WATER LEVEL AND TEMPERATURE MONITORING SYSTEM BASED ON WSN

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Abstract: When the water level in the dam exceeds certain level, the dam is in danger of collapsing. To avoid this, we should constantly monitor dam water level so that dam structure does not give way under the pressure of the water. This can be done by controlling the flood gates if the water level exceeds certain limits. Also water being a scarce resource, it becomes necessary to preserve and maintain its quality. In order to do so, various water related parameters should be under constant check and evaluation. The main water pollution related parameters that need to be monitored are Temperature, Turbidity and pH. This paper explains the theoretical aspects related to the project we are doing and the details regarding the demonstration of the automation of dam gates. The system we have proposed is an extended approach to monitor a control industrial system. We can monitor the industrial system from any location, due to this it will save lots of time in this busy era. In this project, we have designed GSM based water level and temperature monitoring system. We detect the water level of the tank which is connected to the industry. We also monitor the temperature of the tank.

I. INTRODUCTION

Floodgates are adjustable gates used to control water flow in flood barriers, reservoir, river, stream, or levee systems. They may be designed to set spillway crest heights in dams, to adjust flow rates in sluices and canals, or they may be designed to stop water flow entirely as part of a levee or storm surge system. Floodgates sometimes are also used to lower the water levels by allowing more water to flow into a flood bypass or detention basin. In addition to spillways, openings through dams are also required for drawing off water for irrigation and water supply, for ensuring a minimum flow in the river for riparian interests downstream, for generating power, and for evacuating water and silt from the reservoir. These gated openings normally are fitted with coarse screens at the upstream ends to prevent entry of floating and submerged debris. Provision for cleaning these screens is essential. The water level is detected based on the feedback from the mechanism used. In the case of major dams, nearly real-time structural monitoring of the dams can reduce the loss of human lives or properties and in the case of small irrigation purpose dams, real-time monitoring can help in reducing the damage caused to the crops by giving an indication when the water level in the dam exceeds a certain threshold and depending on the water level of the dam, gates can be controlled. In addition to the automation of the dam gates, a predefined SMS will be sent to all the concerned officials when the water level crosses the highest mark. Along with these water level sensors, sensors to measure various pollution related parameters are present. Environmental variables like temperature, turbidity

and pH are also measured in order to get an accurate picture of the dam properties. When the range of these values crosses a certain undesired threshold, a predefined SMS will be sent using a GSM modem to all the concerned officials so that they can take the necessary actions.

II. HARDWARE SYSTEM

To solve the problem related to collapsing of dam due to storage of water beyond its capacity, we have proposed to automate the flood gates. We will be fixing water level sensors on dam walls. When the water reaches danger level, the sensor will send signal to the microcontroller. The microcontroller will then execute the predefined instructions stored in it. This predefined instruction deals with opening of flood gates using a dc motor here. Also, the sensors for the other environment parameters will continuously send the values to microcontroller and are displayed on the PC at the receiver end.

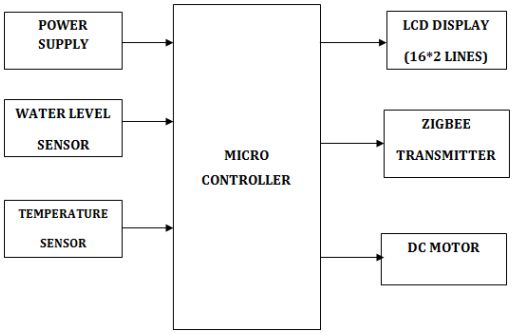

Fig 1: Transmitting section

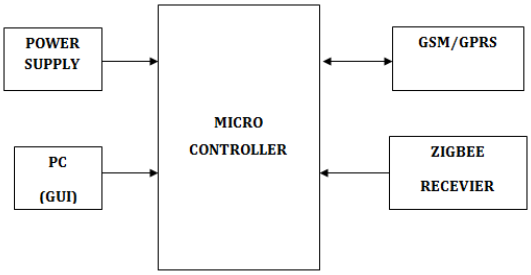

Fig 2: Receiving section

III. HARDWARE FEATURES

Micro controller: This section forms the control unit of the whole project. This section basically consists of a Microcontroller with its associated circuitry like Crystal with capacitors, Reset circuitry, Pull up resistors (if needed) and so on. The Microcontroller forms the heart of the project because it controls the devices being interfaced and communicates with the devices according to the program being written.

ARM7TDMI: ARM is the abbreviation of Advanced RISC Machines, it is the name of a class of processors, and is the name of a kind technology too. The RISC instruction set, and related decode mechanism are much simpler than those of Complex Instruction Set Computer (CISC) designs.

Liquid-crystal display (**LCD**) is a flat panel display, electronic visual display that uses the light modulation properties of liquid crystals. Liquid crystals do not emit light directly. LCDs are available to display arbitrary images or fixed images which can be displayed or hidden, such as preset words, digits, and 7-segment displays as in a digital clock.

Temperature sensor:

A thermistor is a type of resistor whose resistance is dependent on temperature. Thermistors are widely used as inrush current limiter, temperature sensors (NTC type typically), self-resetting over current protectors, and self-regulating heating elements. The TMP103 is a digital output temperature sensor in a four-ball wafer chip-scale package (WCSP). The TMP103 is capable of reading temperatures to a resolution of 1°C.

Fig 3: Temperature sensor

Water level sensor:

The sensor used for measurement of fluid levels is called a level sensor. The sensing probe element consists of a special wire cable which is capable of accurately sensing the surface level of nearly any fluid, including water, saltwater, and oils. The sensor element is electrically insulated and isolated from the liquid into which it is inserted, and will not corrode over time. Unlike, other sensors, the measurement range is adjustable from a few centimeters to over several meters. A variety of sensors are available for point level detection of solids. These include vibrating, rotating paddle, mechanical , capacitance, optical, pulsed-ultrasonic and ultrasonic level sensors.

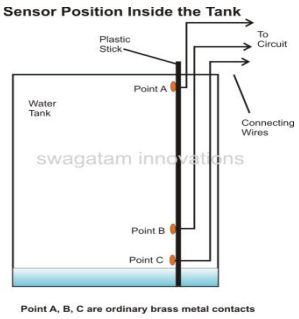

Fig 4: Water level sensor

GSM:

GPRS (general packet radio service) is a packet-based data bearer service for wireless communication services that is delivered as a network overlay for GSM, CDMA and TDMA (ANSI-I36) networks. GPRS applies a packet radio principle to transfer user data packets in an efficient way between GSM mobile stations and external packet data networks. Packet switching is where data is split into packets that are transmitted separately and then reassembled at the receiving end. GPRS supports the world's leading packet-based Internet communication protocols, Internet protocol (IP) and X.25, a protocol that is used mainly in Europe. GPRS enables any existing IP or X.25 application to operate over a GSM cellular connection. Cellular networks with GPRS capabilities are wireless extensions of the Internet and X.25 networks.

Fig 5: GSM module

ZIGBEE:

Zigbee modules feature a UART interface, which allows any microcontroller or microprocessor to immediately use the services of the Zigbee protocol. All a Zigbee hardware designer has to do in this case is ensure that the host's serial port logic levels are compatible with the XBee's 2.8- to 3.4-V logic levels. The logic level conversion can be performed using either a standard RS-232 IC or logic level translators such as the 74LVTH125 when the host is directly connected to the XBee UART. The X- Bee RF Modules interface to a host device through a logic-level asynchronous Serial port. Through its serial port, the module can communicate with any logic and voltage Compatible UART; or through a level translator to any serial device.

Data is presented to the X-Bee module through its DIN pin, and it must be in the asynchronous serial format, which consists of a start bit, 8 data bits, and a stop bit. Because the input data goes directly into the input of a UART within the X-Bee module, no bit inversions are necessary within the asynchronous serial data stream. All of the required timing and parity checking is automatically taken care of by the X-Bee's UART.

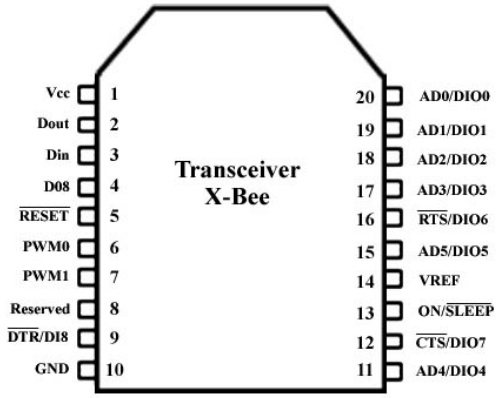

Fig 6: Zigbee pin diagram

DC Motor:

A DC motor relies on the fact that like magnet poles repels and unlike magnetic poles attracts each other. A coil of wire with a current running through it generates an electromagnetic field aligned with the center of the coil. By switching the current on or off in a coil its magnetic field can be switched on or off or by switching the direction of the current in the coil the direction of the generated magnetic field can be switched 180°.

Fig 7: DC Motor

IV. CONCLUSION

The system successfully provides real time monitoring of the water level, temperature sensors for measuring various pollution parameters like temperature, were successfully implemented. Transmission and reception of data from the sensors to the GUI using ZigBee modules is demonstrated. Automation of flood gates when the water level of the dam exceeds the predefined threshold values is also demonstrated. A predefined SMS using GSM modem is sent when any of the monitored parameters goes beyond the range..Hence by using this monitoring system we can have real time monitoring of various parameters and depending on these observations the concerned authorities are alerted to take the precautionary measures.

V. REFERENCES

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