Design and Implementation of a Digital Code Lock using Arduino

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Abstract- *Security is a vital concern around the world and it has been major thread for all confidential departments. This work is based on Arduino and is used for the security purpose. .Arduino is an open-source prototyping platform based on easy-to-use hardware and software. Arduino uses an ATmega328 microcontroller. As security is very essential now a day, so by using this project only the authorized person will be allowed to enter by entering the correct password. The circuit is tested in proteous and is working. It is very simple, cost effecting and secure. The lock can be open if the password entered is correct and match to the password which is already stored in the internal memory. It also consist a LCD display which is used to interface with the project to output lock status. This project can be used in ATMs, doors of houses, lockers, offices and anywhere where security is needed.*

Keywords- Microcontroller, integrated circuit, Displays.

INTRODUCTION

Arduino is an open-source prototyping platform based on easy-to-use hardware and software. Arduino consists of both a physical programmable circuit board (often referred to as a microcontroller) and a piece of software, or IDE (Integrated Development Environment) that runs on your computer, used to write and upload computer code to the physical board [1],[5].
ATmega328P is a 8-bitAVRRISC-based microcontroller combines 32 KB ISPflash memory with read-while-write capabilities, 1 KB EEPROM, 2 KB SRAM, 23 general purpose I/O lines, 32 general purpose working registers, three flexible timer/counters with compare modes, internal and external interrupts, serial programmable USART, a byte-oriented 2-wire serial interface,

SPI serial port, 6-channel 10-bit A/D converter(8-channels in TQFP and QFN/MLF packages), programmablewatchdog timer with internal and

five software selectable power saving modes [7]. The device operates between 1.8-5.5 volts. The device achieves throughputs approaching 1 MIPS.

MY PROJECT

The project presented here is based on arduino [1][10] and is more simple and reliable than simple micro controller based digital code lock. Here is a LCD [2] display which is used to interface with the project to output lock status. In this project we have an additional advantage that the user can change the password. The user will be prompted to *set a password* at installation. This password inputted at installation will continue to serve the lock until it is change. The program will check for current password and allows the user to change Password only if the current password is input correctly.
Applications: It can be used in places where we need more security. It can also be used in door, lockers, offices, main gate of house, ATM etc.

PROPOSED SYSTEM

a. Power Supply: A power supply is an electronic device that supplies electric energy to an electrical load. The primary function of a power supply is to convert one form of electrical energy to another and, as a result, power supplies are sometimes referred to as electric power converters.

b. Keypad: A keypad is a miniature keyboard or set of buttons for operating a portable electronic device.

c. Arduino UNO:Arduino is an open-source prototyping platform based on easy-to-use hardware and software. Arduino consists of both a physical programmable circuit board and a piece of software, or IDE (Integrated Development Environment) that runs on your computer, used to write and upload computer code to the physical board.

d.LCD Display: The LCD display is used to see whether the entered password is correct or not. It is

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also used to interface with the project to output lock status.

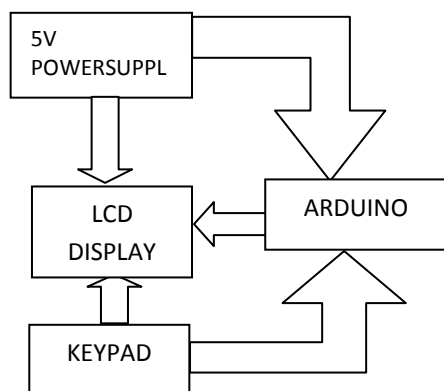## *BLOCK DIAGRAM AND DISCRIPTION*

Fig1: Block Diagram

First the arduino and the LCD will be energized using 5v power supply. Whenever anyone press the password on the keypad. The signal will go to the arduino.In arduino UNO, AVR RISC controller is used where the program for the project is written. It is also used for continuously monitors the keypad for a match with the stored password which is stored in its flashmemory and also to provide digital and analog signal to the devices. The microcontroller inside it will check whether the enter password is correct or not. If the password is correct the arduino will send a signal to LCD display which will then display that access granted. Any mechanism connected will be started. If the password is wrong then it will display wrong password. If wrong password is entered three times, the system will be locked. To unlock the system we have to reset the system.

CIRCUIT DIAGRAM AND DISCRIPTION

In this project, a 5V supply is used which is connected to the LCD display and arduino. When the circuit is energized**,** you will be asked to enter **5** digits as password at the initial boot**/**reset of the device. The first 5 digits you will enter at installation will be saved as your **SET** PASSWORD**.** The device will go LOCKED after setting PASSWORD. We have to input correct password to Unlocking.

If a user wants to open the security system, first he/she will be asked to enter the password, After entering the password, the arduino will check whether the password match the password which is

stored in the internal RAM is correct or not. A LED is connected to pin no. 13 will remain on for 3 sec, and then it will go to off state. If the pressed password is correct then arduino will display access granted. It will be turn on the relay or other mechanism.

If the password is not correct it will display wrong password. When wrong password is entered more than 3 times, the system will be locked. To unlock it we then have to reset the system by pressing reset button and after resetting it the program will be re-excited.

The main part of the above circuit diagram is arduino UNO. The power supply section is very important. It should provide constant voltage to the devices for successful working of the project.
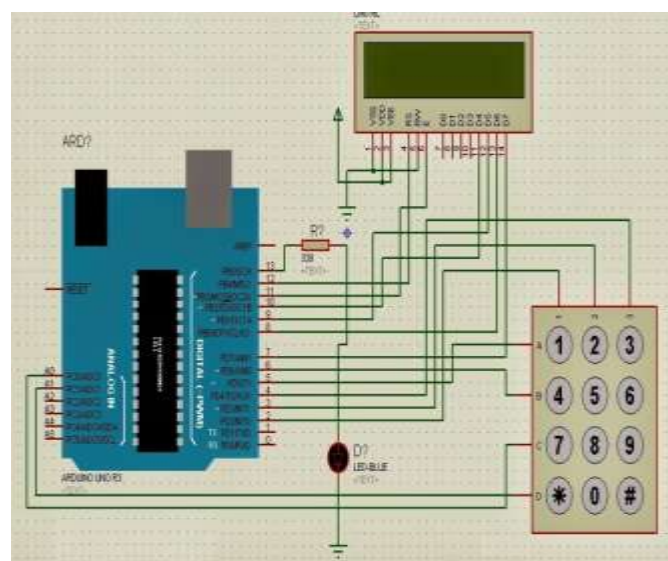

Fig3: Circuit Diagram of arduino UNI

RESULT AND SIMULATION

The project is being tested in protous and is working properly. It is also tested in bread board and is properly working. It has lots of application like we can use this project in door for home and office security, lockers, ATM, and anywhere where security is needed. Here we can easily change the password and it has features like if wrong password is entered more than three times it would be locked until and unless reset button is pressed. In this project we have used very less component so it is cost effective and it is less complicated than a simple micro controller based code lock system.

CONCLUSION

Digital code lock is totally based on arduino.Arduino has been the brain of thousands of projects. As compare to other microcontroller

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based digital lock it is easy and it required less hardware. It doesn't need addition A/D and D/A converter. The programming is little bit complex. We can set the password and reset it without using external device. It is reliable. It is 90% working and can be easily implemented.

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