

I-Button based Access Control System

M. Raga Divya¹, M.Anusha², G.Nagalakshmi³ and J.Nagalakshmi⁴

Department of Electronics and Communication Engineering
Vignan's Lara Institute of Technology And Science
Guntur, Andhra Pradesh, India

Abstract— Automation is the most frequently spelled term in the field of electronics. The hunger for automation brought many revolutions in the existing technologies. One among the technologies which had greater developments is I-Button technology. In this work, a security system is developed for the bank with intruder based door open and close along with an I-Button. The result of this is the I-Button which transmits a unique identification number. This number transmitted by the I-button can be read with the help of an I-Button reader. We make use of both of these devices to construct an automatic security access control system. The authentication to the house or industry can be provided in full or limited depending on the I-Button technology. The decisions like full access or limited access are taken by an onboard computer to which the I-Button reader is interfaced. The doors of the house or industry form the output module and are interfaced to the same onboard computer. This onboard computer consists of number of input and output ports. The onboard computer is commonly termed as microcontroller. The input and output port of the controller are interfaced with different input and output modules depending on the requirements. In other words microcontroller acts as a communication medium for all the modules involved in the project. The device also consists of graphical LCD which displays the information about doors open and close.

Keywords—Automation; authentication; microcontroller; LCD

I. INTRODUCTION

An embedded system is a combination of software and hardware to perform a dedicated task. Some of the main devices used in embedded products are Microprocessors and Microcontrollers. Microprocessors are commonly referred to as general purpose processors as they simply accept the inputs, process it and give the output. In contrast, a microcontroller not only accepts the data as inputs but also manipulates it, interfaces the data with various devices, controls the data and thus finally gives the result. The "I-Button based security access control system" using PIC16F72 microcontroller is an exclusive project which is used to control safety door operation using I-Button reader. We can use this project to reduce the thefts and alerts immediately from any place in the world. The thesis explains the implementation of "I-Button based security access control system" using PIC16F72 microcontroller.

1-Wire is a device communications bus system designed by Dallas Semiconductor Corp. that provides low-speed data, signaling, and power over a single signal.[1] 1-Wire is similar in concept to I²C, but with lower data rates and longer range. It is typically used

to communicate with small inexpensive devices such as digital thermometers and weather instruments. A network of 1-Wire devices with an associated master device is called a MicroLan. One distinctive feature of the bus is the possibility to use only two wires: data and ground. To accomplish this, 1-wire devices include an 800 pF capacitor to store charge, and power the device during periods where the data line is used for data.

Dependent on function, native 1-wire devices are available as single components in integrated circuit and TO92 packaging, and in some cases a portable form called an iButton that resembles a watch battery. Manufacturers also produce products that are more complex than a single component, and use the 1-wire bus to communicate.

A 1-Wire device may be just one of many components on a circuit board within a product, but are also found in isolation within devices such as a temperature sensor probe, or attached to a device being monitored. Some laboratory systems and other data acquisition and control systems connect to 1-Wire devices using cords with modular connectors or with CAT-5 cable, with the devices themselves mounted in a socket, incorporated in a small PCB, or attached to the object being monitored. In such systems, RJ11 (6P2C or 6P4C modular plugs, commonly used for telephones) are popular

Systems of sensors and actuators can be built by wiring together 1-Wire components, each including all of the logic needed to operate on the 1-Wire bus. Examples include temperature loggers, timers, voltage and current sensors, battery monitors, and memory. These can be connected to a PC using a bus converter. USB, RS-232 serial and parallel port interfaces are popular solutions for connecting the MicroLan to the host PC. MicroLans also interface to microcontrollers, such as the Arduino, Parallax BASIC Stamp, Parallax Propeller, PICAXE, the Microchip PIC family and RENESAS family.

The iButton (also known as the Dallas Key) is a mechanical packaging standard that places a 1-Wire component inside a small stainless steel "button" similar to a disk-shaped battery. iButtons are connected to 1-Wire bus systems by means of sockets with contacts which touch the "lid" and "base" of the canister.

II. IMPLEMENTATION

This work is to reduce the thefts and alerts immediately from any place in the world. The thesis

explains the implementation of "I-Button based security access control system"

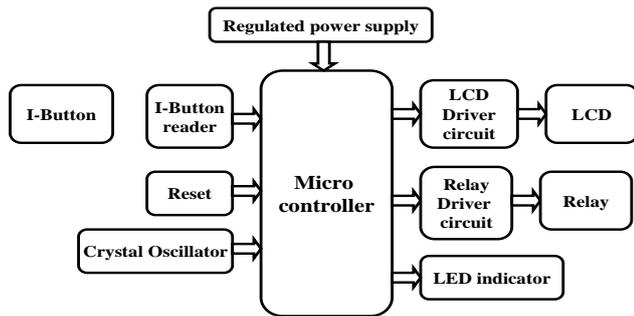


Fig. 1. Block diagram of I-button based security access control system

The main blocks of the proposed system are:

1. Micro controller (16F72)
2. Crystal oscillator
3. Regulated power supply (RPS)
4. LED Indicator
5. I-Button reader
6. Relay
7. LCD
8. Buzzer

A Microcontroller is a programmable digital processor with necessary peripherals. Both microcontrollers and microprocessors are complex sequential digital circuits meant to carry out job according to the program / instructions. Sometimes analog input/output interface makes a part of microcontroller circuit of mixed mode (both analog and digital nature).

The crystal oscillator speed that can be connected to the PIC microcontroller range from DC to 20Mhz. Using the CCS C compiler normally 20Mhz oscillator will be used and the price is very cheap. The 20 MHz crystal oscillator should be connected with about 22pF capacitor. Please refer to my circuit schematic. There are 5 input/output ports on PIC microcontroller namely port A, port B, port C, port D and port E. Each port has different function. Most of them can be used as I/O port.

Power supply is a supply of electrical power. A device or system that supplies electrical or other types of energy to an output load or group of loads is called a power supply unit or PSU. The term is most commonly applied to electrical energy supplies, less often to mechanical ones, and rarely to others. A power supply may include a power distribution system as well as primary or secondary sources of energy such as

Conversion of one form of electrical power to another desired form and voltage, typically involving converting AC line voltage to a well-regulated lower-voltage DC for electronic devices. Low voltage, low power DC power supply units are commonly integrated with the devices they supply, such as computers and household electronics.

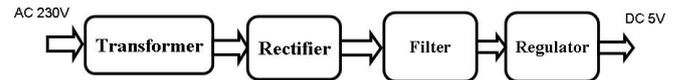


Fig. 2. Regulated Power Supply

A light-emitting diode (LED) is a semiconductor light source. LEDs are used as indicator lamps in many devices, and are increasingly used for lighting. Introduced as a practical electronic component in 1962, early LEDs emitted low-intensity red light, but modern versions are available across the visible, ultraviolet and infrared wavelengths, with very high brightness.

The iButton (also known as the Dallas Key) is a mechanical packaging standard that places a 1-Wire component inside a small stainless steel "button" similar to a disk-shaped battery. iButtons are connected to 1-Wire bus systems by means of sockets with contacts which touch the "lid" and "base" of the canister. iButtons are used as Akbil smart tickets for the Public transport in Istanbul. Alternatively, the connection can be semi-permanent with a different socket type; the iButton clips into it, but is easily removed.

A relay is an electrically operated switch. Many relays use an electromagnet to operate a switching mechanism, but other operating principles are also used. Relays find applications where it is necessary to control a circuit by a low-power signal, or where several circuits must be controlled by one signal. The first relays were used in long distance telegraph circuits, repeating the signal coming in from one circuit and re-transmitting it to another. Relays found extensive use in telephone exchanges and early computers to perform logical operations. A type of relay that can handle the high power required to directly drive an electric motor is called a contactor. Solid-state relays control power circuits with no moving parts, instead using a semiconductor device triggered by light to perform switching. Relays with calibrated operating characteristics and sometimes multiple operating coils are used to protect electrical circuits from overload or faults; in modern electric power systems these functions are performed by digital instruments still called "protection relays".

One of the most common devices attached to a micro controller is an LCD display. Some of the most common LCD's connected to the many microcontrollers are 16x2 and 20x2 displays. This means 16 characters per line by 2 lines and 20 characters per line by 2 lines, respectively.

Basically, the sound source of a piezoelectric sound component is a piezoelectric diaphragm. A piezoelectric diaphragm consists of a piezoelectric ceramic plate which has electrodes on both sides and a metal plate (brass or stainless steel, etc.). A piezoelectric ceramic plate is attached to a metal plate with adhesives. Applying D.C. voltage between electrodes of a piezoelectric diaphragm causes

mechanical distortion due to the piezoelectric effect. For a misshaped piezoelectric element, the distortion of the piezoelectric element expands in a radial direction. And the piezoelectric diaphragm bends toward the direction. The metal plate bonded to the piezoelectric element does not expand. Conversely, when the piezoelectric element shrinks, the piezoelectric diaphragm bends in the direction. Thus, when AC voltage is applied across electrodes, the bending is repeated, producing sound waves in the air. To interface a buzzer the standard transistor interfacing circuit is used. Note that if a different power supply is used for the buzzer, the 0V rails of each power supply must be connected to provide a common reference.

III. CONCLUSION

Integrating features of all the hardware components used have been developed in it. Presence of every module has been reasoned out and placed carefully, thus contributing to the best working of the unit. Secondly, using highly advanced IC's with the help of growing technology, the project has been successfully implemented. Thus the project has been successfully designed and tested.

IV. RESULTS

This work is intended mainly to operate automatic door opening or closing system using door locking mechanism based I-button technology. Theft identification unit is also incorporated in this system which was designed with I-Button technology.

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