloud using Wi-Fi.

5. RESULT

Fig 2 When there is no

Water position W_F Water inflow G Gas Figure 2 When there's no blockage in the drainage pipe, there will be a smooth inflow of the drainage water. The water inflow detector will descry the Figure 3 When there's a blockage inside the drainage pipe, the water position will increase. But there won't be the water inflow. So either the inflow will drop or it'll come 0 and only the water position increases. water inflow and the position detector also measures the water position inside the pipe. 0 in the gas indicates there's no conformation of methane gas inside the drainage pipe. Fig5 After detecting the block, the communication is transferred to the advanced authority in megacity.

Fig 3 block detection in the pipe

Fig 5 After detecting the block, the message is sent to the higher authority inmunicipality.

6. CONCLUSION

Underground monitoring is grueling problem. The proposed idea gives different styles for monitoring and managing underground drainage system. It explains colorful operations like underground drainage and manhole identification in real time. colorful parameters like poisonous feasts, inflow and position of water are being covered and streamlined on the internet using the Internet of effects. This enables the person in- charge to take the necessary conduct regarding the same. In this way the gratuitous passages on the manholes are saved and can only be conducted as and when needed. Also, real time update on the internet helps in maintaining the chronicity in drainage check therefore avoiding the hazards. This system can be used to guide the specification, optimization, and development of detector network Platforms for other IoT operation discipline. Our project helps to reduce the problems of drainage system with the help of sensors like ultrasonic, gas and Temperature sensors. Our mechanism helps to notify the registered number, when the harmful gases are detected to gas sensor and level is detected by ultrasonic sensor, with help Wi-Fi module like NODE_MCU Arduino which is connected with the blink server. By this project the underground drainage system can be easily organized.

Conflict of interest statement

Authors declare that they do not have any conflict of interest.

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