

Iot Based Gully Pot Monitoring System Using Gsm

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Abstract: *In recent busy world, technology has taken the lead in each and every field and shown advancements. There are many technology improvements due to the advent of sensors and Internet of Things. In spite of these drastic developments, people face some challenges in their daily life. One such problem prevailing is sewer and gully blockages in residential areas. These blockages will lead to sewer flooding into residence leading to pollution and causes epidemic diseases. An energy and cost effective IoT based can be designed for regular monitoring of gully pots and providing intimation to concerned authorities to prevent sewage leakage into a residential areas. This system can also be used escalating unusual liquid levels during storms or cyclones by sending an alarm to the corresponding officials.*

Keywords: GSM Module, Microcontroller, Water sensor, SMS, Gully pot

1. INTRODUCTION

The Internet of Things (IoT) is the collection of things that may be real life objects, machines or humans uniquely identified in the network to share information through the communication devices to provide an automated actions based on the data sensed by the things. IoT came into existence because, without human interaction computers were able to access data from objects and devices, but it was aimed at, to overcome the limiting factors of human entered data, and to achieve cost, accuracy and generality factors. Sensor Network is a key enabler for IoT paradigm. This paper represents the implementation and design function of Gully Pot Monitoring System (GPMS) for IoT applications. The vital considerations of this design are low cost, low maintenance, fast deployment, and high number of sensors, long life-time and provide better Quality of Service (QoS). The proposed model provides a system of monitoring the liquid level inside a gully pot and to check whether there is an unusual level. In real time, GPMS can remotely monitor current states of the gully pot.

Most of the cities adopted the underground drainage system and it is the duty of managing station to maintain cleanliness of the cities. If the drainage maintenance is not proper the pure water gets contaminated with drainage water and infectious diseases may get spread. The sewage canal may be blocked during rainy season, and create problem for routine life such as traffic may get jammed, the environment becomes dirty, and totally the environment becomes unhealthy. The system provides an efficient mechanism for early detection of blockage and

communicating officials regarding this to clear the blockage immediately. The proposed system gully pot monitoring system uses sensors to sense the water level and send message to the officials whenever there is an overflow.

RELATED WORK

This section describes some previous works related to the monitoring system using GSM network services. The work presented by [1] has developed a Prepaid Water Meter System for prepaid billing of water consumption through remote monitoring without any human intervention. This system promises fast and accurate billing of water as well as preventing any misuse of it. However, [2] developed a water meter reading using GSM network that suitable for remote places to monitor the water meter reading before any billing process. This could reduce the use of human resource for reading the meter and issuing a bill. There was also a work on monitoring of electrical meter reading using GSM network done by [3]. The system was capable of monitoring the meter reading and sent an SMS to the authorized centre for billing purpose. This could reduce the number of estimated reading when the authorize person unable to reach the meter. Janaki et al [4] proposed IoT based garbage monitoring and clearance system that maintains smartbins across the location which shall send SMS through GSM technology. Another work presented by [5] using wireless text messaging system to send early warning SMS messages to users advising them to proactively reduce their power consumption before system capacity is reached and systematic power shutdown takes place. This could increase cost-effective wireless distributed load shedding system for non-emergency scenarios. In smart home application, the work presented by [6] was a design on a system to control home appliance remotely and provide security when the owner is away from the place. The similar work presented by [7] [8] which designed and developed a smart home application system. The system allows the homeowner to be able to monitor and control the house appliances via a mobile phone set by sending commands in the form of SMS messages and receiving the appliances status.

AREA OF STUDY

Coimbatore, called as the Manchester of Tamil Nadu is an industrial hub and the second largest city of Tamil Nadu State. The city is an emerging hub for information technology and automobile industries. Coimbatore has a pleasant climate throughout the year due to western ghats. The city is situated at a center point connecting three states, Kerala and Karnataka with Tamil Nadu through three national highways. Coimbatore is the home of 2.3 million habitants. Coimbatore surrounded by Western Ghats enjoys south west monsoon during the months of august to October. Coimbatore, shown in Fig 1, is located on the banks of the Noyyal River surrounded by the Western Ghats, it is the second largest city in the state after Chennai and 16th largest urban agglomeration in India.



Fig 1. Coimbatore Map

It is administered by the Coimbatore Municipal Corporation and is the administrative capital of Coimbatore district. It is one of the fastest growing tier-II cities in India and a major hub for textiles, industries, commerce, education, information technology, healthcare and manufacturing in Tamil Nadu. It is often referred to as the "Manchester of South India" due to its cotton production and textile industries. Coimbatore is also referred to as the "Pump City" and it supplies nearly half of India's requirements of motors and pumps.

Lakshmi mills area, shown in Fig 2, hundred feet road, Cross cut road, shown in Fig 3 may be the coimbatorean's paradise. But these places are also known for the characteristic odour emanating from the drainages.



Fig. 1. Lakshmi Mill area



fig. 3 Gandhipuram Area

The problem is not specific to these two places in Coimbatore. In the absence of a well-connected underground drainage system in the city, sewage is being let off into surface drains unchecked, making stench and filth everyday problems for coimbatoreans. Even at the places where an underground drainage system is provided, several residents flout the rule, letting sewage into the open drainage.

PROPOSED WORK

Roadside gully pots are an important component of urban drainage and it is the first entry point of road runoff into an urban drainage network as shown in Fig 4.



fig.4 Urban drainage network

Pots, shown in Fig 5 are extensively used to retain sediments from road runoff, leaves and organic litter in order to avoid blockage of the drainage system, that is, it trap solids from runoff in order to minimise the problems associated with sediment deposition in the downstream drainage structures, as shown in Fig 6.



fig 5. Gully pot sample

Sewer and gully flooding have become major causes of pollution particularly in the residential areas majorly caused by blockages in the water system and drainages. Therefore, Gully pots require regular monitoring and cleaning to prevent blockages. An effective way of avoiding this problem will be by deploying some mechanism to monitor gully pot water level at each



point in time and escalating unusual liquid levels to the relevant authorities for prompt action to avoid a flooding or spillage occurrence.

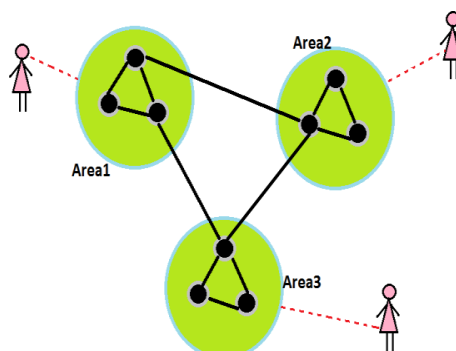
fig 6.Gully pot attached to underground drainage

This paper presents a low cost, power efficient and advanced technology in gully pot liquid level monitoring technique. Here, sensors are used to effectively monitor the level of the gully pot. The Sensor senses the pot and transmits the information to the relevant authority when an unusual level is found. GSM is used to send messages to the authority. For example,

- Sensor1 is placed in Area1
- Sensor2 is placed in Area2
- Sensor3 is placed in Area3
- If there is an unusual level in Area1, then the respective authority will get an alert message (using GSM).

The proposed working area is shown in Fig 7, where an area have three gully pots and if there is an blocking in any of the three pots then the respective authority of that area will get an intimation as SMS using GSM.

Fig 7.Proposed Working Model



The experimental setup for underground liquid level indication can be used for both residential and commercial purposes.

EXPERIMENTAL SETUP

The modules of the system are discussed in brief in this section. The modules in Gully pot monitoring using GSM are discussed below.

Module 1 -Power Supply

In the power supply module instead of using batteries, 230 volts regular current supply is used. But that 230 volts can't be given to the components we used, because they are all low voltage components. Therefore step1 transformers are used to convert high volt current supply to low volt supply.

Module 2 –Rectification

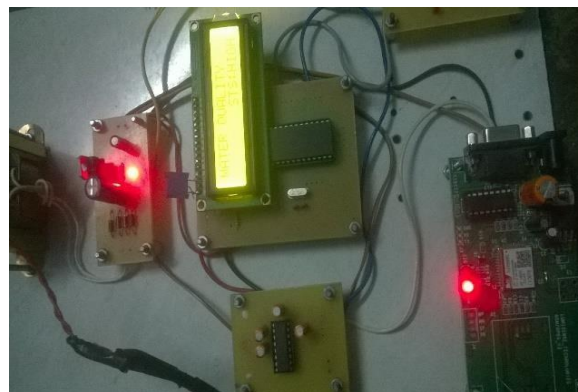
In this module AC current is converted into DC. This conversion is done because all electronic components work under DC current. Four diodes are used as rectifiers and a capacitor is used to get pure DC and a fixed volt regulator is used to regulate the current flow in fixed amount. Then LED is used as intimation for power supply.

Module 3 –GSM Module

For sending and receiving SMS we need a mobile module, Open type mobile module. A sim is inserted and the power supply needed for GSM is given in form of the DC. Two LEDs are used as intimation one for power supply and other for signal tower. DC Adapter can be used for modem verification.

Module 4 –Sensing Unit

Water level sensor is used for checking the unusual level of liquid in Gully pot. If an unusual level is found then an alert message is sent to the respective authority of that area.



Module 5 –Alarm Unit

Alarm unit can't be connected to microcontroller directly. Therefore one driver unit should be used. Here transistor driver unit is used and that output is given to a buzzer. Whenever the SMS is sent the alarm will sound.

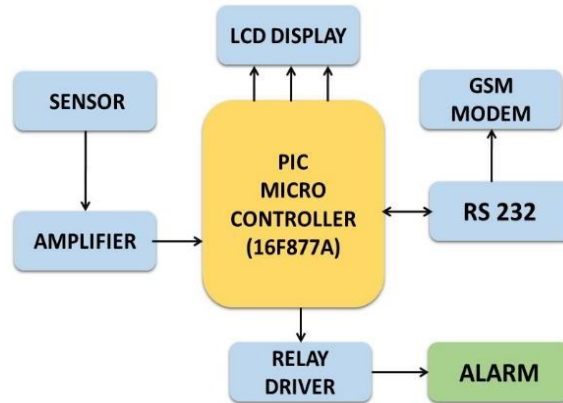


fig 8. Transmitting block

Transmitting block diagram of the whole proposed system is shown in Fig 8 and Receiving block of the proposed system is shown in Fig 9.

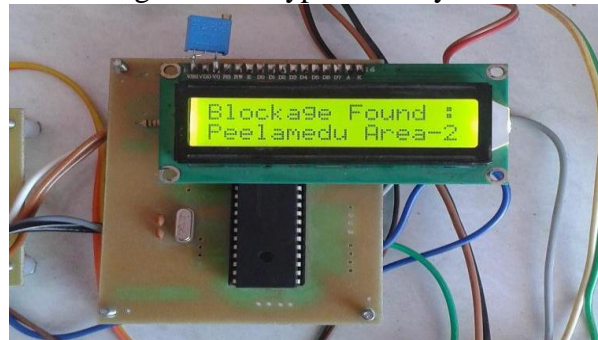


Fig 9. Receiving block

AREA OF STUDY

The proposed prototype model of the Gully pot monitoring using GSM shown in Fig 10 specify that there is an unusual liquid level in Gully pot. The output is displayed in the LCD display as shown in Fig 11 an alert SMS is sent to the mobile phone as shown in Fig 12.

Fig 12. Prototype of the system



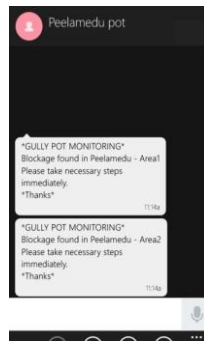
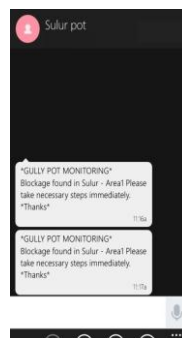


Fig13. LCD display output

Fig 14. SMS Output



2. CONCLUSION

In conclusion, Internet of Things is the concept in which the virtual world of information technology connected to the real world of things. The technologies of Internet of things like Sensors make our life become better and more comfortable. The proposed gully pot monitoring system effectively transmits SMS to the higher officials on time to remove block in the drainage system. The results showed that SMS is successfully delivered. In future enhancement, secure data transmission can be made.

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