

Controlling and Monitoring Of GUI Based Devices Using MATLAB

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Abstract

In this project we have made a PC based system which will control various devices like Motor, Light, and Fan etc. with the help of PC. In this project we have designed a special GUI (Graphical User Interface) on MATLAB software which will help us to give commands to system. We have used Microcontroller in order to receive commands from PC and accordingly control the devices connected to it. In this way this system is completely controlled by PC from remote location. In today's world there is high demand for PC based control system because of its various advantages over manual control system, PC based control systems are highly reliable, accurate and time saving systems, they provide number of features like quick data storage, data transfer and data security which help industries to work in efficient manner.

Index Terms — MATLAB, GUI, Microcontroller AT89C51

I. INTRODUCTION

This Automation is today's fact, where more things are being completed every day automatically, usually the basic tasks of turning ON or OFF certain devices and beyond, either remotely or in close proximity. The control of the devices when completely taken over by the machines, the process of monitoring and reporting becomes more important. Depending on the location of its usage, automation differs in its name as industrial automation, home automation etc. With the development of low cost electronic components home automation migrated from being an industrial application to home automation. The home automation, our point of concern deals with the control of home appliances from a central location. Market researches claim that most of the homes will be equipped with home automation systems in the very near future. The whole process of supervising, controlling and monitoring electrical devices and equipment's from electric power stations and the distribution grids is based on automation, protection, data acquisition and equipment control. A popular application in this field, which is in highly demand, involves controlling the power equipment in the building, such as the motor, heater, lamp and air conditioner.

In this project the user specified embedded program is entered into the computer and downloaded from the computer to the microcontroller using serial connection between them. Further the computer acts as a host for an interactive GUI for the user so as to control the various devices connected to

the microcontroller.

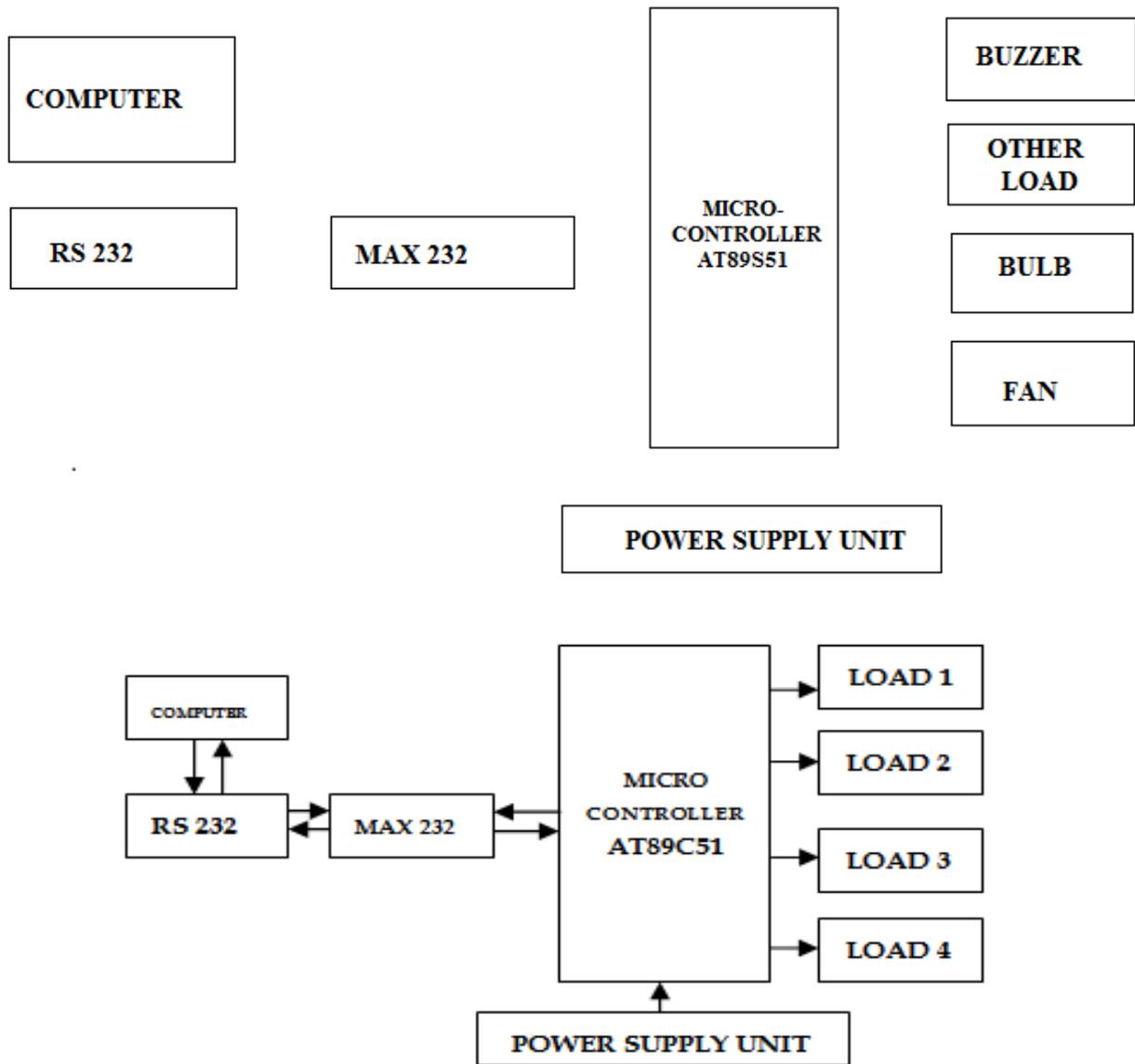
The problem of power management is the remote control adjustment, which is a result from consumers' carelessness. Microcontrollers are suitable in low-cost control applications. There are many trade-offs that are addressed during the control system design, of which control allocation is an integral part, dictate the need for a reliable, computer-based design tool. The proposed system architecture, considering both the hardware and software elements involved is essential in this new era. There are various applications with built in controllers and ready for internet access which may be too expensive and complicated to build whereas this is a dedicated application which is cost effective. The next section will briefly introduce the units in the automation system.

The device controller consists of two sections of software and hardware. As software MATLAB is used because it already consists of Graphical User Interface (GUI) tool. The microcontroller reads the data from the computer therefore turning on the devices accordingly. IC is used to activate the relays to turn ON/OFF the home appliances. A pair of transistor is required by every relay to operate in order to provide high current. Using relay isolation from ac to dc is carried out and also the switching is done easily. The device controller generally can be referred as an example of master slave communication where all devices act as slave being controlled by the single PC acting as master. Here the computer is the main controlling unit that the operation of RS232 convertor with the AT89C51 microcontroller circuit system that

is referred to as a slave unit. To interface the USB port of the computer with the system developed, the USB-to-RS232 convertor is used. The USB port as a serial port protocol is initialized by the driver of USB-to-RS232 convertor. By transforming the RS232 levels back to 0 and 5 Volts with the use of common level connector that is MAX232 the CMOS level is converted into Transistor Transistor Logic.

The receiver transmitter pin of MAX 232 is connected to receiver transmitter pin of microcontroller. The MAX232 is used with five 1 μ F capacitors to adjust the voltage level difference between the PC based logic and controller based logic.

II. 2 HARDWARE



1) Computer: We have used computer in order to give commands to the system with the help of RS 232 protocol commands will be given through special GUI.

2) RS 232 Protocol: it has been used in order to do serial communication with for this we have used MAX 232 as level converter.

3) MICRO-CONTROLLER (8051): this is the most important segment of the project. The controller is responsible for detection and polling of the peripherals status. It is responsible for making. It is responsible for prioritizing all the devices attached to it. We have used the P89C51 microcontroller. The P89C51 is a low-power, high-performance CMOS 4-bit microcontroller with 64K bytes of in-system programmable Flash memory. It has got 32 I/O lines two

data pointers, two 16-bit timer/counters, six-vector two-level interrupt architecture, a full duplex serial port, on-chip oscillator, and a clock circuitry.

Features of microcontroller AT89C51

4K Bytes of In-system Programmable Flash Memory Endurance. 1,000 Write / Erase Cycles. Fully Static Operation: 0 Hz to 24 MHz. Three-level Program Memory Lock. 128 x 8-bit Internal RAM. 32 Programmable I / O Lines. Two 16-bit Timer/Counters. Six Interrupt Sources. Programmable Serial Channel. Low-power Idle and Power-down Modes. 64 KB of on-chip flash program memory with ISP (In-System Programming) & IAP (In Application Programming). 5V operating voltage from 0 to 40 MHz. SPI (Serial Peripheral interface). 1 KB RAM. 32 I/O lines. Programmable counter array. Eight interrupt sources with four priority levels. Four 8-bit I/O ports. Low EMI mode (ALE inhibit). System Application Three 16-bit Timer/Counter Accumulator

4) Light: We have used LED s in order to represent lamp in the normal day to day life and showing the current situation of device whether is ON or OFF.

5) RELAY: We have used relay. It will perform the function of switch; it can be used in various applications. A relay will switch one or more *poles*, each of whose contacts can be *thrown* by energizing the coil in one of three ways:

1. *Normally- open (NO) contacts* - Normally-open (NO) contacts connect the circuit when the relay is activated; the circuit is disconnected when the relay is inactive. It is also called a Form A contact or "make" contact. NO contacts can also be distinguished as "early-make" or NOEM, which means that the contacts will close before the button or switch is fully engaged.

2. *Normally-closed (NC) contacts* - Normally-closed (NC) contacts disconnect the circuit when the relay is activated; the circuit is connected when the relay is inactive. It is also called a Form B contact or "break" contact. Contacts can also be distinguished as "late-break" or NCLB, which means that the contacts will stay, closed until the button or switch is fully disengaged.

3. *Change-over (CO), or double-throw (DT), contacts control two circuits* - one normally-open contact and one normally-closed contact with a common terminal. It is also called a Form C contact or "transfer" contact ("break before make"). If this type of contact utilizes "make before break" functionality, then it is called a Form D contact.

Functions of the relays -

Relays are used throughout the automobile. Relays which come in assorted sizes, ratings, and applications, are used as remote control switches. A typical vehicle can have 20 relays or more since relays are switches, the terminology applied to switches is also applied to relays.

6) Interfacing the Serial / RS232 Port: The Serial Port is harder to interface than the Parallel Port. In most cases, any device you connect to the serial port will need the serial transmission converted back to parallel so that it can be used. This can be done using a UART.

7) Power Supply: There are many types of power supply. Most are designed to convert high voltage AC mains electricity to a suitable DC voltage supply for electronic circuits and other devices. We have used 5 Volt power supply. we have designed a special GUI on PC, For this we have used Visual C language this GUI contains various Tabs for various instruments connected in the system, for example the Button No 1 can be used to control the device which is connected in the system at position 1. Once any Button is pressed by user PC will send command to Microcontroller with the help of standard serial communication protocol

The RS 232 standard is used in order to perform serial communication with Microcontroller standard 9600 baud rate is used in order to perform the serial communication

III. Advantages

This project can be effectively and conveniently utilized for the control of different appliances. As this project could be extended to control about 4 devices, this could be used for computerization of an office, home, or a firm. Though it is quiet costlier, the circuit is simple and the working mechanism could be easily understood. An added advantage of this project is that we are able to know the status of the device to be controlled. The program to control the appliances is written in C language which is more users friendly and easy to understand than other programming languages. In today's world there is high a demand for PC based control system because of its various advantages over manual control system. PC based control systems are highly reliable, accurate and time saving systems; they provide number of features like quick data storage, data transfer and data securities which help industries to work in efficient manner. By using remote system that is PC or Laptop we can save time. The circuit is very simple and hence it requires very less maintenance is required.

IV. Conclusion

The project was aim the objective to control and monitor a device in several location then display

at computer. Besides, success to develop a GUI by using visual basic for measurement.

Where more things are being completed every day automatically, usually the basic tasks of turning on or off certain devices and beyond, either remotely or in close proximity. The control of the devices when completely taken over by the machines, the process of monitoring and reporting becomes more important. The device controller generally can be referred as an example of master slave communication where all devices act as slave being controlled by the single PC acting as master. Here the computer is the main controlling unit that governs the operation of RS232 convertor with the AT89C51 microcontroller circuit system that is referred to as a slave unit.

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