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Development of Interfacing System For PIC Based Datalogger

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***Abstract*—** This paper discussed on the development of data logger system for data transferring using Visual Basic (VB) and MAX 232 connection protocols. The microcontroller of PIC16F877A is used as a main control unit (MCU) for sensors integration which MPLAB is used to write the program and assembly language. The Pic Based Data Logger will be able to log data such as inputs from a mixture of analogue and digital signals up to 4800 bits per second and it has RAM with capacity of 256 byte. The main idea for software interfacing is to store the data to eeprom and the data could be transferred to user computer. Thus desired output in term of graph or other plotting method can be generated for further analysis. Result shows the development techniques for user interfacing system for PIC based datalogger. The main circuit which consists of sensor datalogger for temperature was successfully developed and it can be interfaced with personal computer via serial communication

***Keywords*:** datalogger, Visual Basic

I. INTRODUCTION

Datalogger is an electronic device that records the output of a sensor. shock. There are variety of sensors that can measure physical quantities, ranging from speed, acceleration, position, temperature, and humidity. A single channel datalogger has a capability to record from only one sensor, while multi channel datalogger could have wide range of recording channels. Potential application of datalogger is highly demanded for portable data acquisitioning and monitoring. Typical applications for data loggers include agricultural research, automotive testing, and civil engineering, environmental monitoring and process control.

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II. DEVELOPMENT

The purpose of this work is to develop a multi purpose portable low cost datalogger that has a capability to log data from the attached sensor to its memory, and the data then can be transferred to a computer. A PIC microcontroller which are usually used for controlling purposes, are chosen as the 'base' for this data logger system. This is because of its low cost and eases of programming. Furthermore, it already consist of a built in Analog-to-Digital unit.

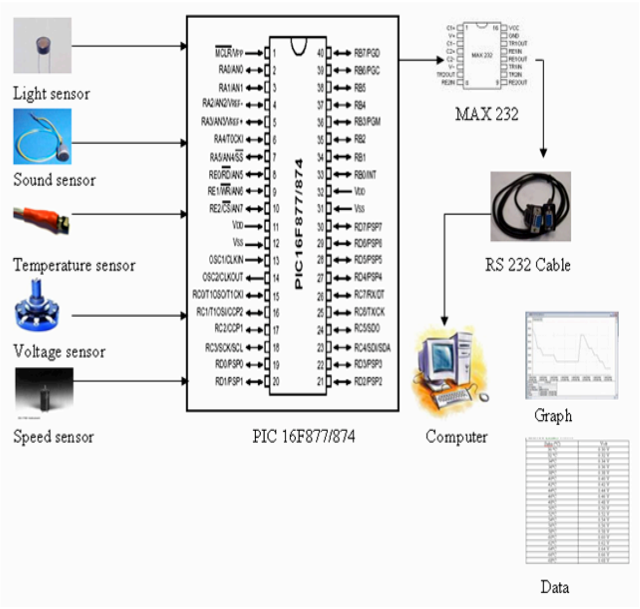


Figure 1. Configuration of PIC based datalogger

The PIC16F877A microcontroller as the main system unit is used. It will accept the analog output of the sensor signal from 0V to 5V range and stored them in the internal EEPROM. Data can then be sent to a PC via serial port using MAX-232 integrated circuit as the interfacing part. Figure 2 shows the PIC port configuration. A basic analysis software for downloading data and drawing graph are built by using Visual Basic platform.

III. Results and Discussions

The PIC based datalogger are able to read analog data from sensor, stored it in its EEPROM and transfers data to a PC flawlessly. For this study, the data logger is connected to a LM35DZ temperature sensor. The sensor is configured to read temperature between 30°C to 100°C. The output is in a form of analog voltage shown in table 1. The voltage are read by the PIC and stored in the EEPROM with the corresponding HEX value.

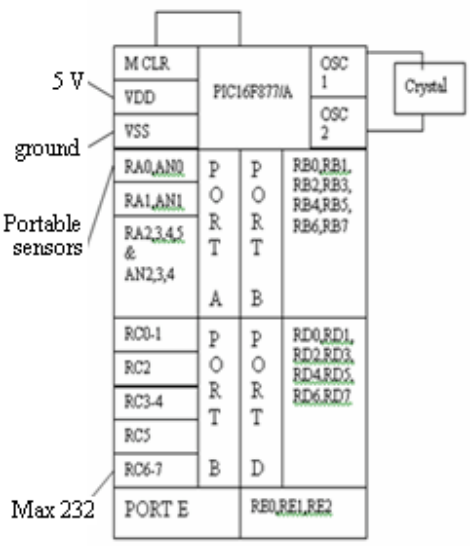


Figure 2. PIC port configuration

The temperature sensing in term of heat detection is sensed by LM35DZ device. The supply voltage for the sensor should be above 4 V and not more than 20V. If the supplied voltage is less from the range, thus, the sensor could not operate properly.

Data stored can be transferred to a PC via RS-232 port. RS-232 is a standard for serial binary data interconnection between a *DTE* (Data terminal equipment) and a *DCE* (Data Circuit-terminating Equipment). It is commonly used in computer serial ports which data is sent as a time-series of bits. Hyper Terminal test on com port is necessary to ensure that the RS-232 circuit which is connected to both computer and PIC is working precisely. Once the COM port cable is connected to the circuit we may check which COM Port it is connected to. This can be done by right click at My Computer → Properties → Hardware → Device Manager → Ports (COM & LPT). After that echo test on COM Port is done to confirm the existence of the connection.

The data that has been collected by the portable sensors could be analyzed further using the development of Visual Basic software for visual integration. Figure 3 shows the Visual Basic interface of the data logger. The data could be statistically analyzed in term of graph or other desired method. As an alternative, data can also be saved as a text file so that it can be imported to spreadsheet application for other complex calculation.

The portable sensors circuit was assembled using software such as ORCAD or PCB Wizard. The wires connection and component will be arranged and placed automatically. Once the design is complete, the *gerber* data then need to be print out for the next process to make a PCB. Figure 4 shown the designed of the portable temperature sensor for PIC based datalogger.

Table 1. Temperature sensing with Voltage output

Temperature (°C)	Output voltage (V)	EEPROM (HEX)
30	0.30	0F
32	0.32	10
34	0.34	11
36	0.36	12
38	0.38	13
40	0.40	14
42	0.42	15
44	0.44	16
46	0.46	17
48	0.48	18
50	0.50	19
52	0.52	1A
54	0.54	1B
56	0.56	1C
58	0.58	1D
60	0.60	1E
62	0.62	1F
64	0.64	20
66	0.66	21
68	0.68	22
70	0.70	23
72	0.72	24
74	0.74	25
76	0.76	26
78	0.78	27
80	0.80	28
82	0.82	29
84	0.84	2A
86	0.86	2B
88	0.88	2C
90	0.90	2D
92	0.92	2E
94	0.94	2F
96	0.96	30
98	0.98	31
100	1.00	32

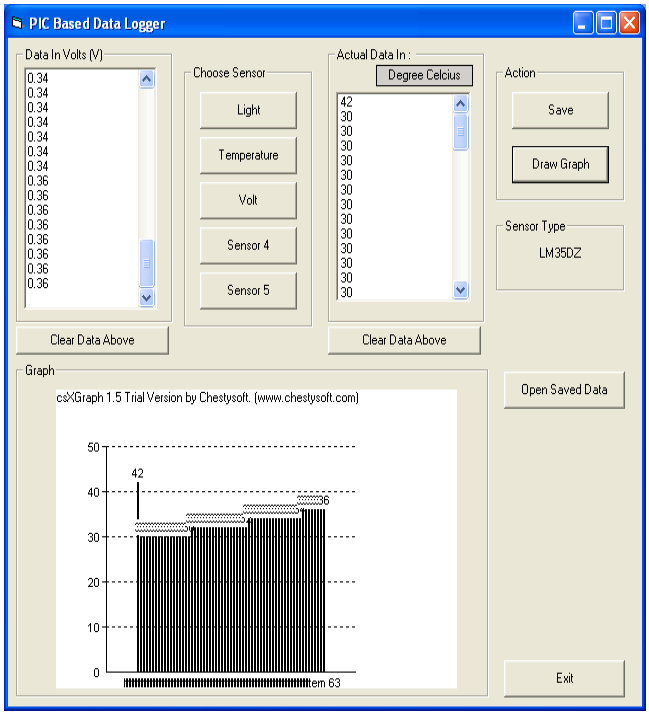
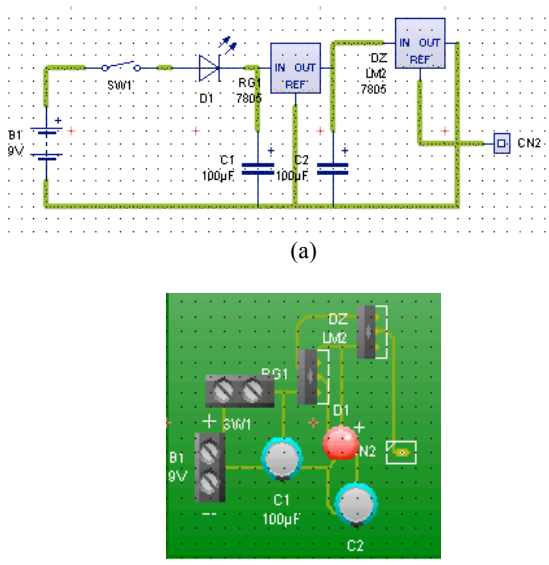


Figure 3. The Visual Basic interface for datalogger



(a)

(b)

Figure 3. The design of portable temperature sensor with (a) circuit schematic diagram, and (b) PCB assembled

IV. CONCLUSIONS

The design consideration of portable sensors of datalogger was presented. The datalogger is low cost, low power consumption, and use plug and play method to communicate with personal computer. The development of Visual Basic is useful for data analysis and manipulation. Results of the datalogger proved that it can be operated as other data logger available in the market.

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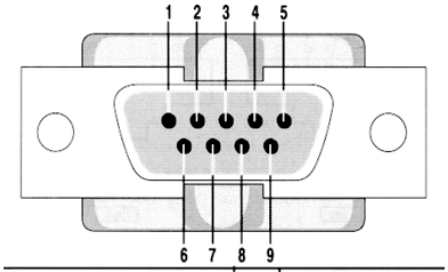
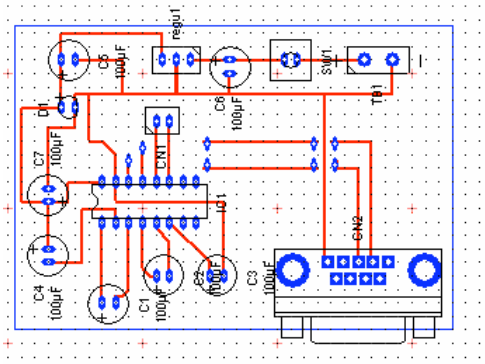
APPENDIX

App. A: RS-232 Port configuration



Pin	Signal	Pin	Signal
1	Data Carrier Detect	6	Data Set Ready
2	Received Data	7	Request to Send
3	Transmitted Data	8	Clear to Send
4	Data Terminal Ready	9	Ring Indicator
5	Signal Ground		

App. B: RS-232 Circuit for Datalogger



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