MEASUREMENT OF WATER LEVEL AND TEMPERATURE

Özcan ÇETINKAYA [1] Hilmi KUSCU [2]

[1]*Trakya University, Kesan Vocational School, Turkey, oz.cetinkaya@hotmail.com*

[2]*Trakya University, Engineering and Architecture Faculty, Mechanical Engineering Division, Mechanical Theory and Dynamics Main Branch, Turkey, hilmi@trakya.edu.tr*

Abstract

In this study, a water tank as a percentage of the water level measurement and the temperature of the water in the tank is measured. For this purpose, the water level tank through a potentiometer between 0-5V analog voltage into a microcontroller with the help of shown on the LCD screen. Temperature of the water in the tank again with the help of semiconductor temperature sensor is measured and displayed on the LCD screen.

Keywords : Water level measurement, Micro controller

INTRODUCTION

Measurement of Water Level To measure the water level of water stored in the lifting force has been exploited. 115mm diameter at the shaft of the potentiometer 4mm 'lik counter made of poplar in Figure-1 at pulley was connected.

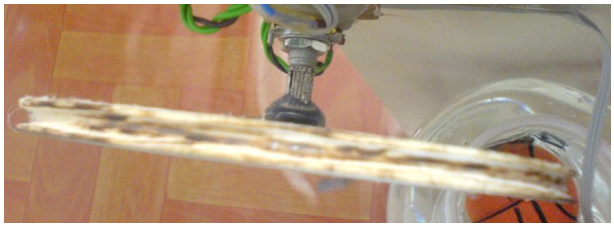

Figure 1. Pulley view

WHAT IS A MICRO CONTROLLER ?

One side of the rim served as a buoy connected to a ball on the 20gr weight (figure-2), to the other side of the rim that balances the 10gr float 'lık a lead weight (figure-2) were attached.

Water level can be measured with the diameter of the rim connecting the potentiometer (R) and potentiometer 270 ° angle limitation is proportionate with the following formula is found.

$$Water\ level = \frac{\pi.R.270}{360} = \frac{3.\pi.R}{4} = \frac{3.\pi.115}{4} \cong 270\,mm$$

Figure 2.

With the linear movement of the water to lift and float with the float moving pulley connected to the potentiometer shaft rotates back their own. Figure-3 'as in 5V applied to the hard edge of pulley movement and returns with potentiometer potentiometer varies between 0-5V from the middle fly an analog voltage is achieved. With this method, the water level will be converted to analogue voltage potentiometer microcontroller is sent.

Figure 2

MEASUREMENT OF WATER TEMPERATURE

To measure the temperature of the water with semiconductor temperature sensor LM35 is used. LM35 temperature sensor as in Figure-4 three-legged and two legs (+ Vs - GND) supply terminals, the third leg output (Volt) is the end.

Figure 4.

Released as a linear edge (10mV / ° C) 1 ° C increase in temperature lık 10mV voltage generates. Taken from the end of this output voltage is displayed on the LCD display are processed in microcontroller. In practice, according to the LM35 temperature range to be measured in various ways have connections.

These are;

Figure-5a, -55-150 ° C range to measure
Figure-5b, 0-100 ° C range to measure
Figure-5c, to measure the range of -5-40 ° C

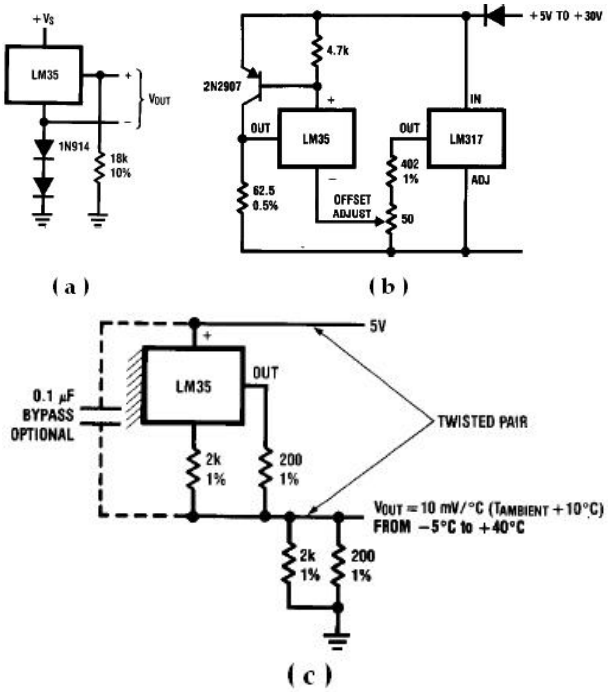

Figure 5.

This study, we used to measure the range of -55-150 ° C links are used.

CIRCUIT DIAGRAM AND MICROCONTROL-LER SOFTWARE

The PIC16F877 microcontroller is used in the circuit. 8 10-bit analog-digital PIC16F877 Microcontroller converter (ADC) input is. Analog-Digital Converter for measuring the water level AN0 input analog voltage from potentiometer is used to measure. The LM35 temperature sensor inputs AN1 and AN2 in Figure-5a 'tensions from the following link (+ AN1, - AN2) has been used to measure. In addition, the LCD screen in dark conditions could be read easily in Figure-6 'following the light-sensitive resistor (LDR) using a transistor switching circuit is used.

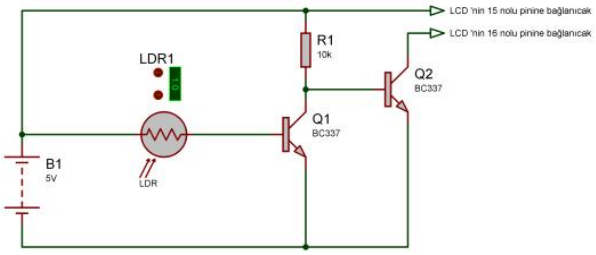

Figure 6

Proteus simulation program was prepared with the circuit diagram is as follows.

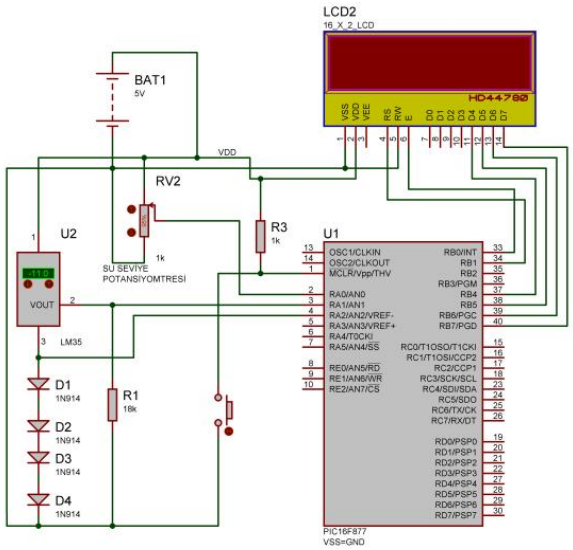

Figure 7

As is known LDR URLs resistance is inversely proportional to the intensity of light falling on the changes. Figure-6 'or LDR transistor Q1 is connected in series to the edge of the oval. Light falls on the LDR resistance triggered transistor Q1 will decrease the transmission end of the Q1 transistor Q2 transistörürün elliptical collector voltage is applied in the leg so near. In this case, transistor Q2 into isolation and LCD 's lighting lamp does not light up. LDR is low light intensity falling on the transistor Q1 will decrease the current added elliptical triggered transistor Q1 into isolation. Isolation of the transistor Q1 transistor

Q2 into elliptical tip resistance due to the R1 triggered via the LCD 's lighting lamp lights up.

Microcontroller software has been prepared with the PICBASIC PRO language is as follows.

```
'*********************************************
TRISA=%11111111
TRISB=0
TRISC=0
TRISD=0
'---------------------------------------------
@ DEVICE pic16F877
@ DEVICE pic16F877, WDT_on
@ DEVICE pic16F877, PWRT_ON
@ DEVICE pic16F877, PROTECT_OFF
@ DEVICE pic16F877, HS_OSC
'---------------------------------------------
DEFINE  ADC_BITS        10
DEFINE  ADC_CLOCK       3
DEFINE  ADC_SAMPLEUS    50
DEFINE  OSC             4
ADC_BILGI_0    var  WORD
ADC_BILGI_1    var  WORD
ADC_BILGI_2    var  WORD
ADC_BILGI_Y1   var  WORD
ADC_BILGI_Y2   var  WORD
ADC_BILGI_Y3   var  WORD
ADC_BILGI_Y4   var  WORD
ADC_BILGI_Y5   var  WORD
ADC_BILGI_Y6   var  WORD
ADC_BILGI_S1   var  WORD
ADC_BILGI_S2   var  WORD
ADC_BILGI_S3   var  WORD
FARK  var  WORD
'---------------------------------------------------
DEFINE LCD_DREG PORTB
DEFINE LCD_DBIT 4
DEFINE LCD_RSREG PORTB
DEFINE LCD_RSBIT 1
DEFINE LCD_EREG PORTB
DEFINE LCD_EBIT 0
DEFINE LCD_BITS 4
DEFINE LCD_LINES 4
'---------------------------------------------------
ADCON1=%10000000
'---------------------------------------------------
PAUSE 100
lcdout $FE,1
lcdout %11101111,"ZCAN
CET",%01101001,"NKAYA "
lcdout $FE,$C0
lcdout "MAK.M",%11110101,"H. DOKTORA"
PAUSE 2500
lcdout $FE,1
lcdout "   1088107253   "
lcdout $FE,$C0
lcdout "SU SEVIYE & ISI "
PAUSE 2500
'---------------------------------------------------
BASLA:
pause 100
ADCIN 0, ADC_BILGI_0
ADCIN 1, ADC_BILGI_1
ADCIN 2, ADC_BILGI_2
BAK:
IF ADCON0.2=1 THEN BAK
ADC_BILGI_Y1=(ADC_BILGI_0/1023)
ADC_BILGI_Y2=(ADC_BILGI_0//1023)
ADC_BILGI_Y3=(ADC_BILGI_Y2*25)
ADC_BILGI_Y4=(ADC_BILGI_Y3/1023)
ADC_BILGI_Y5=(ADC_BILGI_Y4*4)
ADC_BILGI_Y6=(ADC_BILGI_Y1*100)+ADC_BILGI
_Y5
FARK=ADC_BILGI_1-ADC_BILGI_2
lcdout $FE,1
lcdout "DOLULUK : % ",dec3 ADC_BILGI_Y6

if FARK<65000 THEN  GOSUB ISLEM1
if FARK>65000 THEN  GOSUB ISLEM2

GOTO BASLA
ISLEM1:
ADC_BILGI_S1=(FARK/2)
lcdout $FE,$C0
lcdout "ISI     : +",DEC3
ADC_BILGI_s1,%11011111, "C"
lcdout $FE, $CB
RETURN

ISLEM2:
ADC_BILGI_S2=((65535-FARK)/2)
lcdout $FE,$C0
lcdout "ISI     : -",DEC3
ADC_BILGI_s2,%11011111, "C"
lcdout $FE, $CB
RETURN
END
```

The final version of the work-8 'is as in

Figure 8

LCD 's work as image-9' are as follows.

Figure 9

CONCLUSION

In this study, using a microcontroller in a warehouse level and temperature of the water were asked to be measured. As a result of the trials of the water level inside the tank and the temperature was measured with accuracy. Instead of water level and temperature measured can be used in other liquid. In this study, the level of measurement used in the float-pulley system completely, although a mechanical pulley system connected to the potentiometer can be made very precise measurements. Measurement will be stored outside of the potentiometer will be made to the assembly is isolated from the atmosphere within the tank. Therefore, this method of measuring the level of aggressive liquids can be used safely and comfortably. Temperature of the stored liquid from outside want aggressive or electrical insulation from inside the tank can be measured.

REFERENCES

[1] http://www.national.com/ds/LM/LM35.pdf
[2] http://ww1.microchip.com/downloads/en/ DeviceDoc/30292c.pdf