



Devices Interfacing with PC using 8-bit Serial Port Communication and Visual Basic 2010

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Abstract—The aim of this project is to control home and other electronic devices via pc using serial port 8-bit communication and a software developed using VisualBasic.net2010 this project is not only use for controlling home devices but also have other feature.

Keywords—Microcontroller AT89C51; Visualbasic.net; Serial port; LPG sensor; Smoke Sensor;

I. INTRODUCTION

An electronics switch is a device which has electronic control assembly attached to it. They are provided with an access control system. This system allows the user to control the device with software which is developed and designed using visualbasic.net2010 serial port communication. The code is entered by virtual Button made in Application. The user can also set his home login password to ensure better protection. The major components include a microcontroller AT89C51 which belongs to AT89C51 series of Microcontrollers. The main features of this system is to that they automatically off the main power supply after finding leakage LPG gas and smoke. And also help user to monitor the status of different devices connecter to pc. This paper is divided into three sections. Section-1 is the introduction. In Section-2 we have presented the overview of the technology used. Section-3 represent framework of the system.

II. OVERVIEW OF THE TECHNOLOGY

Visual Basic .NET (VB.NET) is an object-oriented computer programming language that can be viewed as an evolution of the classic Visual Basic (VB),[1] implemented on the .NET Framework. Here we are develop a three page software using VB.NET the first page is for signup in the software with user name and password (see Fig 2) second page for login (see Fig 3) Using Visual basic we have created a pc driver (software) using VisualBasic2010 the control page (see Fig 4) have many keys for different devices they are programmed in a manner that when they pressed they sending 8-bit data (1 byte hex code) serially through serial port of pc at baud rate 9600 baud. The application we are going to create is known as an electronic library. This electronic library will be able to accept the user registration as well as handling login command that require the user's password, thus enhancing the security aspect of the database. Basically, the application will constitute a registration menu, a welcome menu, a Login menu and the main database menu. The sequence of the menus are illustrated (see Fig 1)

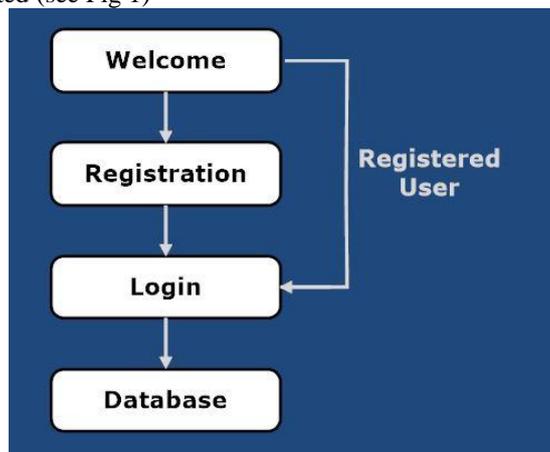


Fig. 1: The Sequence of the Menus.

Most serial ports on personal computers conform to the RS-232C or RS-422 standards.[2][3] This protocol requires a voltage between -3 V to -15 V to represent binary 1, and a voltage between +3 V to +15 V to represent binary 0. For CMOS and TTL communication, this is incompatible since TTL uses 5 V to represent binary 1 and 0 V to represent binary 0. This chip therefore performs the necessary protocol conversion of the electrical voltage levels in both directions, we are using serial port in a general-purpose interface that can be used for almost any type of device, including modems,

mice, and printers We are also providing password protection feature. First data is received on receiver pin of IC MAX232, MAX232 is a hardware layer protocol converter IC manufactured by the Maxim Corporation. Commonly known as a RS-232 Transceiver, it consists of a pair of drivers and a pair of receivers. At a very basic level, the driver converts TTL and CMOS voltage levels to TIA/EIA-232-E levels, which are compatible for serial port communications. After regulates the voltage according to microcontroller. MAX232 transmits the data to the receiver pin of microcontroller 89C51,[4] now microcontroller verifies the on-off condition of the device by checking the 8th bit of data. at INTO pin of microcontroller a reset button is used which sets port data of all the devices to initial state.

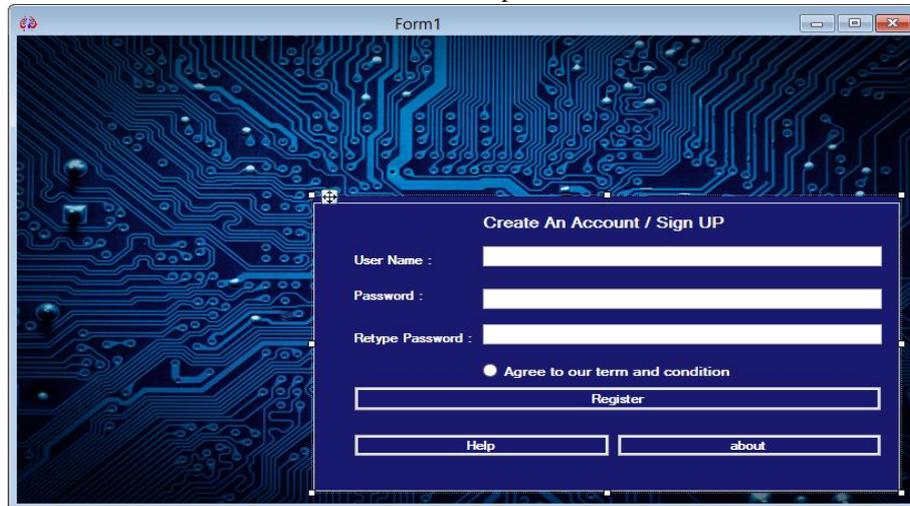


Fig. 2: The signup page

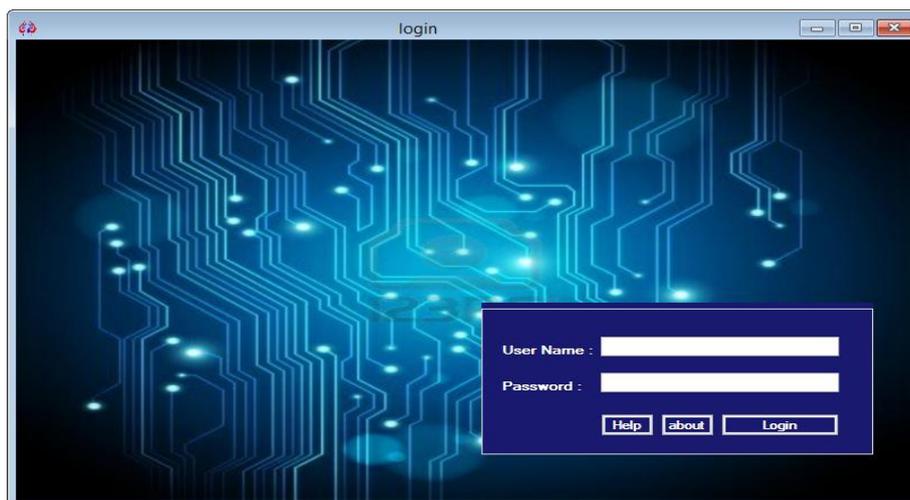


Fig. 3: The Login page.

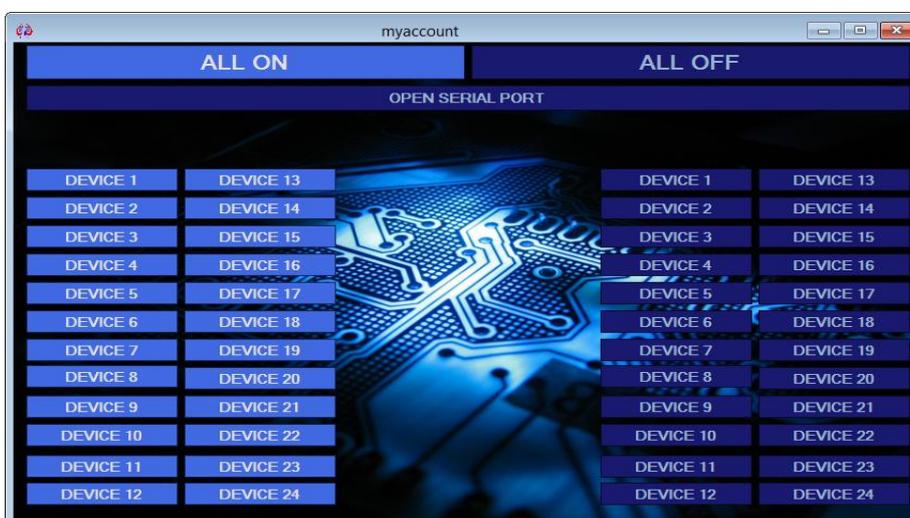


Fig. 4: The Control page.

The last page is for controlling devices using buttons provided in last page (see Fig 3) once user signup then user do not have signup again and again. The second page which is login page is first appearing by opening the software after installation. Different Buttons have different particular code. After pressing button the code is sent in to serial port (see Fig 4) which is received by microcontroller AT89C51

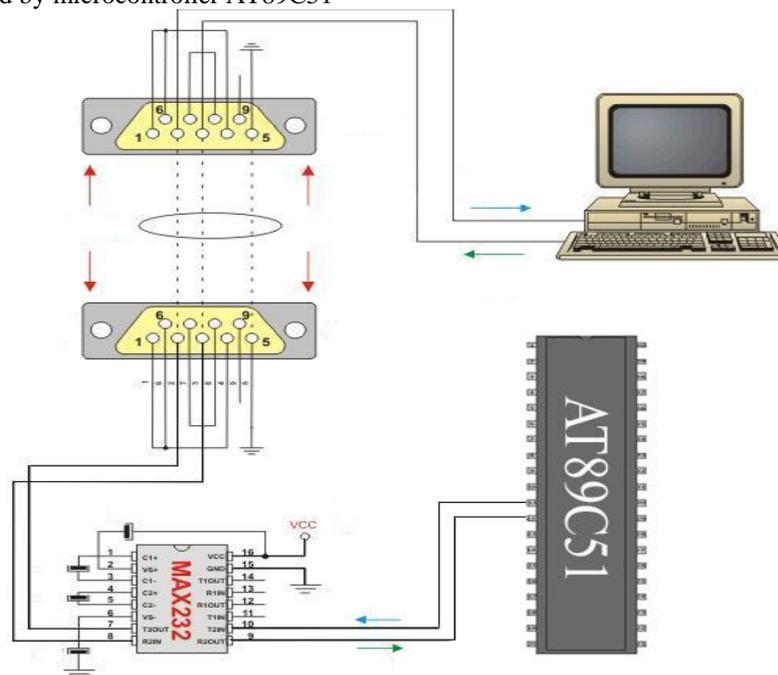


Fig. 5: Serial port communication using RS232

The serial port is a type of connection on PCs that is used for peripherals. It is sometimes called a COM port or an RS-232 port, which is its technical name. In telecommunications, RS-232 is the traditional name for a series of standards for serial binary single-ended data and control signal. Serial communication is popular because most computers have one or more serial ports, so no extra hardware is needed other than a cable to connect your instrument to the computer (or two computers together).[5] connecting between DTE (data terminal equipment) and DCE (data circuit-terminating equipment, originally defined as data communication equipment). It is commonly used in computer serial ports. The standard defines the electrical characteristics and timing of signals, the meaning of signals, and the physical size and pinout of connectors.

Data is transmitted serially in one direction over a pair of wires. Data going out is labeled Tx (indicating transmission) while data coming in is labelled Rx (indicating reception). To create a two way communication system a minimum of three wires are needed Tx, Rx and GND (ground). Crossing over Tx & Rx between the two systems lets each unit talk to the opposite one. Each byte can be transmitted at any time (as long as the previous byte has been transmitted). The transmitted byte is not synchronized to the receiver - it is an asynchronous protocol i.e. there is no clock signal. For this reason software at each end of the communication link must be set up exactly the same so that each serial decoder chip can decode the serial data stream.

III. FRAME WORK OF THE SYSTEM

A. Block Diagram

The heart of this system is a Microcontroller, which is configured by programming in Embedded C language for AT89C51 Microcontroller (see Fig 5) AT89C51 microcontroller is programmed in such a way so that it will drive the relays according to the sensors input and serial port input.[6]

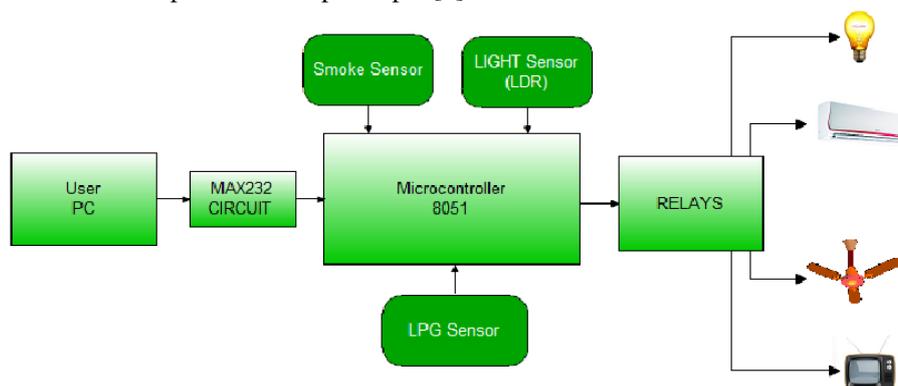


Fig. 6: Block diagram of the system

B. Over View of Hardware

port 0 ,port 2, port 3 of this microcontroller can be used to control devices like television, fan, bulb etc. along with relays.[7] As shown above in block diagram smoke sensor, light sensor, and LPG sensor have attached at pin p1.0, p1.1, p1.2 In the hardware description we have controlled LEDs at port0.

C. LPG gas sensor unit

This is a simple to use LPG Gas Sensor Module which can sense the presence of combustible gases mainly LPG, isobutane, and propane in the air. The module uses our MQ-6 sensor. It simplifies interface to the odd pin spacing of the sensor and provides interface through 4 0.1" header pins. It provides both an analog output corresponding to the concentration of the gases in the air and an easy to use digital output. The on board potentiometer can be used to set the maximum gas concentration beyond which the digital output gets triggered. [8][9] Just power the module with 5V, set the threshold and you may get the output! An on board LED signals the presence of any gas. The digital output can be easily interfaced to microcontrollers and other circuits. The analog output can be hooked up to an ADC of a microcontroller to get a wide range of sensor reading. Here in our application output of gas sensor is input of microcontroller at port 0.1, when input of microcontroller at port 0.1 is one i.e. gas sensor is sensing gas then according to program at microcontroller we have done microcontroller will switch off all home devices. This also safety measure for home devices we have additionally done.

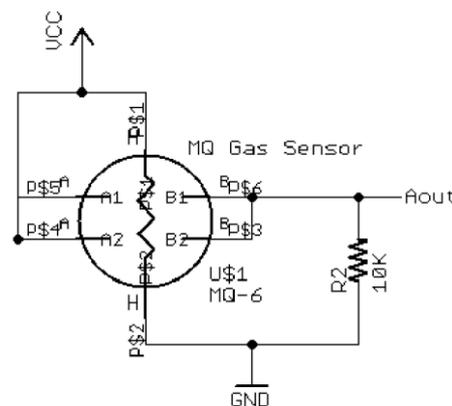


Fig. 7: LPG gas sensor unit

D. Visual Basic 2010

Visual Basic is modern, high-level, multi-paradigm, general-purpose programming language for building apps using Visual Studio and the .NET Framework. Visual Basic is not only a programming language, but also a complete graphical development environment. This environment allows users with little programming experience to quickly develop useful Microsoft Windows applications which have the ability to use OLE (Object Linking and Embedding) objects,[10] such as an Excel spreadsheet. Visual Basic also has the ability to develop programs that can be used as a front end application to a database system, serving as the user interface which collects user input and displays formatted output in a more appealing and useful form than many SQL versions are capable of.

E. Atmel AT89C51

The AT89C51 is a low-power, high-performance CMOS 8-bit microcomputer with 4K bytes of Flash Programmable and Erasable Read Only Memory (PEROM). The device is manufactured using Atmel's high density nonvolatile memory technology and is compatible with the industry standard MCS-51™ instruction set and pinout. The on-chip Flash allows the program memory to be reprogrammed in-system or by a conventional nonvolatile memory programmer. By combining a versatile 8-bit CPU with Flash on a monolithic chip, [11][12] the Atmel AT89C51 is a powerful microcomputer which provides a highly flexible and cost effective solution to many embedded control applications. The microcontroller AT89C51 has an inbuilt UART for carrying out serial communication. The serial communication is done in the asynchronous mode. A serial port, like other PC ports, is a physical interface to establish data transfer between computer and an external hardware or device. This transfer, through serial port, takes place bit by bit. The 8051 has an integrated serial port so we can very easily read and write serial port data. Write a bits into a serial port would be a rather tedious process requiring turning 0 and 1 one of the I/O port in rapid succession to properly clock out each individual bit including parity bit, stop bit start bit, simply we need to configure the serial ports baud rate(9600) in operation mode. [13] Once all setup configured, all we write to an SFR to write a value to the serial pin or input the same SFR to input a value from the serial port. The AT80C51 automatically let us know that it finished sending the bit character we wrote and also let us know when microcontroller received a bite so we take further process. We do not have to worry about bit level transmission that saves us processing time and save us quite a bit.

IV. CONCLUSIONS

In this paper we have presented a model for control home and other electronic devices via pc using serial port and a software developed using VisualBasic.net2010 further that we also design a hardware model and test the whole design successfully.

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