Water Level Indicator with Auto flow control

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***Abstract*—Water is a very fundamental element in our daily life. There is a proverb called water is life. In our modern day city life water is wasted in many ways, for example many water tanks overflows every single day. Such wastage of water is a threat to our existenc. This water level indicator can measure the water level in the tank and automatically switch on/of the water pump to stop overflowing. In this project an effort is made to design a circuit used in water level indicator which can control the storage level of water in a tank to provid water throughout the day without any wastage.**

I. Introduction

Water level indicator is a system by which you can monitor the water level of an overhead tank. The system a pic microcontroller and a few register and leds. We have to put some wires to the tank to sense the water level inside the tank.No water sensor is used to receive data.The percentage of water in the tank is shown using the LEDs. There is a relay signal to turn on the water pump if the tank is empty.

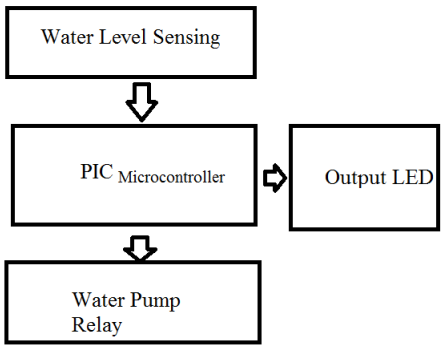


FIG: Block Diagram

A. Explanation of block diagram

1. Water Level sensing kit is used sense the level of water which is planted in the water tank.
2. Sensor Data sends high low signal to the PIC microcontroller
3.The PIC Microcontroller calculates the water level and displays through LED Indicators.
4. The Water Pump Control Relay is controlled by the Microcontroller depending upon the water level it Starts and Stops the motor.

II. Circuit

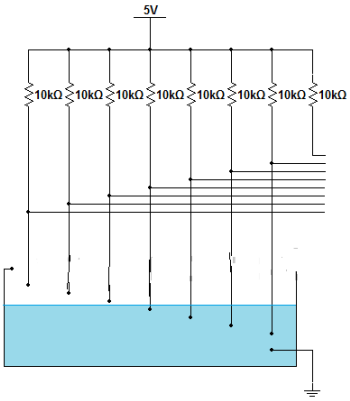
The Water Level Sensing Section senses the level of water in the tank and sends it to the PIC microcontroller ports. the Controlling Section(PIC 18f2550) process the received information and produces visual and controls the operation of the motor whenever required.

A. Used Components

The device only uses some limited components. Thus having a low cost. They are:
1. PIC18F2550 Microcontroller
2. Five 10k ohms Resistors.
3. LED
4. Bread board, power Source etc.

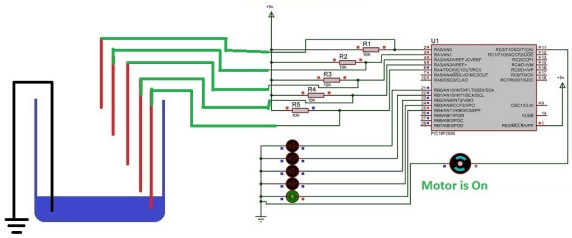
B. Water level sensing

Water level is measured using five points in the tank. The benefit of this technique is that we dont need extra water level sensor to determine the water level. We simply fix 5 points in the tank and attach 5 wires to those points. There should be a ground in the bottom of the tank. The water level is determined in a fashion given below. The wires which are under water are conductiong current and passing a signal to the controller. Thus we know the water level.

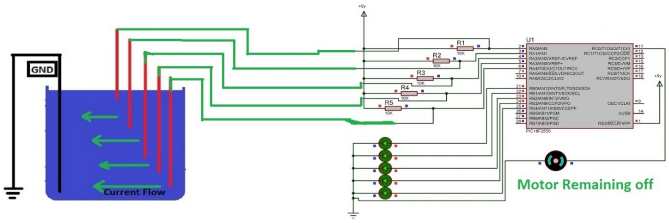


C. Circuit Diagram

The circuit diagram is very simple. The system is built in such a way to be compact and cost efficient. We can see the components and connection from the circuit diagram.
Here microcontroller pins (RA0-RA4) are connected to VDD through five 10k Ohm resistors . Five cables are connected to the points between resistors first end points and mcu (RA0-RA4)pin points . Those five (A,B,C,D,E) cables are hanged into the tank at different five levels(A,B,C,D,E) so that each cable represents each of five levels individually .Once water level goes to E level , it makes enable the connection between GND and 'E' level cable . So , it makes the RA4 pin GND(logical 0) and we get notification the tank is empty . Consequently the system turns on the motor switch .

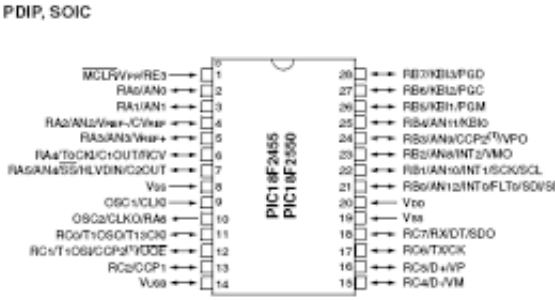


When it's full, all the mcu pins(RA0-RA4) goes to low or 0 . We get the notification tank is full the motor needs to be turned off . That's the working process of this system.



D. PIC 18f2550

PIC 18 series is mid ranged microcontroller. This family of devices offers the advantages of all PIC18 microcontrollers namely, high computational performance at an economical price with the addition of high endurance, Enhanced Flash program mem ory. In addition to these features, the PIC18F2455/2550/4455/4550 family introduces design enhancements that make these microcontrollers a log ical choice for many high-performance, power sensitive applications.All of the devices in the PIC18F2455/2550/4455/4550 family incorporate a range of features that can significantly reduce power consumption during operation.PIC18f pin diagram is given below.



Ideal for low power (nanoWatt) and connectivity applications that benefit from the availability of three serial ports: FS-USB (12 Mbit/s), IC and SPI (up to 10Mbit/s) and an asynchronous (LIN capable) serial port (EUSART). Large amounts of RAM memory for buffering and Enhanced FLASH program memory make it ideal for embedded control and monitoring applications that require periodic connection with a (legacy free) Personal Computer via USB for data upload/download and/or firmware updates. While operating up to 48 MHz, the PIC18F2550 is also mostly software and hardware compatible with the PIC16C745 Low-Speed USB OTP devices.

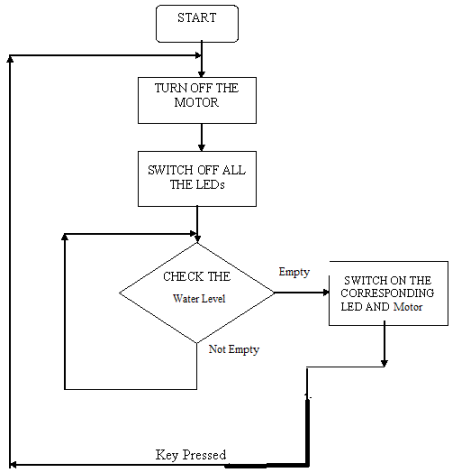
Features:

Full Speed USB 2.0 (12Mbit/s) interface 1K byte Dual Port RAM + 1K byte GP RAM Full Speed Transceiver 16 Endpoints (IN/OUT) Internal Pull Up resistors (D+/D-) 48 MHz performance (12 MIPS) Pin-to-pin compatible with PIC16C7X5

III. Code

We used Pic kit2 to program the pic microcontroller. We programmed the RA0-RA4 port for input, initially we assign the A ports for input. We take the five level data from the

water level sensing unit.
Code Description
Initially we assign the ports
Then we check if we get any signal from input ports
if we get signal that tank is empty
we start the pump
Else we only use RB ports to show water level.



The device code is written in Assembly language. Assembly language is very short and simple type of programming language. We can also use C compilers to burn programs to the PIC microcontroller. PicKit2 is used to embed pure assembly into the device.An assembly (or assembler) language,[1] often abbreviated asm, is a low-level programming language for a computer, or other programmable device, in which there is a very strong (generally one-to-one) correspondence between the language and the architecture's machine code instructions. Each assembly language is specific to a particular computer architecture. In contrast, most high-level programming languages are generally portable across multiple architectures but require interpreting or compiling. Assembly language may also be called symbolic machine code.[2]

Assembly language is converted into executable machine code by a utility program referred to as an assembler. The conversion process is referred to as assembly, or assembling the source code. Assembly time is the computational step where an assembler is run.

Assembly language uses a mnemonic to represent each low-level machine instruction or operation, typically also each architectural register, flag, etc. Many operations require one or more operands in order to form a complete instruction and most assemblers can take expressions of numbers and named constants as well as registers and labels as operands, freeing the programmer from tedious repetitive calculations. Depending on the architecture, these elements may also be combined for specific instructions or addressing modes using offsets or other data as well as fixed addresses. Many assemblers offer additional mechanisms to facilitate program development, to control the assembly process, and to aid debugging.

IV. Conclusion

This project is intended to design a simple and low cost water level indicator and controller. 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.

Acknowledgment

I would like to thank our supervisor Md. Atiqur Rahman Ahad for giving us such an opportunity to introduc ourselves solving real time problems using Microcontrollers. I would also like to thank all of my friends who helped me in the project.

References

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