Wireless Multi-Channel Non-Contact Liquid Level Controller

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Abstract: *The wireless technique of non-contact liquid level controlling and monitoring system concentrated with some newly available devices which are softly aggregated together in the proposed system. The proposed system employs non-contact liquid level control principle for controlling the liquid level of electrically conductive or non-conductive liquids. The system uses IR transceiver sensor for sensing liquid level, a microcontroller and HC 12 RF transceiver. The liquid level can be programmed to any lower and upper level values by using level control switches. The microcontroller compares the sensor output with upper and lower levels and provides serial data which is wirelessly coupled to the remotely placed RF transceiver. The RF receiver along with microcontroller provides the switching command signal for the suitable switching relay which in turn switches the motor ON or OFF. The unit is designed for eight (8) different units. Each unit is defined to work at different transmitting frequency to avoid interference free transmission. The validity of the proposed control scheme is verified by means of a practical testing on an experimental liquid level control device. The implementation of this control in a prototype design shows satisfactory and encouraging results which are effective, precise and reliable.*

Keywords: AT Mega 16 microcontroller, IR transceiver, HC 12 transceiver, LCD.

1. Introduction

Liquid level control of any tank, packages or industrial processes is a very important requirement; it belongs to accuracy, quality, quantity and finally with cost. This is directly related to efficient use of the resources, which means by controlling liquid level, it reduces or eliminates possibility of wastage which is directly related to cost saving, energy saving, optimal utilization of resources. Sudden fall of liquid level can effects continuous process and requirement in industries. Each and every time it might not be possible for the operator to keep an eye on the Liquid filling process in the reservoir and immediately switch the motor OFF manually once the reservoir is completely filled. It may happen few times that the operator might be busy with some work and unknowingly forgets about switching the motor OFF manually and due to this kind of negligence, there might be unnecessary wastage of Liquid. So intelligent close loop independent control with monitoring, display status can help to maintain process continuous. Keeping this in mind we have designed a system which can avoid these issues by completing the task automatically by wireless. The automatic Liquid level indicator and controller systems are quite useful to reduce the wastage of Liquid from any reservoir, while filling water in such reservoir without worrying about switching the motor OFF once the reservoir is completely filled so as to avoid wastage of water. In this project we have used two limits Upper (U) and Lower (L) which are adjusted respectively of Liquid in the tank. In this project we have also used LCD indicator. The microcontroller based control is advantageous in carry out information processing and control functions. It is obvious that the digital control system can offer high accuracy and high speed responses.

2. Block Diagram and Description

As shown in the Fig. 1 The IR transceiver (GP2YOA21YK) set-up used to sense the level of the liquid. This sensor provides DC analog voltage proportional to the level of the liquid. These analog voltage is fed to analog port of the microcontroller, which in turn converts it into digital and compare with the upper and lower liquid level settings and provides the data accordingly, the upper and lower liquid level setting are done by using up/down and mode select tactile switches as shown in Fig. 2. These set values can be monitored on LCD and stored in microcontroller.
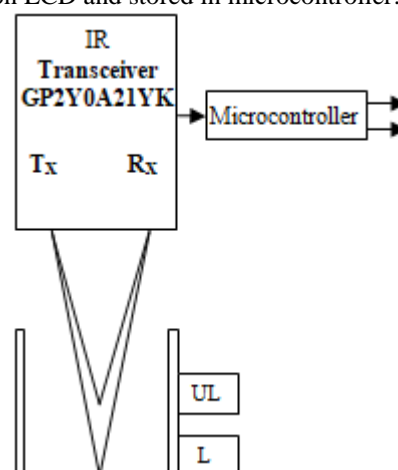

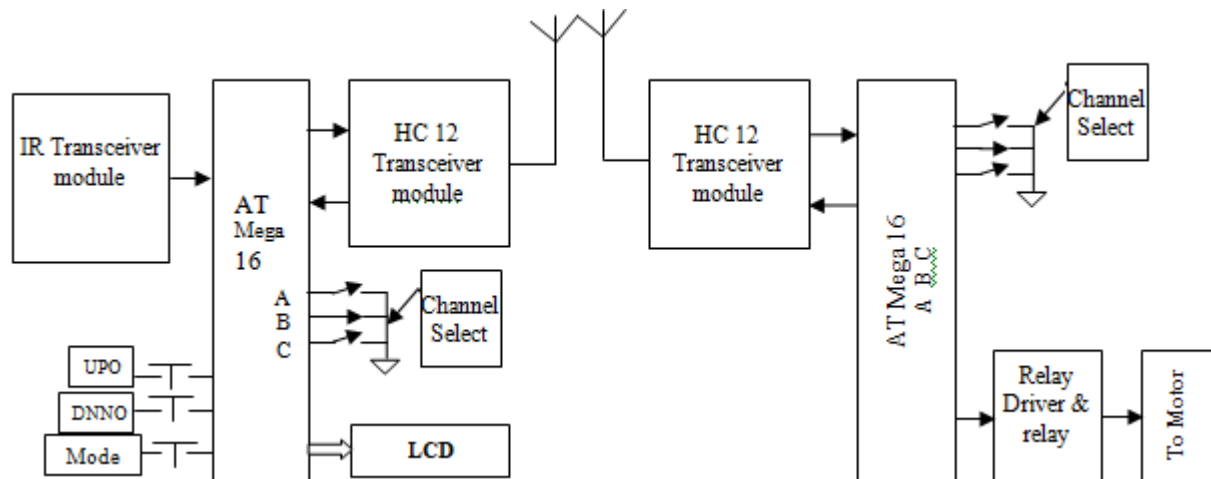**Figure 1:** Block Diagram of IR Transceiver Set-Up

Figure 2: Block Diagram of Transmitter & Receiver of Wireless Multi-channel Non-contact Liquid Level Controller

Motor is turned OFF when it reaches upper level and ON when reaches lower level; these levels decide the status of the motor. These serial data from microcontroller is then fed to transceiver which modulates the serial data and radiates to the space through antenna. The receiver receives signals demodulates and fed to microcontroller.

3. Conclusion

This paper was intended to design a simple and low cost Wireless Multi-channel Non-contact Liquid Level Controller.

This is not only for water tank but also can be used for various liquids & oil level in industries and chemical labs too. To design this system, we used Microcontroller as a platform connected to relay along with local materials for low cost. We tried to design a system in such a way that its components will be available easily and when connected together, will be able to prevent the wastage of Liquid. The whole system operates automatically. So it does not need any expert person to operate it. It is not at all very expensive. Optimum operation is maintained to run of motor and pump by monitoring level of process tank which saves energy. By sensing the liquid level automatically zero possibility of liquid over flow can be achieved and display of system status on LCD. In total it can be said, this model is effective, reliable, informative, energy efficient, time efficient and automatic.

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