Manhole and Sewage Snag Detection

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ABSTRACT—

Manhole and sewage detection is a system that detects the drainage water level and blockages in the drainage. If a drain is overflowing, this usually means that there is a blockage somewhere between the insides plumbing and the exterior deplete, or, an outside blockage from exterior flotsam and jetsam. Calling a plumbing proficient is the leading move to solve the issue. To minimize the manhole related problems will implement project to help and develop the government and society.

Its employments IoT to form the waste checking framework in a profoundly car by utilizing sensor for recognizing and sending alarms through GSM and GPS module to the specialists. This extend overcomes the demerits by recognizing seepage water blockage by introducing water stream rate sensors at the crossing point of nodes. When there is a blockage in a particular node, there is variation in the flow of drainage water which when cross the set value will display the alert in the managing station.

Keywords—GSM, GPS, IOT.

I. Introduction

An integral part of any drainage system is the access points into it when it comes to cleaning, clearing, and inspection. Metropolitan cities have adopted underground drainage system and the city's municipal corporation must maintain its cleanliness. If the sewage maintenance is not proper, ground water gets contaminated causing infectious diseases. Blockages in drains during monsoon season, causes problems in the routine of the public. Hence, there should be a facility in the city's corporation, which alerts the officials about blockages in sewers, their exact location[1].It mainly acknowledges in the field of alerting the people about the gas explosion, increase in the water level and the temperature level. It uses IoT to make the drainage monitoring system in a highly automotive by using sensor for detecting and sending alerts through GSM and GPS module to the authorities. This project overcomes the demerits by detecting drainage water blockage by installing water flow rate sensors at the intersection of nodes. When there is a blockage in a particular node, there is variation in the flow of drainage water which when cross

the set value will display the alert in the managing station. Also, other demerits are solved by detecting temperature variations inside the manhole and alerting the same to the managing station. Moreover, stream rate sensors are utilized to identify the over stream of the seepage water and cautioning the same to the overseeing station through programmed message[2]. Maintenance of manholes manually is monotonous and dangerous due to the poor environmental conditions inside so, the main focus of this project is to provide a system which monitors water level, atmospheric temperature,

water flow and toxic gases. In case sewage gets blocked and sewage water floods, it is detected by the sensors and message is sent to the metropolitan. It is, in this manner unsafe to go interior the sewer vents for review of its current state. To unravel all the issues related to underground sanitation, a inaccessible alert framework is essential for transmitting information collected by the sensors set interior the sewer vent to the overseeing station. This incorporates components such as controller, memory, handset and battery to supply power[3].

II. Methodology

1. Sensors such as flow sensors are interfaced with microcontroller Arduino Uno in order to make the system smart. When these spective sensors reach the threshold level, the indication of that respective value and sensor is being sent to the microcontroller. Furthermore, sends the signal from the manhole to the municipal corporation through GSM.

2. A flow meter works by measuring the amount of a liquid, gas, or steam flowing through or around the flow meter sensors. Flow meter provides the most accurate and repeatable flow measurements for a specific application, whether for process control, general research activities, or semiconductor processing.

3. A temperature sensor is a device that is designed to measure the degree of hotness or coolness in an object. The cooler the temperature, lesser will be the resistance, and vice-versa. Once the sensor reaches the threshold level, the indication of that respective value and sensor is sent to the microcontroller.
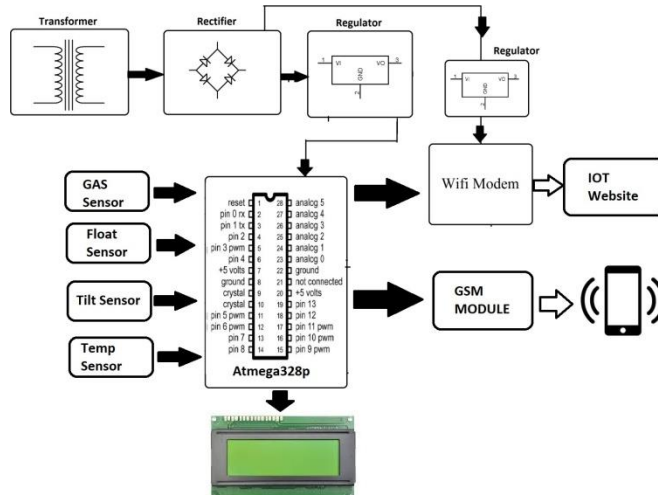

Fig 1: Block diagram of manhole and sewage snag detection

III. Components

Hardware Components

1. Atmega328

The Atmel 8-bit AVR RISC-based microcontroller combines 32 KB ISP flash memory with read-while-write capabilities, 1 KB EEPROM, 2 KB SRAM, 23 general-purpose I/O lines, 32 general-purpose working registers, 3 flexible timer/counters with compare modes, internal and external interrupts, serial programmable USART, a byte-oriented 2- wire serial interface, SPI serial port, 6-channel 10-bitA/D converter (8 channels in TQFP and QFN/MLF packages), programmable watchdog timer with internal oscillator, and 5 software-selectable power-saving modes. The device operates between 1.8 and 5.5 volts. The device achieves through-put approaching 1 MIPS/MHz

2. Temperature Sensor

the temperature sensor is an electronic device that measures the temperature of its environment and Converts the input data into electronic data to record monitor or signal temperature changes. There are many different types of temperature sensors. Here you can get a variety of Temperature & Humidity sensor which includes Digital Microcomputer Thermostat Switch, Humidity Controller Module, high-temperature resistance Probe, Moisture Sensor and many more modules.

3. Water level Sensor

Water level sensor are one of those unsung heroes of our modern world. They allow us to automate the flow of water to and from every part of our lives. The United States Government has put an incredible amount of research into the science of water level sensors to make sure that we can make the most of this powerful technology.

4. Gas Sensor

The Gas sensors can be used to gauge altitude in aircraft, rockets or balloons. They're frequently used in automotive design, from optimizing engine function and controlling emissions to monitoring pressures in tires and airbags, and even controlling inflatable air bolsters in dynamic seat

5. Tilt Sensor

The 12V power supplies (or 12V DC power supplies) are one of the most common power supplies in use today. Linear regulated 12V DC power supplies, regulate the output using a dissipative regulating circuit. They are extremely stable and have a very low ripple.

6. LCD

The term LCD stands for liquid crystal display. It is a kind of electronic show module utilized in an broad extend of applications like different circuits & gadgets like versatile phones, calculators, computers, TV sets, etc. These shows are basically favored for multi-segment light- radiating diodes and seven sections. The most benefits of utilizing this module are cheap; basically programmable, movements, and there are no confinements for showing custom characters, uncommon and indeed liveliness, etc.

7. Jumper Wires

Jump wire which is an electrical wire, or group of them in a cable, with a connector orpin at each end, which is normally used to interconnect the components of a breadboard or other prototype or test circuit, internally or with other equipment or components, without soldering.

8. GSM Module

Before we get into what a GSM module is, let us get our fundamentals right and understand what GSM and GPRS are. A GSM module or a GPRS module is a chip or circuit that will be used to establish communication between a mobile device or a computing machine and a GSM or GPRS system.

9. Wi-Fi Module

Wi-Fi Module is an integrated TCP/IP protocol stack with an independent SOC with that can give any microcontroller access to your Wi-Fi network. Each WIFI module comes pre-customized with an AT command set firmware, which means, you can basically attach this to your Arduino gadget and get about as much Wi-Fi-ability as a Wi-Fi Shield offers (and that is simply out of the case)! The WIFI module is a to a great degree savvy board with a tremendous, and consistently developing, group.

Software Components

Arduino IDE

The Arduino Integrated Development Environment (IDE) is a cross platform application that is written in the programming language Java. It is used to write and upload programs to Arduino compatible boards, but also, with the help of 3rd party cores, other vendor development boards. The Arduino IDE supports the languages C and C++ using special rules of code structuring. The Arduino IDE supplies a software library from the wiring project, which provides many common input and output procedures. User-written code only requires two basic functions, for starting the sketch and the main program loop, that are compiled and linked with a program stub main into an executable cyclic executive program with the GNU tool chain, also included with the IDE distribution. The Arduino IDE employs the program argued to convert the executable code into a text file in hexadecimal encoding that is loaded into the, Arduino board by a loader program in the board's firmware.

The Six Buttons appearing under the Menu tab are connected with the running program as follows.

1. The check mark appearing in the circular button is used to verify the code. Click this once you have written your code.
2. The bolt key will transfer and exchange the desired code to the Arduino board.
3. The dotted paper is used for creating a new file.
4. The upward arrow is used for accessing an existing Arduino project.
5. The downward arrow is used to store the current running code.
6. The button present on the top right corner is a Serial Monitor - A separate pop-up window that acts as an independent terminal and plays an important role for sending and receiving the Serial Data. Tools panel and select Serial Monitor can be done by using Ctrl+Shift+M all at once will open it instantly.

The Serial Monitor will help to debug the written, Sketches where can get a hold of how program is operated. Arduino Module should be connected to computer by USB cable in order to activate the Serial Monitor.

IV. Working Procedure

Connect the devices as per the flowchart gives the power supply to the hardware kit get activated sensors start detecting the respective sensing according to the temperature, gas, tilt motion, float and level.

Temperature, gas, level and tilt sensors starts detecting the temperature, gasses, water level, motion of the lidand senses, gives the alert for the GSM module which is connected to the mobile through GSM and gets a notification alert of temperature, gas, tilt, overflow detected.

From sensors, microcontroller receives the input and sensor exceeds range value set to 1 to the respective sensing sensors, output is displayed on the lcd and microcontroller restarts the procedure.
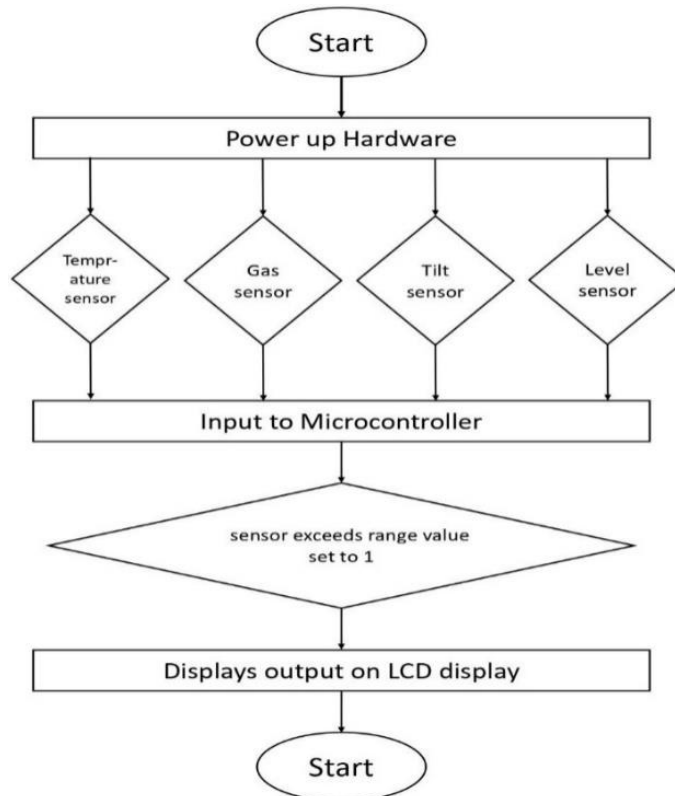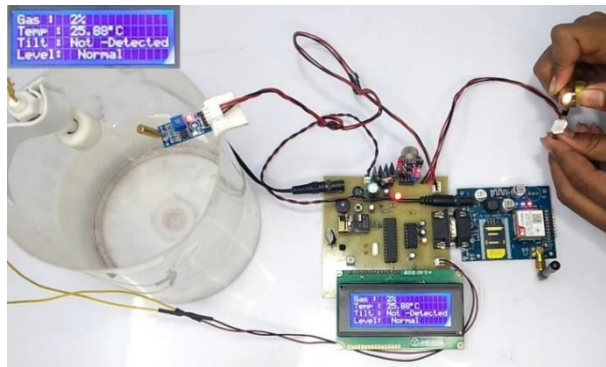
Fig2: Program flow

V. RESULT
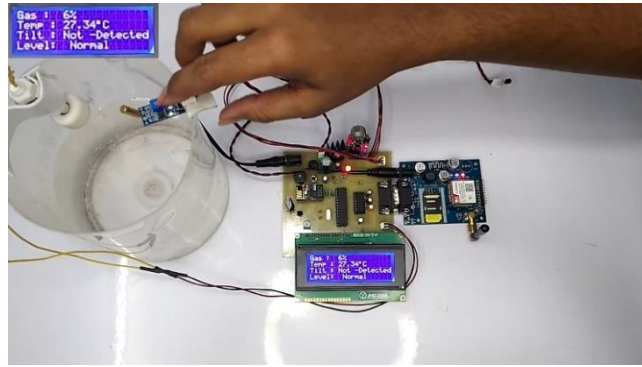

Fig 3: Temperature alert

Fig 4: Gas alert
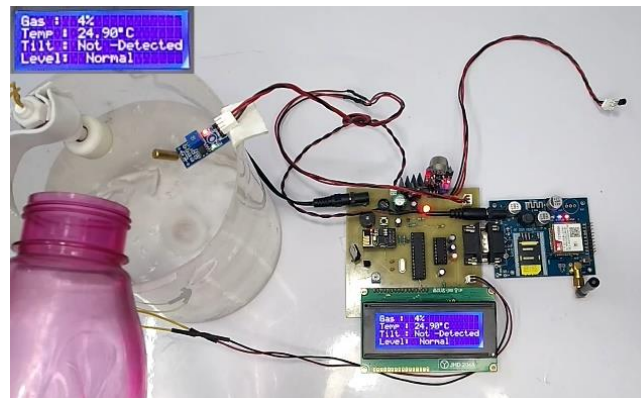
Fig 5: Tilt alert

Fig 6: Overflow alert

VI. Conclusion

Sensors detect the temperature, overflow of sewage, tilt of the lid, gasses released from the sewage and send an alert message to the registered contacts connected through the Wi-Fi module in which notification is received like temperature alert, tilt alert, overflow alert, gaseous discharge alert. Then the department of municipal come for the cleaning or checking of the respective sensor alerts. In this way the situation is predicted by the usage of sensors in identifying and analyzing the problem by the module of manhole and sewage snag detection.

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