Card Locking System Using Microcontroller

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Abstract— **Card locking system (CLS) by using Microcontroller is an electronic operated more secure system to control appliances/system/doors etc. In this, a card with a punched hole is used to control an appliance. The earlier circuit uses a transistor for sensing purposes that make the system bulkier and less reliable. After that using microcontroller and LDR (Light Dependent Resistor) for sensing purpose is used that makes the more complex. In this paper for sensing purpose, the optocoupler is used that makes the system simple and reduce the size of the circuit. The system is more reliable and efficient than previous one.**

Keywords: **OS, IC, LED, LDR, Microcontroller.**

I.   INTRODUCTION

A card locking system (CLS) by using a microcontroller is an electric current operated a device that is used to control or access the system based on the input i.e. inserted card. In this system, a card is used to access or control appliances. Every card has its own password in the form of the punched hole on the card. Based on the inserted card the system is access or control the application. The main objective of CLS is to provide an embedded system that can be used to protect the system or appliances. Embedded system means all the components on a single board. Embedded system controls many appliances at a time. Main blocks of CLS are a sensor, control unit & devices. A basic block diagram of CLS is shown in figure 1.
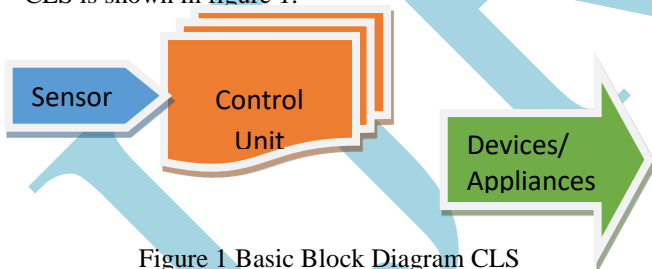

Figure 1 Basic Block Diagram CLS

This type of arrangement is helpful to ensure that the authorized user can access the selected device, system and appliance and prevents false operation of the system.

II.   CARD SENSOR

Card sensor consists of nine optocoupler switches (OCS) and one switch is to interrupt the microcontroller. Optocoupler is a type of optoisolator also known as photocoupler or optical isolator.
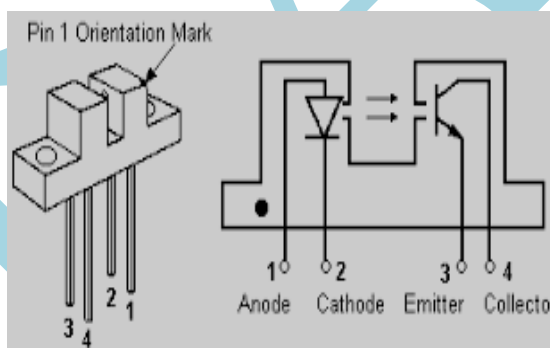

Figure 2 Optocoupler IC and Circuit [6]

An optoisolator basically consists of a phototransistor and light emitting diode in a single plastic housing package with a gap between them. Another combination of sources is also available like LED-photodiode, LED-LASCR, and lamp-phototransistor. It four pin IC as shown in figure 1 at one end i.e. pin 1 & 2 are connected to LED and other connected to the phototransistor. It transfers digital signals i.e. switching the output from 'ON' to 'OFF' state and by using some techniques analog signals can be generated. The OCS can be interrupted by inserting an opaque card inserted between the gap in the OCS. The combination of all the OCS is acting as a card sensor in CLS by using a microcontroller. Card sensor means a card is inserted in the combination that card acting as a password or PIN based on the inserted card the particular device can be switch 'ON' or 'OFF'. The output from card sensor is fed to the microcontroller.
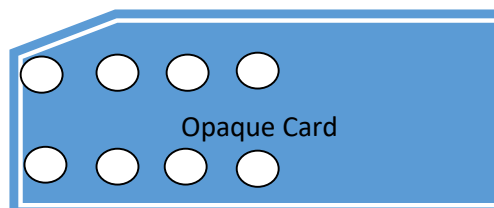

Figure 3 Card

III.   MICROCONTROLLER

The microcontroller is a small computer on a single IC. It is a system on a chip. A microcontroller contains one or more CPU along with memory. Microcontrollers are used in automatically controlled product/ devices such as appliances and power tools. All information regarding the system is stored in the microcontrollers [7].
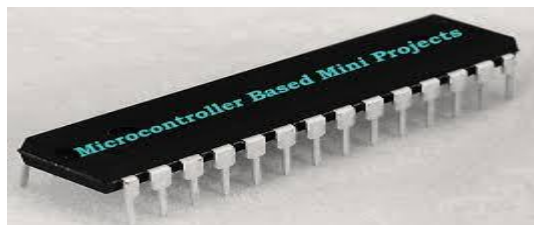

Figure 3 Microcontroller IC

This is 40 pin IC having four port that can be used as input/output according to requirement. A reset circuitry is connected to pin 9 for reset the microcontroller and at pin 18 & 19 oscillatory circuit is connected to work. The single IC perform all the operation. This IC is reprogrammable means as many times we write it and erase it.

IV CIRCUIT DESCRIPTION

Atmel Microcontroller 'AT89C51' is used in the circuit for the programme and it is the heart of the card locker. 'AT89C51' is an 8-bit microcontroller with 4KB of flash, 128 bytes of RAM, 32 input-output pins, two 16-bit timer/ counters and six interrupt services and a full duplex serial port on-chip oscillator and clock circuitry.

Power on reset also provides with a combination of resistor and capacitor. Switch used for manual reset. The output of the optocoupler is given to the microcontroller to compare the code. If the code match with the existing code in the microcontroller port pin P1.0 of AT89C51 high to drive the relay. At the same time, P1.1 also goes high, driving the LED to indicate successful operations. Here diode also connected to the parallel with relay circuit that works like as a freewheeling diode for the relay. Glowing of RED LED indicate that code is not matched with the existing password.

The lock card sensor has main three parts: Card Sensor, Microcontroller, and devices/appliances. A separate power supply made for working of a circuit that contains a transformer, Bridge rectifier circuit and filter circuit with a voltage regulator. The output of the power supply connected to the microcontroller. The microcontroller all pins are connected for some operations for the clock frequency of the microcontroller crystal oscillator at 18th and 19th number pin oscillator generate12 MHz for proper operation of microcontroller and two LED are connected to the microcontroller for identification of the user. RED colour for unauthorized user and green for authorized. If green glow it means authorized user and appliance work ON.
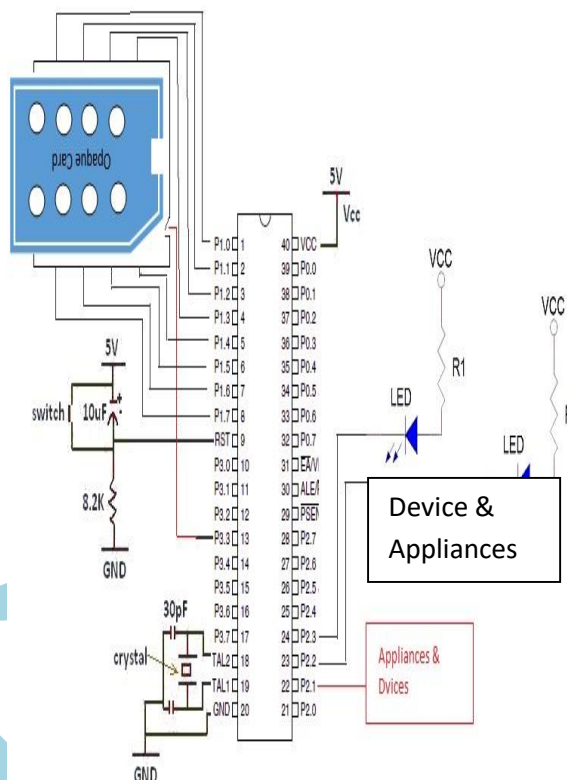

Fig. 3 Circuit Diagram

In this circuit optocoupler used in place of IC and LDR. Optocoupler also knew an optoisolator and present high voltage from affecting the system receiving the signal. Optocoupler combination of LED and phototransistor in the opaque package. Optocoupler transfers the digital signal but sometimes allow tech allow to be used with an analog signal. An optocoupler contains a source of light, almost always near to infrared light. Optocoupler converts the electrical input signal into light.

In card locking sensor the card sensor senses the code on the card and provides the signal to the microcontroller. The microcontroller compares the code and switch on the corresponding device that are connected to microcontrollers.

Advantage:

- Keyless
- More Security
- Less Complexity

Application:

- Use in home door appliances
- Use in parking zone
- Use in-person office

IV.   RESULT

The circuit is much simpler & more secure for electronic card lock. All the information regarding the system is stored in the microcontroller. Port 1 is used for input password to the microcontroller and it is matched with password i.e. stored in the program. According to the

password match selected application is on. It prevents the false operation of any system.
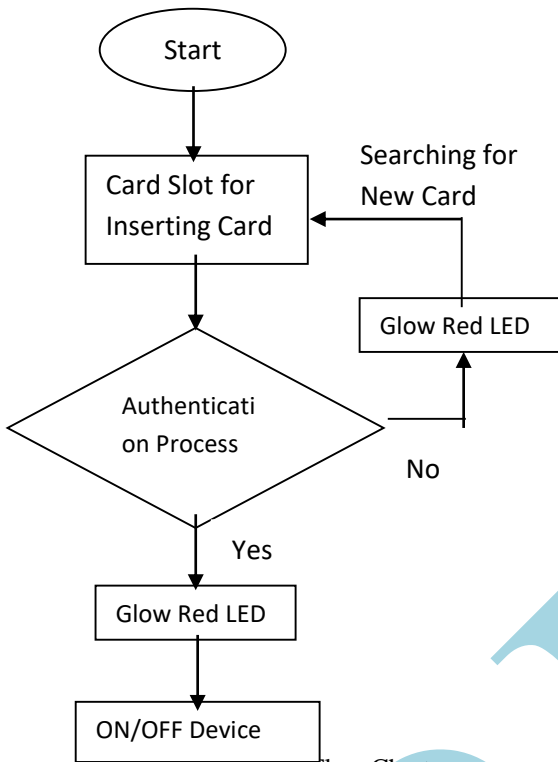

Fig. 4 Flow Chart

V. CONCLUSION AND FUTURE WORK

The earlier circuit uses a transistor or LDR in the circuit for sensing purpose that makes the system bulky and less reliable. Using of optocoupler with microcontroller and no transistors in this system make more reliable. The microcontroller can be program according to our requirement. It can be used at various applications i.e. Parking, Door of industries and at home appliances control etc. By using relay, we can also control AC appliances.

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