A Wireless Sensor for Monitoring Sewerage in Urban Area

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Abstract— The project is developed to monitor the water level in Gully pot using ultrasonic sensor and to inform the overflow condition to sewage board authorities via GSM automatically. The Ultrasonic sensor is employed to sense the water level (depth) in Gully pot. The ultrasonic sensor consisting of a transmitter and receiver is mounted on the top cover of the gully pot. The sensor will transmit the ultrasonic waves periodically and observe the reflected waves whenever the ultrasonic wave touches the water surface they are reflected. The ultrasonic sensor will observe the reflected waves and generate a low pulse output. The width of the pulse output is proportional to water level. Whenever the level reaches either the flooding level or the blocking level an alarm is sounded and the information is transmitted over GSM modem to a central server PC in the sewage board. So that the concerned authorities will take immediate action. Besides the overflow condition can be transmitted to any number of cell phones stored in the microcontroller, so that multiple /concerned person can be immediately alerted to take corrective measures..

Keywords— Gully Pot, Opto Coupler, Microcontroller, Buzzer Alarm, Lcd, Modem.

I. INTRODUCTION

Nowadays there are various electronic technologies available in the market composed with embedded systems and wireless technology for controlling purposes. The embedded system technology is one of the highest growth areas because these systems are used in each and every market segments now days like electronics, automation, biomedical, wireless communication, using wireless and embedded systems we can provide security for our grids, in this project we proposed, "A Low Power Wireless Sensor Network for Gully Pot Monitoring in Urban Catchments".

Urban water supply networks form the link between Drinking water supply and drinking water consumers. These large-scale networks are vital for the survival of urban life, for maintaining a healthy level of economic development, and for the continuous operation of factories and hospitals.

In most of the world, urban water supply systems are public enterprises, usually part of a local government, and the recent increased interest in privatizing public enterprises has not led to reforms of water systems. Nevertheless, in about 50 cities in the developing world, the water system either has been privatized or franchised to a non-governmental entity for its operation and maintenance.

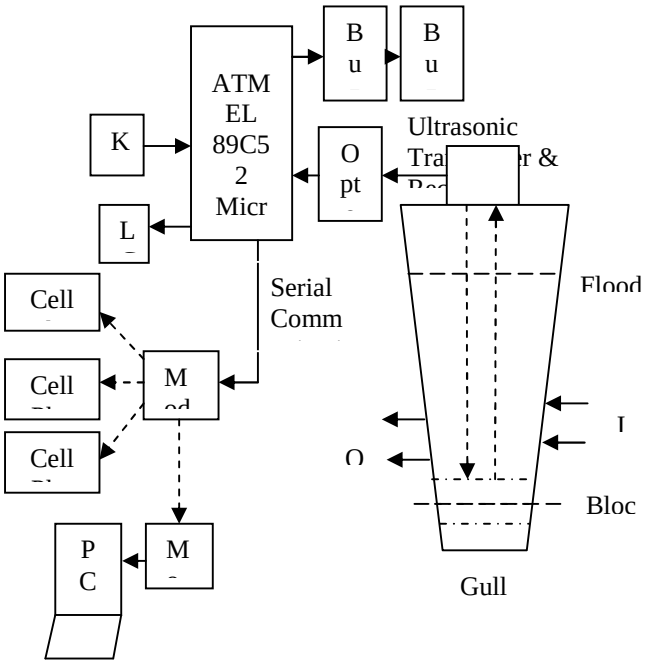
Currently, many water companies have deployed telemetry systems to replace some of the manual operations involved in data collection. These systems require extensive cabling for Public Switch Telephone Network (PSTN) and power. As a result, telemetry systems cannot be deployed widely over a large catchment area because of the cost. If dispersed, infrequent faults are to be monitored then it is imperative to find alternative economical methods to perform the data collection and transmission.

Low cost wireless sensors may be the only cost-efficient option to replace traditional visual CCTV inspection which is infrequent and costly. These wireless sensors could be deployed over an extensive part of the network and provide early warning of impending failure offering time for maintenance teams to prevent service or regulatory failure. Wireless Sensor Network (WSN) has been used by numerous researchers due to its successful implementation in a wide range of government, military, commercial, transportation .

II. SYSTEM REQUIREMENT

- **Microcontroller section :** ATMEL89C52 microcontroller
- **Wireless Section :** GSM Modem
- **Sensor :** Ultrasonic Transmitter & Receiver.
- Embedded C programming using CCS-C complier . `

III. BLOCK DIAGRAM



IV. MODULES

- **Microcontroller section**
  - ATMEL89C52 microcontroller
  - LCD display
  - Keys.
- **Wireless Section**
  - GSM Modem
- **Sensor Section**
  - Ultrasonic Transmitter & Receiver

V. MODULES DESCRIPTION

The Power supply unit plays an important role in the device. The primary purpose of a regulator is to aid the rectifier and filter circuit in providing a constant DC voltage to the device. It is used to give the required voltage to IC for operating the device. The Ultrasonic sensor is employed to sense the water level (depth) in Gully pot. The ultrasonic sensor consisting of a transmitter and receiver is mounted on the top cover of the gully pot. The ultrasonic sensor will transmit the ultrasonic waves periodically and observe the reflected waves whenever the ultrasonic wave touches the water surface they are reflected. The ultrasonic sensor will observe the reflected waves and generate a low pulse output. The width of the pulse output is proportional to water level. So that the concerned authorities will take immediate action. Besides the overflow condition can be transmitted to any number of cell phones stored in the microcontroller, so that multiple /concerned person can be immediately alerted to take corrective measures.

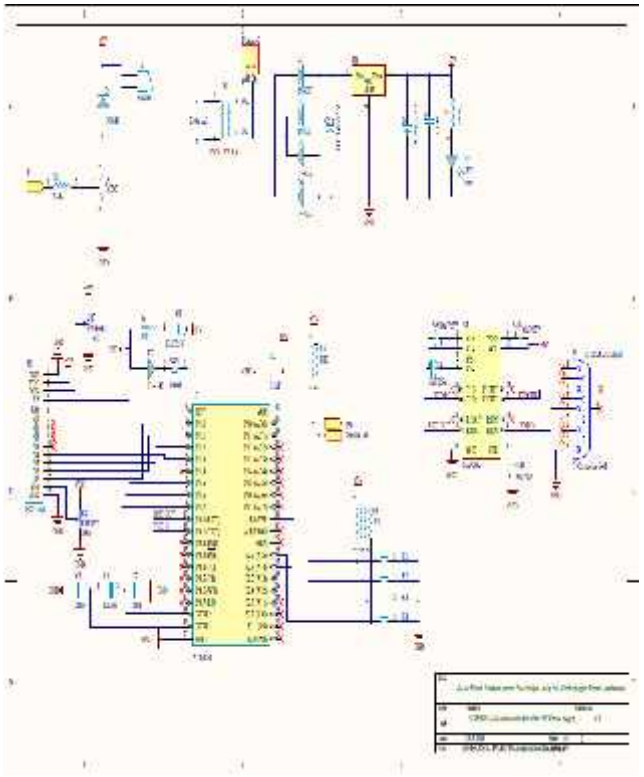
A Microcontroller is employed to measure the time of the low width .The width is calibrated in terms of level and displayed on LCD. Whenever the level reaches either the flooding level or the blocking level an alarm is sounded and the information is transmitted over GSM modem to a central server PC in the sewage board.

The communication is done with help of MAX232 IC between the microcontroller and PC. To communicate over UART or USART, we just need three basic signals which are namely, RXD (receive), TXD (transmit), GND (common ground). To interface MAX232 with any microcontroller.

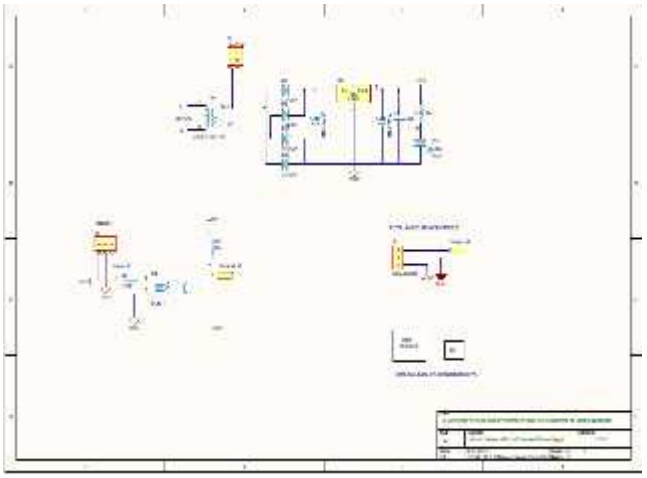
The system is also provided with keys to program the flood level and blocking level. Opto is used as level changer to change the 12 Volt pulse of Ultrasonic sensor to 5Volt pulse. The driver is a transistor to provide higher current to buzzer. The message can be send along with authorization code to avoid reception of unauthorized message.

VI. CIRCUIT DIAGRAM

Microcontroller Section



Sensor Section



VII. ADVANTAGES

- *Low cost*
- *High gain*
- *Low power consumption*
- *Low latency and capability*
- *Low data rate*

VIII. APPLICATIONS

- *Military*
- *Commercial*
- *Transpirations*
- *Health care*
- *Figures and Tables*

IX. CONCLUSIONS

Thus the embedded based a low power wireless sensor network to monitor the water level of gully pot in urban catchments has been developed using ultrasonic sensor. The overflow condition is informed to sewage board authorities via GSM automatically for corrective measures.

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