



**RESEARCH ARTICLE**

**WIRELESS WATER LEVEL INDICATOR AND CONTROLLER USING PIC MICROCONTROLLER**

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**ABSTRACT**

Water is the most important Nature’s gift to the mankind. Without Water there is no life. Now man understood its importance, especially where water is not easily available. Now this is being managed by the proper manner in city areas where the use of water is more than its availability. This wireless level indicator and controller can automatically switch ON and OFF the domestic water pump set depending on the tank water level and also display the level of water using LCD as well as using LED’s and buzzer. In this project an effort is made to design a circuit used in water level indicators which can control the storage level of water in a tank to provide water throughout the day without any wastage.

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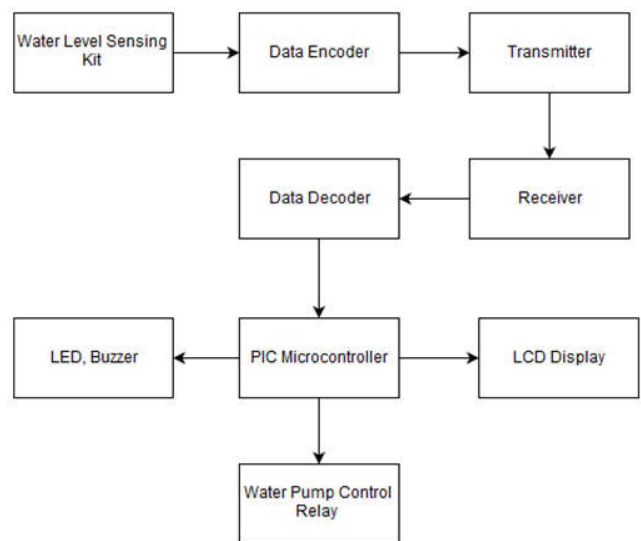
**INTRODUCTION**

Wireless water level indicator and controller is a system by which you can remotely monitor the water level of an overhead tank that is placed up to 100 meters away. The system features an RF transmitter receiver pair, doing away with the need to run wires from the roof to ground. The transmitter is placed near the tank with sensors inside the tank to monitor the level of water. The sensed level is streamed wirelessly through the RF transmitter. This is received by the receiver unit placed remotely and decoded to indicate the water level on an LCD. It also has a buzzer that beeps when the water level drops below one fourth level or when the tank is about to overflow. When the tank is quarter-, half- or three-quarters-full, the percentage of the water level is flashed on the LCD and also controls the motor to Start and Stop automatically.

Need of a water level indicator are shown below:

- Overflow problems.
- To prevent wastage of energy.
- To prevent wastage of water.

- Attention.
- Observation.
- Automatic switch off.



**Fig. 1. Block Diagram**

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**Explanation of Block Diagram**

- Water Level sensing kit is used sense the level of water which is planted in the water tank.
- Data encoder encodes the water level data and is transmitted using Wireless Transmitter.
- Wireless Receiver receives the encoded data decoder decodes the signal.
- This decoded signal is given to the PIC Microcontroller which depending upon the logic displays the level of Water on LCD Display and LED Indicators.
- The Water Pump Control Relay is controlled by the Microcontroller depending upon the water level it Starts and Stops the motor.

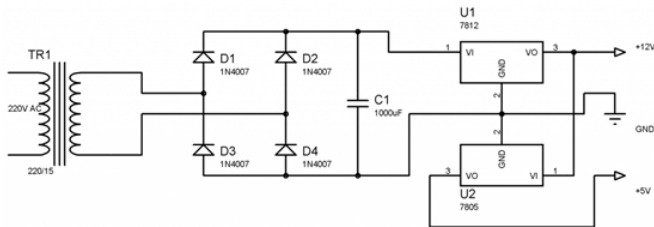
**Circuit Diagram**

The Water Level Sensing Section senses the level of water in the tank and sends it (wirelessly) to the Receiver Section. Receiver Section is connected to the Controlling Section, which process the received information and produces visual, sound indications and controls the operation of the motor whenever required.

The project is divide into 4 sections.

**Power Supply Section**

This provides required supply for Receiver and Controlling modules. Receiver module requires +5V power supply. Controller module requires +5v and +12v supply. Circuit Diagram:



**Water Level sensing section**

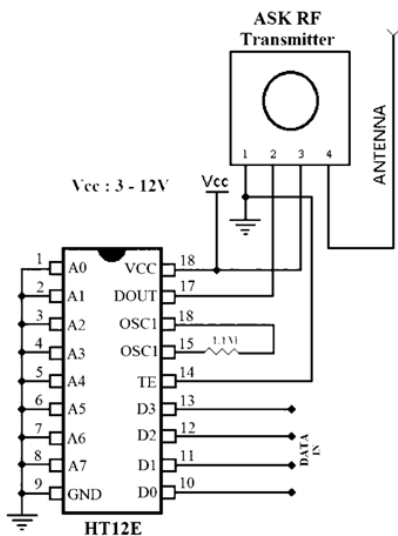


Fig. ASK RF Transmitter

Level Sensor module is made of with HT12E encoder and ASK (Amplitude Shift Keying) RF transmitter. This circuit can be drive using 9V battery. This circuit is placed near the Water Tank and connected to the tank as show in the figure below.

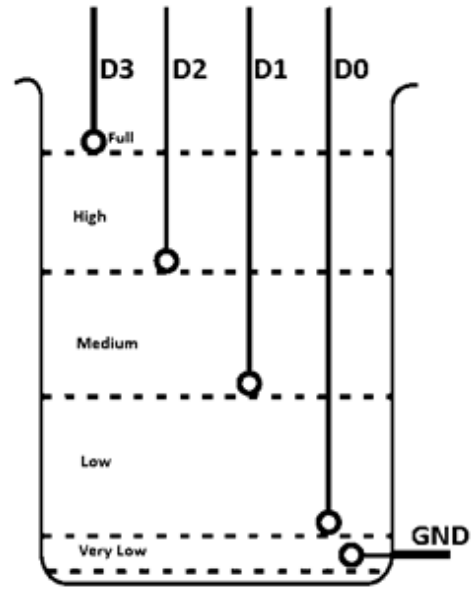


Fig. Water Tank Connections

**Receiver Section**

Receiver Module is made of with HT12D decoder and ASK RF receiver. The data transmitted by the Sensor module is received by this module and is given to the Controlling Module.

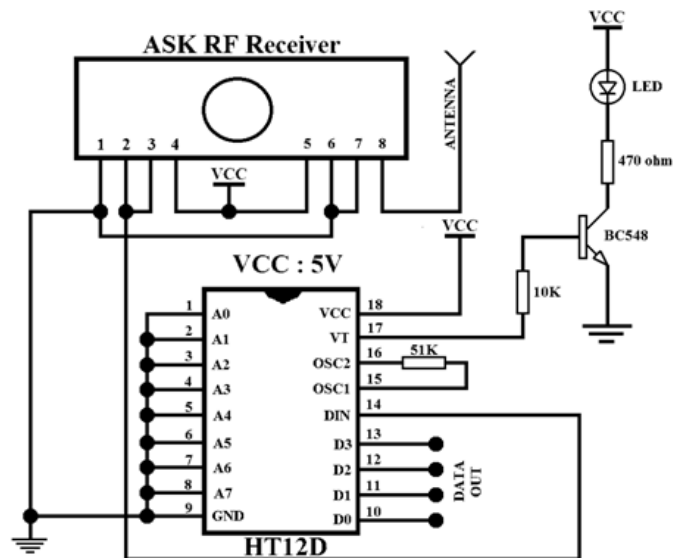
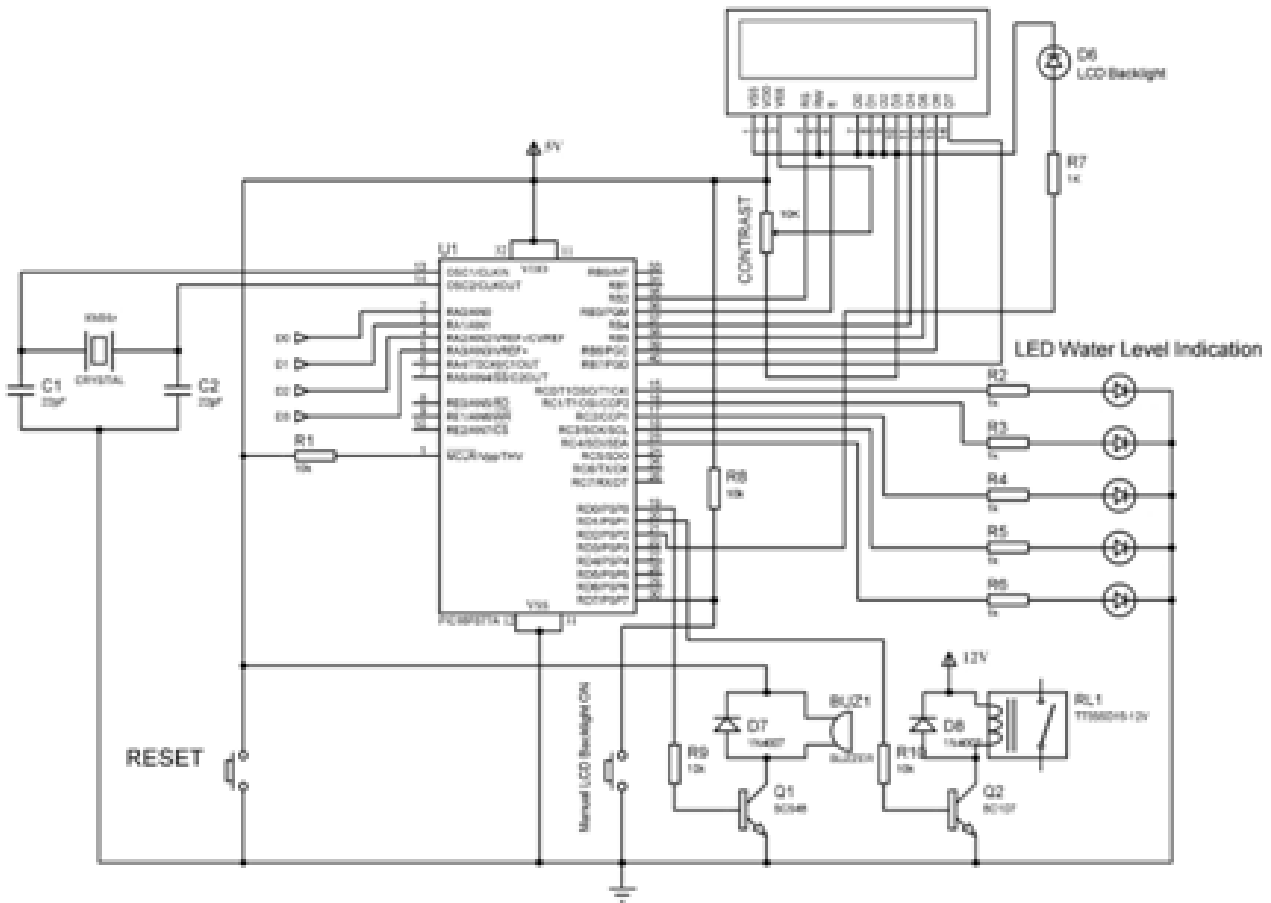


Fig. ASK RF Receiver

**Controlling Section**

The heart of the Controlling Section is PIC16F877A. It processes the data received by the Receiver Section. LCD, LED Indicators and Motor status are updated according to the data.



**Working**

For the reception and transmission of data signal we have used Holtek encoder-decoder pair of HT12E and HT12D. Both of them are CMOS ICs working voltage ranges from 2.4 to 12v. The oscillator resistances are chosen according to the datasheet. When water level raises, the data pins of the encoder will be grounded corresponding to the level of water, which will be transmitted to the Receiver via ASK RF module. The received data is decoded by the decoder HT12D. LED on the receiver indicates that it is receiving data. Then the data is given to the PIC for processing.

D0	D1	D2	D3	Status
0	0	0	0	All data pins are grounded, indicates tank is Full.
0	0	0	1	Water level is below D3 and above D2, indicates High level.
0	0	1	1	Water level is below D2 and above D1, indicates Medium level.
0	1	1	1	Water level is below D1 and above D0, indicates Low level.
1	1	1	1	Water level is below D0, indicates Very Low level.

When the water level becomes Very Low, the motor will turn ON, buzzer sounds and the LCD backlight will automatically turn ON for 5 seconds. When the water level reaches Full level, the motor will automatically turn OFF, buzzer sounds and the LCD backlight will automatically turn ON for 5 seconds. During normal operation you can manually turn on LCD backlight by pressing the Push button switch. The LCD indicates the Level of water ('Very Low', 'Low', 'Medium', 'High', 'Full') and the status of the motor ('ON' or 'OFF'). The LED bar will also indicate the level of water.

**Software Requirements**

**Mikro C:** The mikroC PRO for PIC is a powerful, feature-rich development tool for PIC microcontrollers. It is designed to provide the programmer with the easiest possible solution to developing applications for embedded systems, without compromising performance or control.

*Features of MikroC* mikroC PRO for PIC allows you to quickly develop and deploy complex applications:

- Write your C source code using the built-in Code Editor (Code and Parameter Assistants, Code Folding, Syntax Highlighting, Auto Correct, Code Templates, and more.)
- Use included mikroC PRO for PIC libraries to dramatically speed up the development: data acquisition, memory, displays, conversions, communication etc.
- Monitor your program structure, variables, and functions in the Code Explorer.
- Generate commented, human-readable assembly, and standard HEX compatible with all programmers.
- Use the integrated mikroICD (In-Circuit Debugger) Real-Time debugging tool to monitor program execution on the hardware level.
- Inspect program flow and debug executable logic with the integrated Software Simulator.
- Generate COFF (Common Object File Format) file for software and hardware debugging under Microchip's MPLAB software.

## Conclusion

This project is intended to design a simple and low cost water level indicator and controller with wireless capabilities. This is not only for water tank but also used for oil level and chemical lab. To design this system, we will use PIC microcontroller as a platform and good materials for low cost. Our target is to design a system in such a way that its components will be able to prevent the wastage of water. Microcontroller code will be developed later. The whole system operates automatically. So it does not need any expert person to operate it. It is not so expensive. This design has much more scope for future research and development. Though it is a project, we hope some modification in this project will lead to a reasonable diversity of usage.

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