

EMBEDDED PASSWORD BASED ACCESS CONTROL SYSTEM USING 12C PROTOCOL

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Abstract:

The project is designed for access control with the help of a password only. A keypad is connected to the project to enter the password. For example, fatal electrical accidents to the line man are increasing day by day during the electric line repair due to lack of communication and coordination between the maintenance staff and the electric substation staff. The system is fully controlled by a microcontroller from the 8051 family. A matrix keypad is interfaced to the microcontroller to enter the password. The entered password is compared with the password stored in the EEPROM interfaced to the microcontroller of the 8051 family. If the password entered is correct, then only the line can be turned on/off. Activation / deactivation of the circuit breaker are indicated by a lamp (on/off) provided in the project.

Keywords — MICROCONTROLLER (AT89S52/C51), MATRIX KEYPAD, EEPROM, EMBEDDED SYSTEM.

I. INTRODUCTION

An Embedded system is a combination of hardware and software and perhaps additional mechanical or other parts, designed to perform specific functions. Embedded Systems is a

microcontroller-based, software driven, reliable, real time control system, autonomous, or human or network interactive, operating on diverse physical variables and in diverse environments and sold into a competitive and cost-conscious market.

An Embedded System is not a computer system that is used primarily for processing, not a software system on PC or UNIX, not a traditional

business or scientific application. High-end and Low-end embedded systems. High-end embedded system-Generally 32,64 Bit controllers are used with OS. Examples personal digital assistant and mobile phones etc. Lower end embedded systems-Generally 8,6 Bit controllers used with an minimal operating systems and hardware layout designed for the specific purpose .Examples small controllers and devices in our everyday life like washing machine, microwave ovens, where they are embedded in.

SYSTEM DESIGN CALLS:

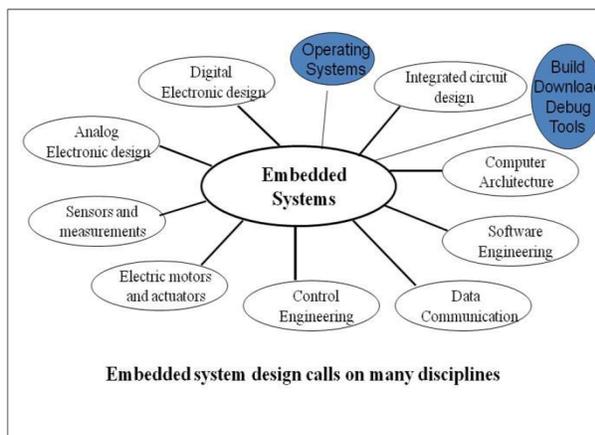


Figure :SYSTEM DESIGN CALLS

Characteristics of Embedded System

An embedded system is any computer system hidden inside a product other than a computer.

- They will encounter a number of difficulties when writing embedded system software in addition to those we encounter when we write applications
 - Throughput – Our system may need to handle a lot of data in a short period of time.

- Response–Our system may need to react to events quickly
- Testability–Setting up equipment to test embedded software can be difficult.
- Debugability–Without a screen or a keyboard, finding out what the software is doing wrong (other than not working) is a troublesome problem.
- Reliability – embedded systems must be able to handle any situation without human intervention.
- Memory space – Memory is limited on embedded systems, and you must make the software and the data fit into whatever memory exists.
- Program installation – you will need special tools to get your software into embedded systems.
- Power consumption – Portable systems must run on battery power, and the software in these systems must conserve power.
- Processor hogs – computing that requires large amounts of CPU time can complicate the response problem.
- Cost – Reducing the cost of the hardware is a concern in many embedded system projects; software often operates on hardware that is barely adequate for the job.

- Embedded systems have a microprocessor/ microcontroller and a memory. Some have a serial port or a network connection. They usually do not have keyboards, screens or disk drives.

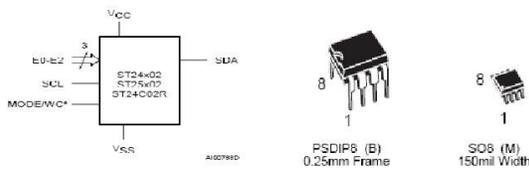
APPLICATIONS

- 1) Military and aerospace embedded software applications
- 2) Communication Applications
- 3) Industrial automation and process control software
- 4) Mastering the complexity of applications.
- 5) Reduction of product design time.
- 6) Real time processing of ever increasing amounts of data.
- 7) Intelligent, autonomous sensors.

CLASSIFICATION

- Real Time Systems.
- RTS is one which has to respond to events within a specified deadline.
- A right answer after the dead line is a wrong answer

EEPROM



Description

The AT24C01A/02/04/08A/16A provides 1024/2048/4096/8192/16384 bits of serial

electrically erasable and programmable read-only memory (EEPROM) organized as 128/256/512/1024/2048 words of 8 bits each. The device is optimized for use in many industrial and commercial applications where low-power and low-voltage operation are essential. The AT24C01A/02/04/08A/16A is available in space-saving 8-lead PDIP, 8-lead JEDEC SOIC, 8-lead Ultra-Thin Mini-MAP (MLP 2x3), 5-lead SOT23 (AT24C01A/AT24C02/AT24C04), 8-lead TSSOP, and 8-ball dBG2 packages and is accessed via a Two-wire serial interface. In addition, the entire family is available in 2.7V (2.7V to 5.5V) and 1.8V (1.8V to 5.5V) versions.

BLOCK DIAGRAM

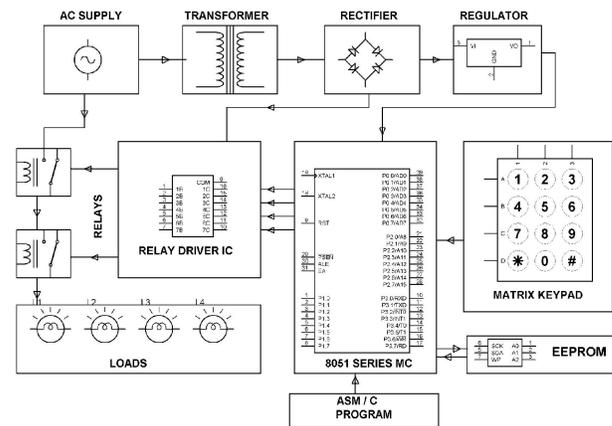


Figure: Block diagram

As shown in the above figure it mainly consists of 8051 micro controller which acts as a controller which controls whole device. The EPROM is used as a storage device to store the passwords. The relay driver IC which controls the relay present in the circuit. The relays act as a magnetic switch .

KEIL MICRO VISION (IDE)

Keil an ARM Company makes C compilers, macro assemblers, real-time kernels, debuggers, simulators, integrated environments, evaluation boards, and emulators for ARM7/ARM9/Cortex-M3, XC16x/C16x/ST10, 251, and 8051 MCU families.

Keil development tools for the 8051 Microcontroller Architecture support every level of software developer from the professional applications engineer to the student just learning about embedded software development. When starting a new project, simply select the microcontroller you use from the Device Database and the μ Vision IDE sets all compiler, assembler, linker, and memory options for you.

Keil is a cross compiler. So first we have to understand the concept of compilers and cross compilers. After then we shall learn how to work with Keil.

EMBEDDED C

Use of embedded processors in passenger cars, mobile phones, medical equipment, aerospace systems and defence systems is widespread, and even everyday domestic appliances such as dish washers, televisions, washing machines and video recorders now include at least one such device.

Because most embedded projects have severe cost constraints, they tend to use low-cost processors like the 8051 family of devices considered in this book. These popular chips have very limited resources available most such devices have around 256 bytes (not megabytes!) of RAM,

and the available processor power is around 1000 times less than that of a desktop processor. As a result, developing embedded software presents significant new challenges, even for experienced desktop programmers. If you have some programming experience - in C, C++ or Java - then this book and its accompanying CD will help make your move to the embedded world as quick and painless as possible.

OPERATION EXPLANATION

Connections:

The output of power supply which is 5v is connected to the 40th pin of microcontroller and around is connected to the 20th pin. Pin 0.1 to pin 0.7 of port 0 of microcontroller is connected to pull-up resistors. Pin 0.1 to pin 0.4 of port 0 are shorted and connected to the pins 1 to 4 of ULN2003. The Pin 9 i.e, com pin of ULN2003. The pin 9 i.e., COM pin of ULN2003 is given 12v. Pins 16 to 13 of relay driver i.e., ULN2003 are connected to relays. Pin 2.0 to pin 2.7 of port 2 of microcontroller is connected to data lines of LCD display. Pin 0.5, pin 0.6 pin 0.7 of port 0 of microcontroller are connected to Read, Write & Enable pins of LCD. Pin 1.0 to pin 1.3 of port 1 of microcontroller are connected to Rows of keypad and pin 1.4 to pin 1.6 of port 1 of MC are connected to columns of keypad.

STANDARD CONNECTIONS TO 8051

SERIES MICRO CONTROLLER

ATMEL series of 8051 family of micro controllers need certain standard connections. The actual number of the Microcontroller could be “89C51”, “89C52”, “89S51”, “89S52”, and as regards to 20 pin configuration a number of “89C2051”. The 4 set of I/O ports are used based on the project requirement. Every microcontroller requires a timing reference for its internal program execution therefore an oscillator needs to be functional with a desired frequency to obtain the timing reference as $t = 1/f$.

A crystal ranging from 2 to 20 MHz is required to be used at its pin number 18 and 19 for the internal oscillator. It may be noted here the crystal is not to be understood as crystal oscillator It is just a crystal, while connected to the appropriate pin of the microcontroller it results in oscillator function inside the microcontroller. Typically, 11.0592 MHz crystal is used in general for most of the circuits using 8051 series microcontrollers. Two small value ceramic capacitors of 33pF each is used as a standard connection for the crystal as shown in the circuit diagram.

Scope for Future Development

This can also be used in coal mines which is another situation where huge loss of life occurs Furthermore; the project can be enhanced by integrating a GSM module such that the password can be sent over a GSM network for the user to change/enter the password for a more secured

system to remotely control the circuit breaker via SMS.

CONCLUSIONS

The objective of the project is to design, simulate and assemble an embedded password based access control system using I2C protocol, to reduce the deaths of the line man due to improper maintenance staff or any other reason. This is achieved in this project by using password based control system using microcontrollers and relays as some main components using embedded system. Forming the assembled block diagram proved to be difficult initially. After several attempts, the correct structure of the system was formulated. Understanding the syntax for programming and assembling it with hardware was a challenging process.

ACKNOWLEDGMENT

The heading of the Acknowledgment section and the References section must not be numbered.

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