

GSM Based Water Control and Management

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Abstract - Last few decades several monitoring system integrated with water level detection have become accepted. Measuring water level and avoiding the wastage of water is an essential task for government and residence perspective. The intension of this project is to reduce time and avoiding the wastage of water. So this problem can be overcome by developing an android application which works on GSM technology. In this the detection of water level is done and according to this pump is turn on/off. An AT89C51 microcontroller is used for the desired operation. At the transmitting end sensor is use for level detection and GSM module is use to send the information to user. According to this information user control the pump action i.e. on or off.

Key Words: Microcontroller, GSM module, Level sensors.

1. INTRODUCTION

Sustainability of available water resource in many reason of the word is now a dominant issue. This problem is quietly related to poor water allocation, inefficient use, and lack of adequate and integrated water management. Water is basic need of all lives and it is commonly used in agriculture, in many industries, as well as for domestic purposes. Therefore, efficient use and water monitoring are potential constraint for home or office water management system. The design approach is developing an android application to control and manage the water tank filling. In this we are going to use GSM technology. Firstly detection of water level in tank is done by using sensors and send this information to user through a SMS notification. Then user send SMS to turn on pump. When tank is filled completely, it is informed to user and then user turn off pump through a SMS notification. A SIM card is required for its operation and it works on AT commands.

2. LITERATURE REVIEW

The water level measurement system was designed to calculate water level and can work well to receive and send message to users. The initial setting data can be inputted into the system via SMS. Upon receiving the SMS to request water level data, the system will send the result of water level measurement data [1].

It provides automated restarting if normal conditions are re-established. The use of mobile phone has

become more common and this system is useful for farmers. This system provide remote control of induction motors through mobile phones using messages [2].

This system was intended to design a simple and low cost water level indicator. This is not only for water tank but also used for oil level and chemical lab. They designed a system in such a way that its components will be able to prevent the wastage of water. The whole system operates automatically. So it does not need any expert person to operate it [3].

System was implemented an efficient System (Real Time Wireless Monitoring and Control of Water Systems). The motive of this system was to establish a reliable, flexible, economical and easy configurable system which can solve our water losing problem [4].

3. PROPOSED SYSTEM

3.1. SYSTEM ARCHITECTURE

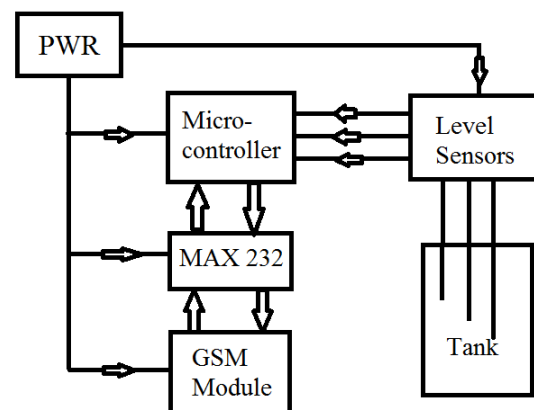


Fig-1: Block diagram of transmitter section

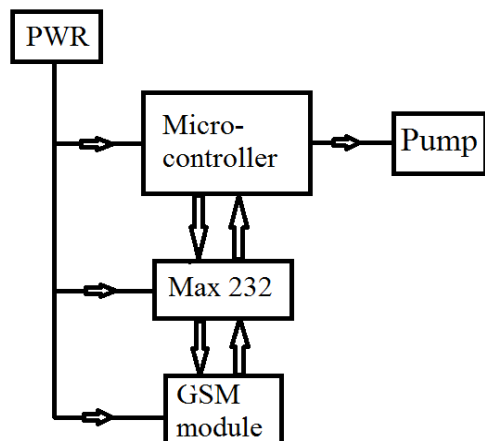


Fig-2: Block diagram of receiver section



Fig-3: Hardware of transmitting section

The overall system consists of three modules:

1. TRANSMITTER SECTION:

In our project we are using GSM SIM 800 module for communication purpose. Firstly detection of water level in the tank is done. It is done by using magnetic float sensor so there is no need to go and check the water level each time. This information is send to user by SMS notification using GSM technology. Detection of water level will be done according to three stages- low, moderate and high. If water is at the low level then this information is sent to user. User can also check the water level within tank by simply sending a message to GSM module at transmitting section by using an android application. This application is developed online by using mit app inventor. When user send message to GSM module at transmitter site as “*WLEVEL?03#” through an android app for knowing the water level then GSM module at transmitter site will send message to user according to water level within tank. Even if the water level is high or low then also a message is sent to user by GSM module automatically. Such as-

- I. if water level is low then it will send message as- “LEVEL BETWEEN 0% to 20%”
- II. if water level is moderate then it will send message as- “LEVEL BETWEEN 20% to 50%”
- III. if water level is high then it will send message as- “LEVEL BETWEEN 50% to 90%”

2. RECEIVER SECTION:

According to information about the water level user will ON or OFF the pump by sending message by using same android app. To turn ON the pump user will send message as “PM PON01#” and to turn OFF the pump user will send message as “PMPOFF02#”.

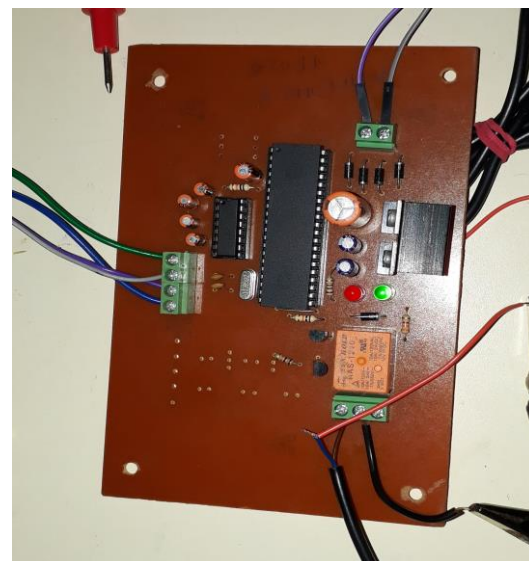


Fig-4: Hardware of receiving section

3. USER INTERFACE:

User can communicate with both the GSM modules in transmitting and receiving section. This can be done by using an android application which is developed by using mit app inventor. There are three type of messages are sent by using app such as-

- I. “*WLEVEL?03#”(this message is used to know water level within tank)
- II. “PM PON01#” (to turn on the pump)
- III. “PMPOFF02#” (to turn off the pump)

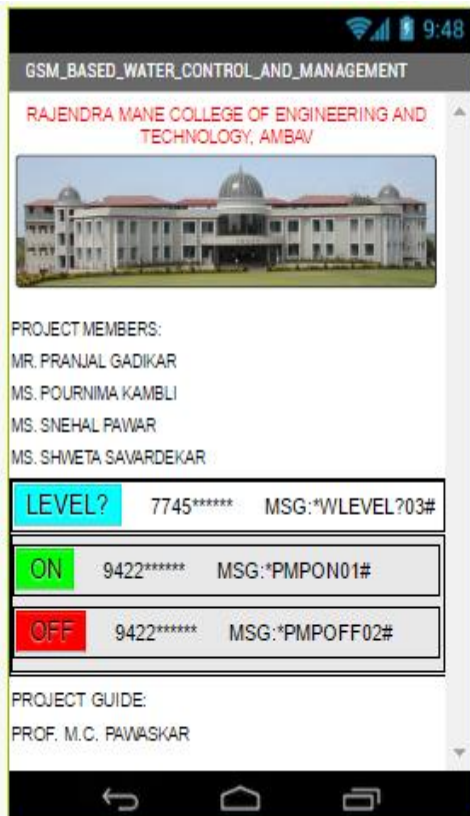


Fig-5: Snapshot of an android app

This is a snapshot of an application developed for communication between the user and GSM modules both at transmit as well as receive site. In that the messages and also registered SIM numbers to which messages will be sent are displayed. Also ON or OFF buttons are provided for pump operation.

3.2. HARDWARE DETAILS:

Hardware components required for this system are given below:

1. MICROCONTROLLER:

In this system we have used AT89C51 microcontroller which works as a main controller. It is 40 pin IC. We have used port 1 and port 3 of this controller. Rx (Receive) and TX (Transmit) pin are used for serial communication with GSM modem. Microcontroller RX pin is connected to GSM modem TX pin and Its TX pin is connected with the GSM modem RX pin.

2. MAGNETIC FLOAT SENSOR:

A float sensor is a device which is used to detect the level of liquid within a tank or container. Magnetic float sensor is an electromagnetic ON/OFF switch. It helps to sense the level of water present in the overhead tank. These sensors contains permanent magnet in the float. The switch is present in the white stem of the sensor. When water level increases float rises and as water level decreases float falls. This process will help to detect the water level within tank or container. Thereby the information which is obtained from the sensors is sent to user via GSM modem

Features:

- 1. It has no electrical contact with water therefore it is shock proof.
- 2. It is corrosion free and dust free.



Fig-6: Magnetic float sensor

3. MAX 232:

The MAX 232 is a dual transmitter / dual receiver that typically is used to convert the RX, TX, CTS and RTS signals. On the GSM SIM 800 modem there is onboard MAX 232. Also we cannot establish a direct communication between microcontroller and GSM SIM 800 because operating voltages of both these are different. Since microcontroller operates at 5V and GSM modem at 3.3V so there is need to provide one driver IC. MAX 232 acts as a driver IC and helps to establish a communication between microcontroller and GSM modem. It is 16 pin IC. The pin configuration is shown in Figure 5.

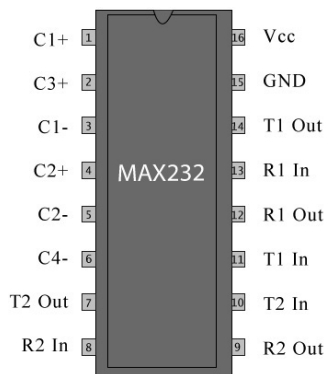


Fig-7: Pin configuration of MAX 232

4. GSM SIM 800:

GSM SIM 800 is wireless and complete Quad-band GSM/GPRS solution in SMT module. Featuring an industry-standard interface, the SIM 800 delivers GSM/GPRS 850/900/1800/1900MHz performance for voice, SMS, Data and Fax in a small form factor and with low power consumption. We can use GSM modem for sending/receiving SMS or to call user and vice versa. In our project we are using SMS service.

As we know that we use GSM for wireless communication is uses serial communication to interface with the microcontroller system and need AT commands for its operation. This commands are sent by microcontroller.

It requires SIM (Subscriber Identity Module) card just like mobile phones and also have IMEI (International Mobile Equipment Identity) number similar to mobile phone.

It is with tiny configuration of 24mm x 24mm x 3 mm. Because of its smaller size it can fit in almost all the space requirements in your Mobile-to-Mobile application, especially for slim and compact demand of design. The configuration of GSM SIM 800 is shown in Figure 8.

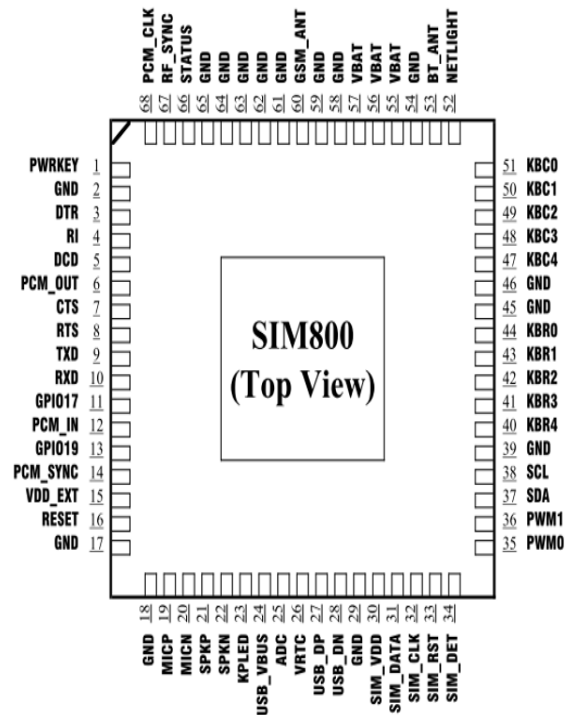


Fig-8: pin out diagram of GSM SIM 800

Table-1: AT command used in the system

AT commands	Usage
AT+CMGF=1	Text Mode
AT+CMGR=1	Read SMS
AT+CMGS="83xxxxxxxx"	Send SMS
AT+CMGDA	Delete All SMS



Fig-9: GSM SIM800

We have directly connect the GSM modem with microcontroller via driving IC MAX 232.

General features:

- 1) Dimensions- 24x 24x3 mm
- 2) Weight-3.4g
- 3) Is control via AT commands
- 4) SIM application toolkit
- 5) Supply voltage range 3.4 to 4.5 V
- 6) Low power consumption
- 7) Operation temperature: -30 °C to +80 °C

4. APPLICATIONS

- 1) This small scale project can be implemented in many houses, buildings and industries with minimum cost and resources.
- 2) This system is useful for farmers in water irrigation and on/off pump from any place.

5. ADVANTAGES

- 1) The implemented overall system is user friendly.
- 2) Time required for working of system is less.
- 3) The system is designed to avoid and control wastage of water.
- 4) The system implemented to reduce manpower.

6. CONCLUSION

Water is one of the most valued thing for all living beings on earth. If there was no water there would be no life on the earth. But unfortunately a large amount of water is being wasted by uncontrolled use. Some water level monitoring and control systems are also offered so far but most of the method have still some disadvantages. We tried to overcome these disadvantages and implemented an efficient System. Our objective of this research work was to establish a system which can solve our water wasting problem. Also to implement the user friendly system.

7. ACKNOWLEDGMENT

We would like to express gratitude to our project guide Mr. M. C. Pawaskar for his enthusiastic and consistent support with guidelines. We are also thankful to our department head Mr. S. P. Adure and principal of our institute Dr. M. M. Bhagwat who gave us the golden opportunity to do this wonderful project, which also helped us for doing a lot of research and we came to know about so many new things. Secondly we would also like to thank our parents and friends who helped us a lot in finalizing this project within the limited time frame.

8. REFERENCES

Papers:

- [1] Ayob Johari, Mohd Helmy, "Tank water level monitoring using GSM network", Faculty of electrical and electronics engineering, (IJCSIT), Vol. 2 (3), 2011.
- [2] Made Saraswati, Endrowednes Kuantama, Pono Mardjoko, "Design and Construction of Water Level Measurement System Accessible Through SMS", Department of Electrical Engineering Universitas Pelita Harapan Tangerang, Indonesia, 2012.
- [3] Oyndrila Roy, Aranyak Roy, Dr. Debasis Roy, "Automatic Water Level Indicator", University of Engineering and Management, Kolkata, India. La Martiniere For Boys, Kolkata, India. Depart of Physics, Jadavpur University, Kolkata, India, Issue 6, Vol. 2, 2016.
- [4] Gama-Moreno L., Reyes J., Sánchez M., Ochoa-Franco C., Noguerón C., "Instrumentation of a water-leaks detection system controlled via the Short Message Service through the GSM Network", Technological Institute of Zacatepec, Zacatepec, Mor. México, 2010.