ISSN: 0975-833X

Available online at http://www.journalcra.com

International Journal of Current Research
Vol. 11, Issue, 08, pp.6010-6012, August, 2019

DOI: https://doi.org/10.24941/ijcr.36075.08.2019

INTERNATIONAL JOURNAL OF CURRENT RESEARCH

RESEARCH ARTICLE

MICROCONTROLER BASED AC VOLTMETER

***Daw Me Me Aye, Dr. Aye Thida Aung and Dr. Phyu Phyu Mar**

Department of Engineering Physics, Yangon Technological University, Yangon, Myanmar

ARTICLE INFO

Article History:
Received 14th May, 2019
Received in revised form
29th June, 2019
Accepted 25th July, 2019
Published online 31st August, 2019

Key Words:

Ac signal, Converters, Measurement, Microcontroller, Signal generator.

***Corresponding author:* Daw Me Me Aye**

ABSTRACT

Today the electronic devices are widely used in this Era. So the measurement of potential difference and current is very important to know. In this work the implementation of voltmeter is carried out. The advantage of this voltmeter is that can be measure the wide range of voltage and precision is 90% efficiency. This circuit is designed to measure 0 to 230VThe new microcontroller based voltmeter cost is very cheap and can be setup easily. When we use what we have learned of microprossers and adjust the program to calculate and show the measure in the 7 segment. The software programming has been interpolated using MPLAB and PROTEUS.

***Citation: Daw Me Me Aye, Dr. Aye Thida Aung and Dr. Phyu Phyu Mar,* 2019.** "Microcontroler based ac voltmeter", *International Journal of Current Research*, 11, (08), 6010-6012.

INTRODUCTION

AC voltmeter are instruments that measure voltage or voltage drop in a vary circuit. They use solid state elements and display values digitally. Typically, AC voltmeters are used to find excessive resistance that may indicate an open circuit or ground. They are conjointly used to identify low voltage or voltage drops that may indicate a poor connection. AC voltmeters will measure a spread of alternating current (AC) voltages.Devices typically display 3 digits.Digital voltmeters will capture minimum and maximum voltages known as spike readings.Voltmeter can be made using PIC Microcontroller having ADC (Analog to Digital Converter). Fig 1 shows the block diagram of the project where the voltage to be measured is applied to one of the analog-to-digital converter (A/D) channels of a PIC Microcontroller having built-in A/D converters (Penfold, 1997).

Implementation of distance measurement system

PIC Microcontroller: PIC is a family of modified Harvard architecture microcontrollers made by Microchip Technology, derived from the PIC16F887 PDIP shown in Fig (2) originally developed by General Instrument's Microelectronics Division. The name PIC initially referred to "Peripheral Interface Controller". PICs are popular with both industrial developers and hobbyists alike due to their low cost, wide availability, large user base, extensive collection of application notes, availability of low cost or free development tools, and serial programming (and reprogramming with flash memory) capability. They are also commonly used in educational programming as they often come with the easy to use PIC legislator' software (http://www.microchip.com).

7805 Voltage Regulator IC: 7805 is a voltage regulator integrated circuit. It is a member of 78xx series of fixed linear voltage regulator ICs. The voltage source in a circuit may have fluctuations and would not give the fixed voltage output. The voltage regulator IC maintains the output voltage at a constant value. The xx in 78xx indicates the fixed output voltage it is designed to provide. 7805 provides +5V regulated power supply. Capacitors of suitable values can be connected at input and output pins depending upon the respective voltage levels. Fig. 3 shows the 7805 voltage regulator IC (Penfold, 1997).

7-Segment LEDs Interface: 7-segmentdisplay are frequently used in electronic circuit as indicators. As shown in Fig (4) a 7-segment display basically consists of 7LEDs connected such that numbers from 0 to9 and some letters can be displayed. Fig (5) shows the segment names of a typical 7-segment display. 7-segment displays are available in two different configurations common cathode and common anode. But AC voltmeter are used common anode 7-segment LEDs display. A common anode display the anodes of all the segment LEDs are tied together shown in Fig (6) and then this common point is connect to 5V supply voltage. In this project, CEM 5415E model red common anode display is used. This is a 13mm height (0.52inch) display with 12 pins. The pin configuration is as shown in Table (1).The display also has segment LED for the decimal point (http://www.wikipedia.org).

Fig. 2. The photo of PIC16F887 PDIP microcontroller

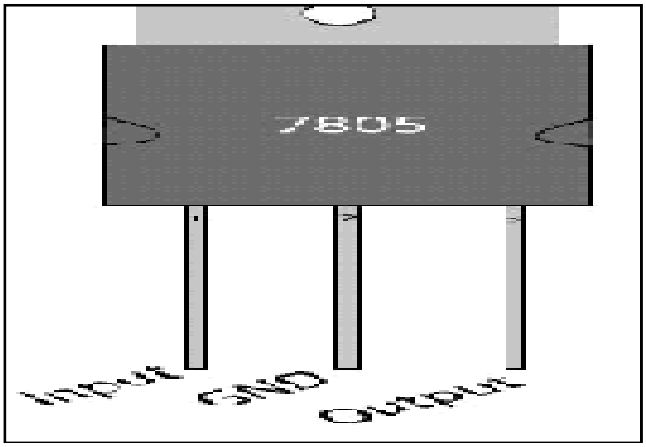

Fig. 3. 7805 Voltage Regulator IC

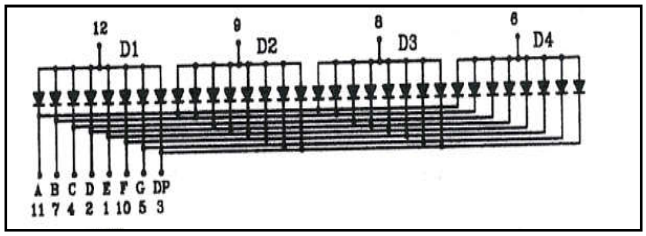

Fig. 4. A common-anode display the anodes of all the segment LEDs

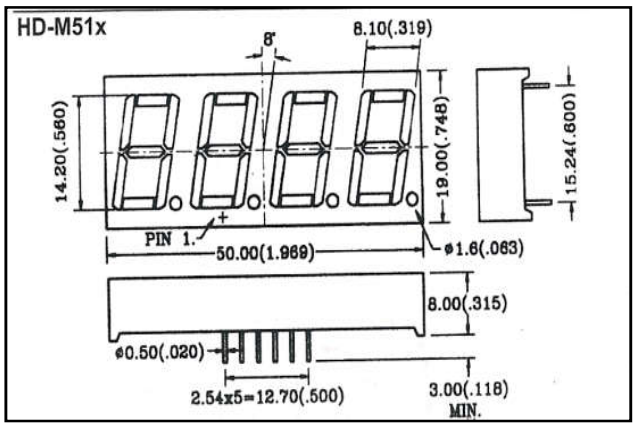

Fig. 5. The segment names of a typical 7-segment display

Fig (6) A 7-segment display basically consists of 7 LEDs

Table 1. CEM5415E pin configuration

Pin Number	Segment
1	E
2	D
3	Decimal Point
4	C
5	G
6	Common Anode
7	B
8	Common Anode
9	Common Anode
10	F
11	A
12	Common Anode

Flow Diagram: The flow diagram of the project is shown in Fig (7). At the beginning of the program, PORTC pin are configured as outputs and the display of LED1, LED 2, LED 3, LED 4 are turn off. Then the bit pattern to be sent to the display to show the value of variable display state is determined and the data is sent to the display.

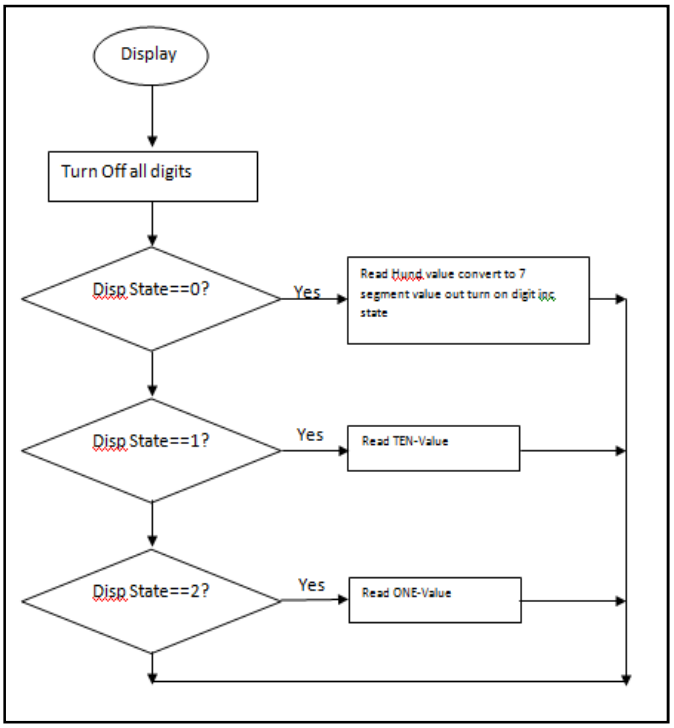

Fig. 7. Shown the flow diagram

RESULTS AND DISCUSSION

Many control applications require the measurement of analogue variables, such as voltage, temperature, pressure, speed and so on. Selected PIC Microcontroller incorporate analogue inputs, which are connected to an analogue to digital converter (ADC); this outputs a 10- bit binary representation of an input voltage. This result is then accurate to 1 part in 1024 (2^{10}), better than 0.1 % at full scale, and precise enough for most purpose. ADC module of PIC Microcontroller converts the signals on its analog pin to 10-bit binary data and it has software selectable high and low voltage reference input to some combination of V_{DD} ,V_{SS} , RA0 and RE3.The analog input to PIC is limited to V_{SS} and V_{DD} voltage (0-5V) of PIC Microcontroller. This circuit is designed to measure 0 to 230V. So it will be map 0 to 230V to 0 to 5V by using a voltage divider. Current through a circuit can be measured by introducing a 1Ω resistor and measuring the voltage across it.

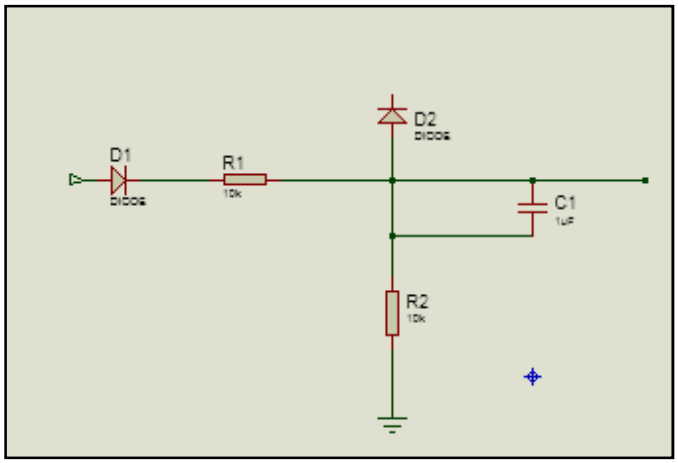

Fig. 8. Voltage Sampling circuit

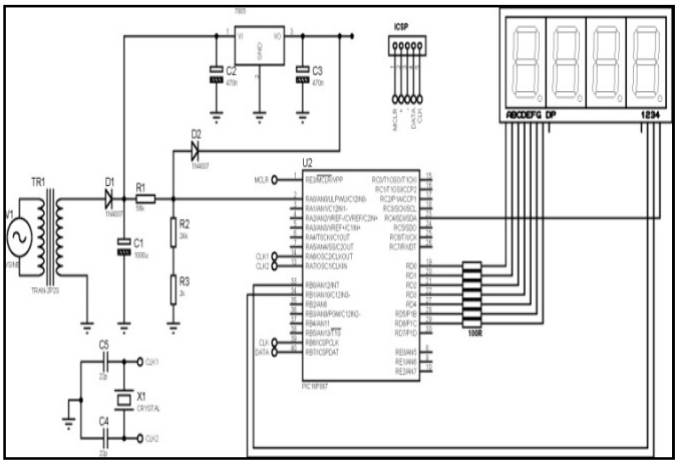

Fig. 9. The complete circuit diagram of AC Voltmeter

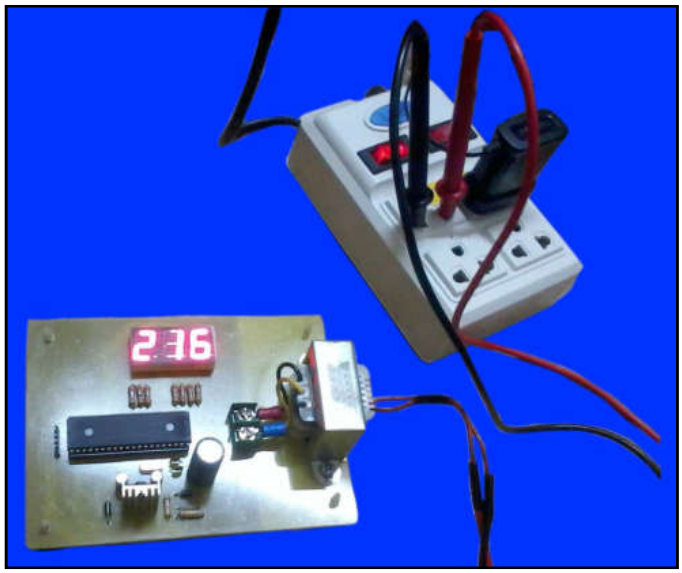

Fig. 10. The picture of the complete circuit diagram of the AC Volt meter

To minimize the path resistance will be use 5KΩ special resistor with fuse. Voltage Sampling circuit is shown in Fig (8). In this Project, the microcontroller is operated from a 4 MHz resonator and the voltage to be measured is applied to analog input AN0 of the Microcontroller. Therefore four digits are required to use for full voltage display. The detail schematic diagram of the AC voltmeter shown in Fig (9). A data processing program (firmware) has been developed and down loaded from the personal computer (PC) to the PIC Microcontroller. The picture of AC Voltmeter is shown in Fig (10).

Conclusion

This project is carried out by following implementation procedures:

The hardware of mid-range PIC device (PIC 16F887) can be studied .The compilation and downloading into the memory of PIC Microcontroller can be studied. The voltage divider circuit and the common –anode 7 segment LED display can be studied .Practical circuit design construction and faultfinding. The program will test and calibrate the correct values of display on 7-segment LEDs.

REFERENCES

Hutching H. 1995. “Interfacing with C” (lordon: Butterworh – Heinemann)
Penfold RA. 1997. “An Introduction to PIC Microcontroller” (England & Barnard Babani)
“http:// www.Microchip.com”
“http:// www.wikipedia.org”

****