Water Level Indicator System

Water Level Indicator:

The Water Level Indicator employs a simple mechanism to detect and indicate the water level in an overhead tank or any other water container. The sensing is done by using a set of nine probes which are placed at nine different levels on the tank walls (with probe9 to probe1 placed in increasing order of height, common probe (i.e. a supply carrying probe) is placed at the base of the tank). The level 9 represents the "tank full" condition while level 1 represents the "tank empty" condition.

When the water-level is below the minimum detectable level (MDL), the seven segment displays is arranged to show the digit 1, indicating that the tank is empty, When the water reaches level1 (but is below level2) the connection between the probes gets completed (through the conducting medium – water) and the base voltage of transistor increases. This causes the base-emitter junction of transistor to get forward biased, this switches transistor from cut-off to conduction mode thus PIN (B0) of microcontroller is pulled to ground hence, the corresponding digit displayed by the seven segment display is 2. The similar mechanism applies to the detection of all the other levels. When the tank is full, all inputs to microcontroller become low and all its outputs go high. This causes the display shows a 9 also in this case a buzzer sound is given, thereby indicating a "tank full" condition.

Most water level indicators are equipped to indicate and detect only a single level. The Water Level Indicator implemented here can indicate up to nine such levels and the microcontroller displays the level number on a seven segment

display. So, not only is the circuit capable of cautioning a person that the water tank has been filled up to a certain level, it also indicates that the water level has fallen below the minimum detectable level. This circuit is important in appliances such as the water cooler where there is a danger of motor-burnout when there is no water in the radiator used up also it can be used in fuel level indication.

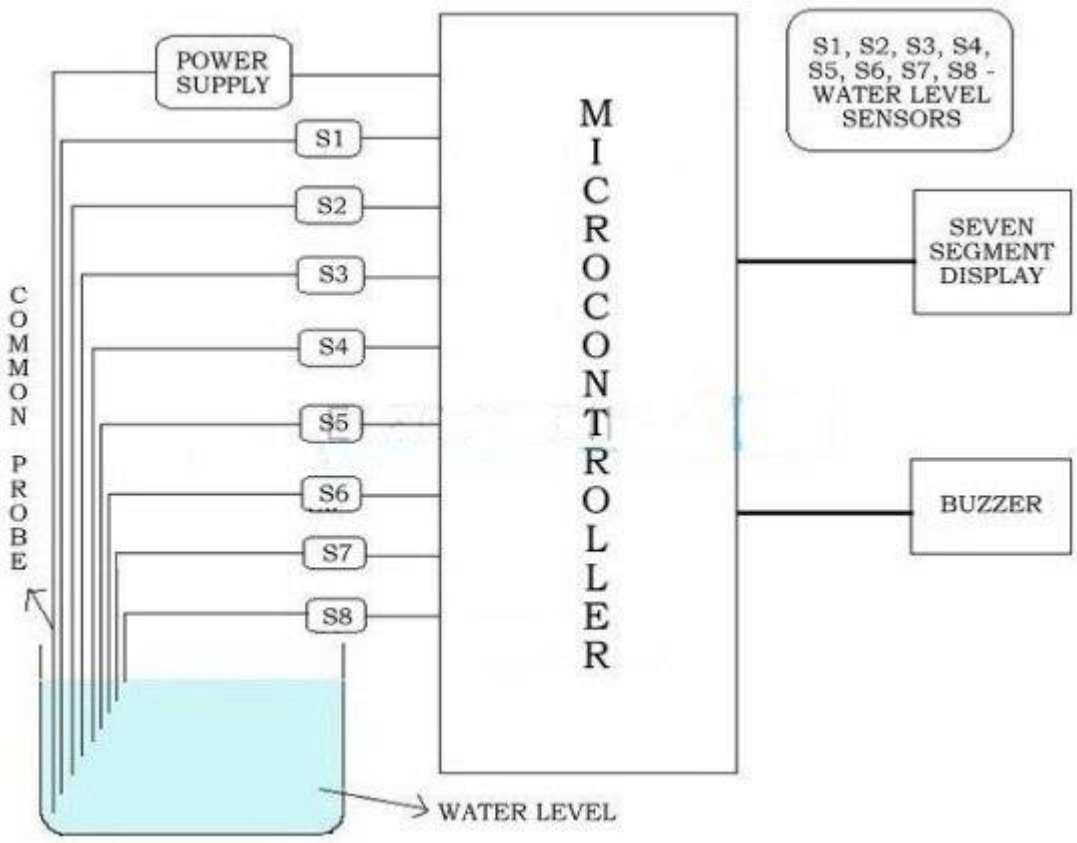
In this project we show the water level indicator using eight transistors which conducts as level rises, a buzzer is also added which will automatically start as the water level becomes full, auto buzzer start with the help of microcontroller. With the help of this project we not only show the level of water with the help of seven segment display but also a buzzer.

Water Level Indicator Project Features:

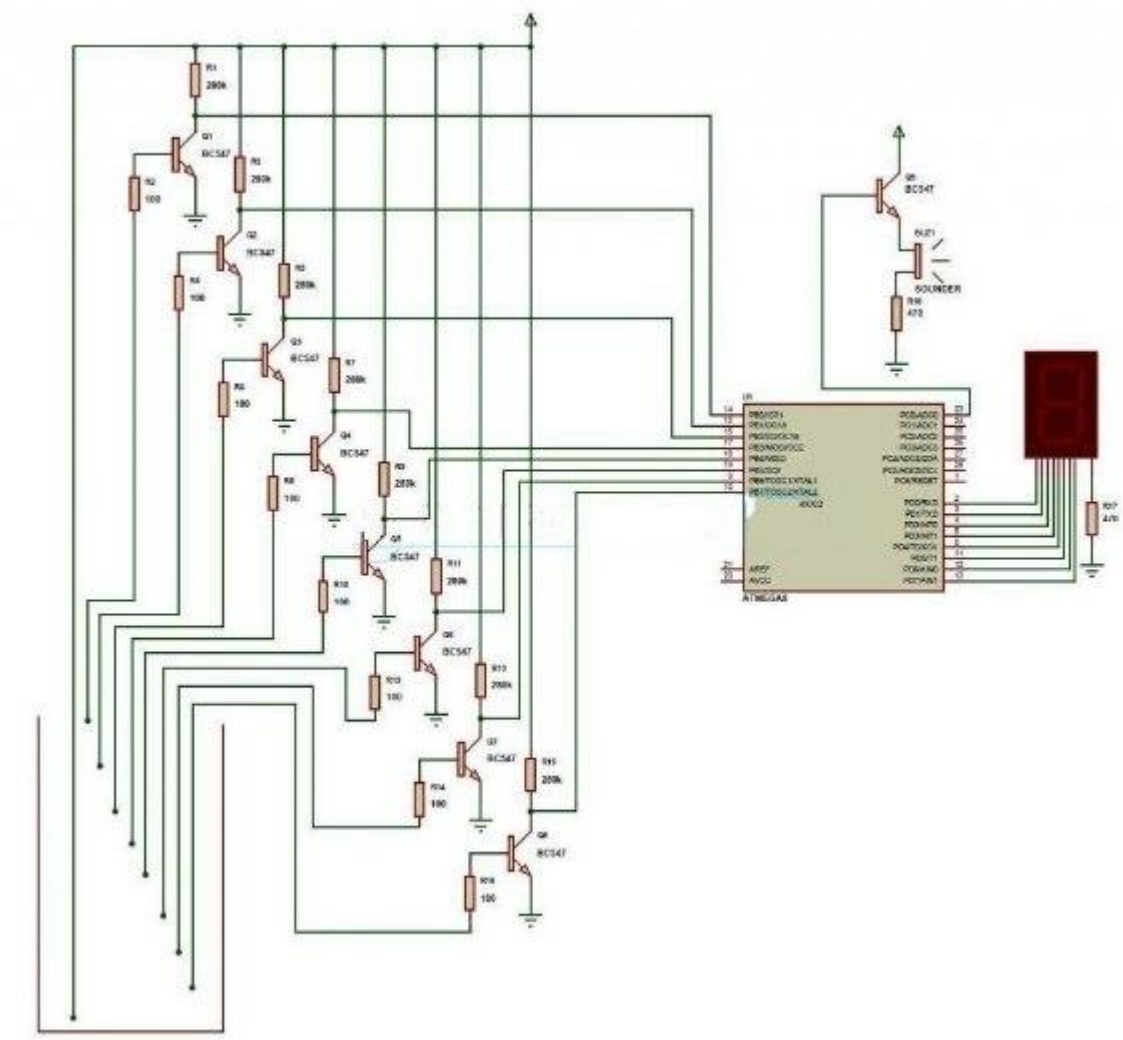
- Easy installation.
- Low maintenance.
- Compact elegant design.
- The Automatic water level controller ensures no overflows or dry running of pump there by saves electricity and water.
- Avoid seepage of roofs and walls due to overflowing tanks.
- Fully automatic, saves man power.
- Consume very little energy, ideal for continuous operation.
- Automatic water level controller provides you the flexibility to decide for yourself the water levels for operations of pump set.
- Shows clear indication of water levels in the overhead tank.

Hardware Description:

Water Level Indicator Project Block Diagram:



Water Level Indicator Project Circuit Diagram:



Water Level Indicator Project Description:

This is the circuit diagram and description for water level indicator.

- A constant 5v power supply is given to the microcontroller and rest of the circuit from a battery.
- The tank has 9 conductive type sensors (other types of sensors have been mentioned earlier but in our project only conductive type are used) embedded

into it and 8 wires of sensors out of 9 are connected to transistors and the 9th is connected to 5v+ supply.

- The use of transistor is it acts as inverter (i.e. in on state gives low voltage at output and in non conducting state gives high voltage at its output), all transistors outputs are connected to 1,2,3,4,5,6,7,8 pins (PORTB) of microcontroller.
- Seven segment display is connected to pin no. 33 to 40 (PORTA). It is connected in common cathode fashion. The Output for the 7th level is not only shown in seven segment display but also indicated with a discontinuous buzzer sound.
- Output for the 8th level (i.e. tank full condition) is not only shown in seven segment display but also indicated with a continuous buzzer sound.

Operation:

The operation of this project is very simple and can be understood easily. In our project "water level indicator" there are 3 main conditions:

1. There is no water available in the source tank.
2. Intermediate level i.e. either of 3rd to 7th level.
3. There is ample amount of water available in the source tank. So let us discuss on the more about these 3 conditions

CONDITION 1*: Water not available*

When the tank is empty there is no conductive path between any of the 8 indicating probes and the common probe (which is connected to 5v+ supply) so the transistor base emitter region will not have sufficient biasing voltage hence it remains in cut off region and the output across its collector will be Vc

approximately 4.2v. As in this case the microcontroller is used in the active low region (which means it considers 0-2 volts for HIGH and 3-5 volts for LOW) now the output of transistor which is 4.2v approximately will be considered as LOW by the microcontroller and hence the default value given by microcontroller to the seven segment display is 1 which indicates as the tank is empty.

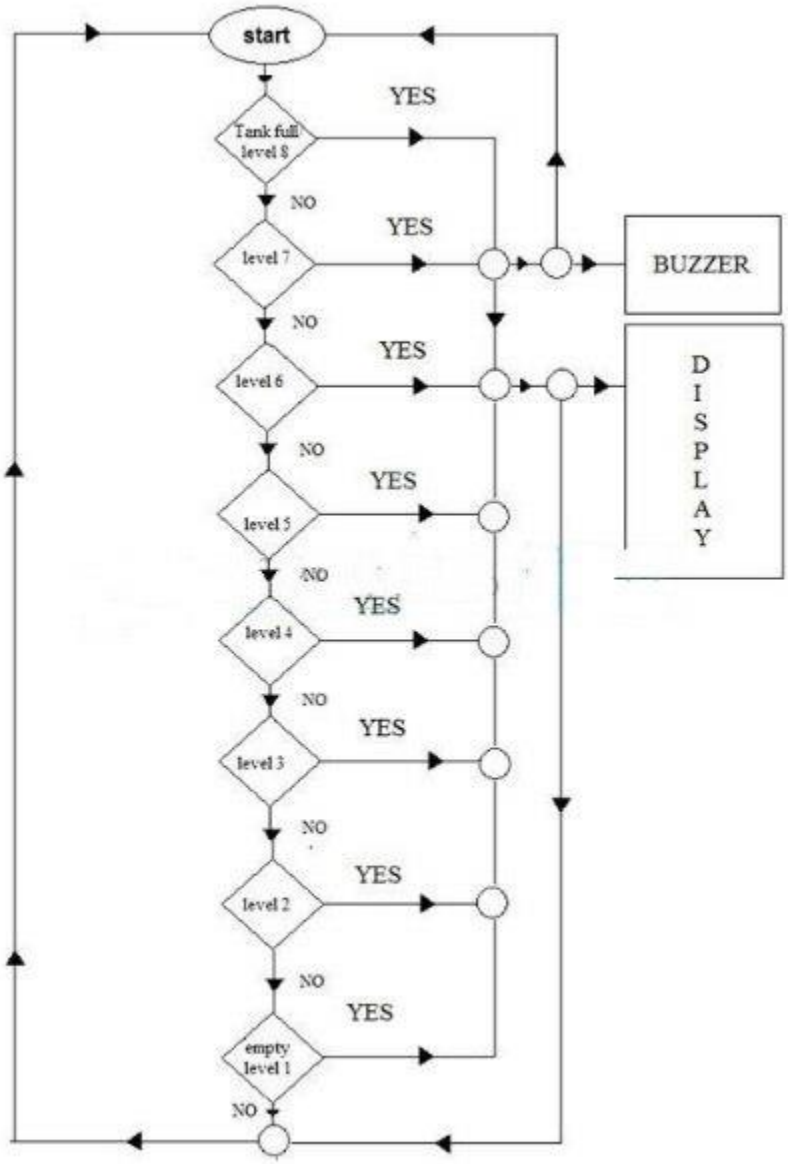
CONDITION 2*: Intermediate levels*

Now as the water starts filling in the tank a conductive path is established between the sensing probes and the common probe and the corresponding transistors get sufficient biasing at their base, they starts conducting and now the outputs will be Vce (i.e. 1.2v-1.8v) approximately which is given to microcontroller. Here the microcontroller is programmed as a priority encoder which detects the highest priority input and displays corresponding water level in the seven segment display. In this project while the water level reaches the 7th level i.e. last but one level along with display in seven segment a discontinuous buzzer is activated which warns user that tank is going to be full soon.

CONDITION 3*: Water full*

When the tank becomes full, the top level probe gets the conductive path through water and the corresponding transistor gets into conduction whose output given to microcontroller with this input microcontroller not only displays the level in seven segment display but also activates the continuous buzzer by which user can understand that tank is full and can switch off the motor and save water.

Flow Chart:



Flow chart gives the clear and easy understanding of the project. The process goes on as follows:

The microcontroller checks if the tank is full if the condition is satisfied it indicates the same on display unit and also sounds a buzzer if the condition fails it checks if the tank is filled upto level 7 and this process continues and the corresponding level is indicated in the display unit.

Conclusion and Scope:

Applications of Water Level Indicator:

- Automatic Water level Controller can be used in Hotels, Factories, Homes Apartments, Commercial Complexes, Drainage, etc., It can be fixed for single phase motor, Single Phase Submersibles, Three Phase motors. (For 3Æ and Single Phase Submersible Starter is necessary) and open well, Bore well and Sump. We can control two motor and two sumps and two overhead tanks by single unit.
- Automatic water level controller will automatically START the pump set as soon as the water level falls below the predetermined level (usually 1/2 tank) and shall SWITCH OFF the pump set as soon as tank is full.
- Fuel level indicator in vehicles.
- Liquid level indicator in the huge containers in the companies.