Embedded High Alert Door Locking System Using Iot Technology

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ABSTRACT *Traditional locks are being replaced by new approach by integrating of mechanical and electronic devices of locking system. One of the salient features of these futuristic lock systems is that they are simple and efficient to use. The system is interfaced with ARM7 microcontroller, which provides control to the actuating the load. ARM7 is an embedded system that receives input from Keypad and Biometrics. The System illustrates a password based door lock system where the door is unlatched only when a valid password and fingerprint is entered and matched. The codes are written in Assembly language using Keil MicroVision version4. Keil MicroVision is an integrated development environment (IDE), which integrates a text editor to write programs.The code is compiled and is converted to hex files.*

Keywords: **ARM7 microcontroller, Keypad, Biometrics, Buzzer, LCD, Wi-Fi Module, DTMF**

I. INTRODUCTION

Security describes protection of life and property. Key locks fortify the mode of security. Dominant persons have bullet proof doors to ensure self security as well of the family. The security sector is experiencing diverseness. This has brought about the need to review the reliability of already existing systems and look into the possibility of creating better systems that are smarter and more secure. The system represented is an access control system that allows only authorized persons to access a restricted area, and is best suitable for offices, home security, and restricted areas. The electronic kit comprises of microcontroller that sends electrical pulses to the rotating motor to unlatch the door lock, when an authorized person enters predetermined user password via the Biometrics, the keypad gets activated thereby allowing the user to enter the predefined password to unlock the door. The controller analogizes the entered password with predefined password. If the password is matched then controller sends signals to the motor, so the motor driver gets the input signals for forward motion of the motor. The stepper motor rotates for few seconds to open the door. The delay time is preset and rotated in reverse direction to latch the door. If an incorrect code is entered for three attempts, then a security alarm is rung and at the same time it enables Wi-Fi modem interfaced to the microcontroller to send an alert message to the owner.

II. LITERATURE SURVEY

DOOR-AUTOMATION SYSTEM USING BLUETOOTH-BASED ANDROID
FOR MOBILE PHONE By ,*Lia Kamelia, Alfin Noorhassan S.R, Mada Sanjaya and W.S., Edi Mulyana*

The paper gives an overall idea of a system called Door Locks Automation System using Bluetooth-based Android Smartphone. The System is designed to latch and unlatch the lock via command that is sent via Bluetooth on Smartphone and other mobile devices than using keys. The Door lock is controlled by sending a command via Bluetooth to the Arduino circuit that acts as an interface between Android Smartphone and Solenoid. If there is any voltage via Solenoid it will unlatch the door.

MICROCONTROLLER BASED HOME SECURITY SYSTEM WITH GSM TECHNOLOGY, By, *Raqibull Hasan, Mohammad Monirujjaman Khan, Asaduzzaman Ashek, Israt Jahan Rumpa*

This paper presents scheme and implementation of a smart home security system based on microcontroller along with GSM for user friendly application. The system is intelligent enough to monitor the secure environment. In addition, the user is informed about the security breach through GSM network that provides a special opportunity whenever the user stays at far away from home. In this work, traditional burglar alarm mode, LED lights and LCD are the promising features used to ensure reliability. The whole system is implemented on a realistic home door that is installed.

PASSWORD BASED SECURITY LOCK SYSTEM By, *Arpita Mishra1, Siddharth Sharma2, Sachin Dubey3, S.K.Dubey*

In day to day life security of any objects or place password based system plays a major role. This paper has utilized the electronic technology to represent an integrated automated home system at a reasonable cost. The system uses secure access for a door which needs a password to unlock. If a valid password is entered via keypad then the door is opened by the motor which is used to rotate the handle of the door lock. LCD Module interfaced to the microcontroller display messages to the user.

III. EXISTING SYSTEM

The Technology behind the working of Automated Door lies in the elucidation of the data sent by the Android phone by means of the developed application .If a valid password is entered using keypad then door is opened. If the user has entered password incorrectly 3 attempts are given to re-enter the password. If the user couldn't enter password correctly by these attempts the person have to wait for a few minutes to re-log in to the system. The data received by the Bluetooth Module HC-05 is given to the Microcontroller (ATmega16). Now depending upon the data sent by the user it performs operations whether to latch it or not. The application is well protected by means of a password thus, prohibits access from anonymous user. This is advantageous in the development of automated home security systems. The Application provides a better security for the user, by means of accessing via a password.

IV. PROPOSED SYSTEM

The System is modelled to bring in a new solution to the Automated Door to overcome security issues. The work model comprises of Biometrics, Keypad, and DTMF Technology. The user's fingerprint is stored in the RAM of LPC2148 ARM7 microcontroller. The Biometric Panel is interfaced with the microcontroller. After the scan is complete, the user is given the access via keypad to enter the four-digit password. If the entered password is verified to be true, the door is unlocked with the aid of Stepper Motor. If an incorrect password is entered for 3 attempts, an alarm is rung and considering the security issues an alert message is sent to the owner via Wi-Fi technology. To provide access from a remote location, DTMF technology is used.

V. DESIGN

[1] DATA FLOW DIAGRAM REPRESENTING THE BIOMETRICS AND KEYPAD

Step 1: Start

Step 2: Welcome message "Scan your finger"

Step 3: Fingerprint is scanned and can also register and unregister users

Step 4: Fingerprint is verified to check if it is a registered user. If true go to step 5 else go to step 8.

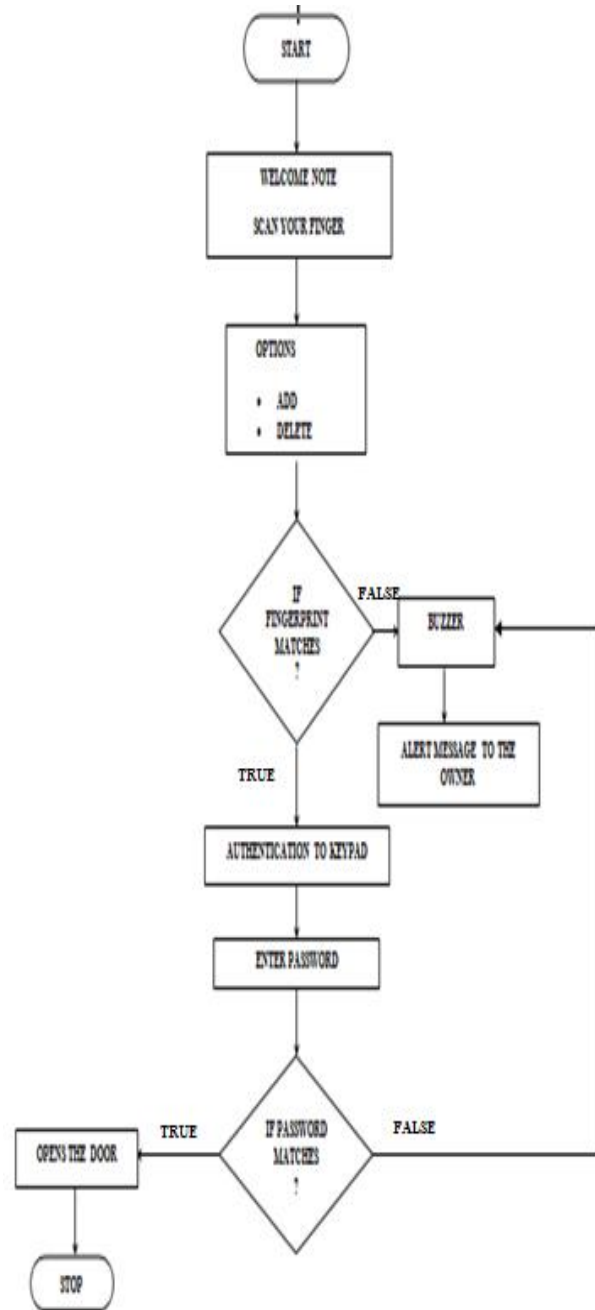Step 5: Keypad is activated to enter 4-digit password.

Step 6: Verify the password. If true goto step 7.On three wrong entries of password go to step 8.

Step 7: Successfully unlocks the door.

Step 8: An alarm is rung and an alert message is sent to the owner via Wi-Fi.

Step 9: Stop

Figure 1 explains the steps diagrammatically.

Figure: 1 Data Flow Diagram Representing the Biometrics and Keypad.

[2] DATA FLOW DIAGRAM REPRESENTING DTMF TECHNOLOGY

Step 1: Start

Step 2: User connects to the mobile interfaced with DTMF Module.

Step 3: Enters one digit number on user mobile keypad.

Step 4: If the frequency of the entered number matches the frequency of number in the DTMF module, go to step 5 else go to step 6.

Step 5: Successfully unlocks the door.

Step 6: Fails to unlatch the door.

Step 7: Stop

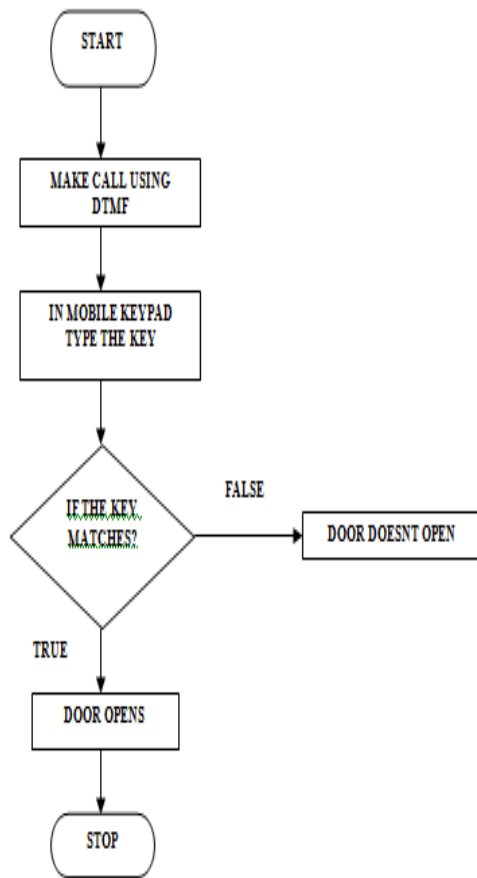Figure 2 explains steps diagrammatically in form of a flow chart.

Figure: 2 Data Flow Diagram Representing DTMF Technology.

VI. SYSTEM ARCHITECTURE AND METHODOLOGY

System Architecture:

The system architecture comprises of the following components: LCD, Wi-Fi module, DTMF module, Power supply to the microcontroller, Burglar alarm, Biometrics, Keypad and Stepper motor. Figure 3 shows the methodical representation of the proposed system, that aids to the reasoning and behavior of the system.
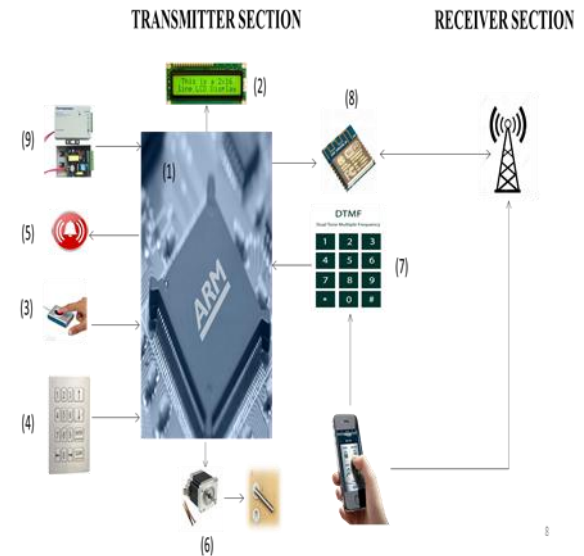

Figure: 3 System Architecture of the System.

Methodology

(1) ARM-7 LPC 2148 Microcontroller

The microcontroller is responsible for detection and polling of the peripherals status. The ARM processor core is the key component of many successful 32-bit embedded systems widely used in mobile phones. Features include Designed small to reduce power consumption. High Code density. Preloaded with many inbuilt peripherals making it cost-effective and reliable.

(2) LCD

The LCD is an acronym for Liquid Crystal Display that is used here is 16x2 alphanumeric Liquid Crystal Display (LCD) which means it can display alphabets along with numbers on 2 lines each containing 16 characters. It is used to show the password entered and the status of the password. It can also display the various options and all the readings that have been stored in the EEPROM.

(3) BIOMETRIC SENSOR

Biometrics refers to metrics related to human characteristics. This technology used as a form of identification and access control. It is also used to identify uniqueness in groups. Fingerprint processing comprises three primary roles: enrollment, searching and verification. Among these, enrollment plays a significant role by capturing the fingerprint image from the sensor.

(4) KEYPAD

A Panel used in the door locking system, designed to enter the password. We use a 12-button numeric keypad, similar to what we might find on a telephone. This keypad has three columns and four row. Pressing a button will short one of the row outputs to one of the column outputs.

(5) STEPPER MOTOR

A DC motor is a mechanically commutated electric motor powered from direct current (DC). In DC motor, operation is based on simple electromagnetism. The magnetic field is generated by placing the current-carrying conductor. The external magnetic field is experienced when the conductor is placed in magnetic field.

(6) BURGLAR ALARM

A security alarm is detect intrusion prohibiting entry into the area. Security alarms are used in office and restricted areas for protection against burglary (theft) or property damage.

(7) DTMF TECHNOLOGY

Dual-Tone Multi Frequency is the signal generated when a user presses a mobile phone's key. DTMF generates two tones of specific frequencies. The generated tones cannot be duplicated by the other means.

(8) Wi-Fi MODULE

A wireless network transmit and receive radio waves, and converts digital form that is 0s and 1s into radio waves. Wi-Fi has a range of about 2.5 GHz. In our system we use Wi-Fi to prevent malfunctioning and to send an alert message to the owner.

(9) POWER SUPPLY

The power supply gives +5v and +12v supply to the circuit and comprises of four stages namely transformer, rectifier, filter, and regulator. Transformer is a step-down transformer receives input of 230v AC and produce output of 15v at the secondary. This 15v AC converts the AC wave into fully rectified wave.

SOFTWARE DETAILS:

We use embedded C language for the working of ARM 7 Microcontroller. Embedded C use almost the similar syntax as that of structured C Language. The embedded C programming includes salient features like fixed-point arithmetic, multiple distinct memory banks, and basic I/O operations. Keil Microvision is an IDE (Integrated Development Environment). Philips Utility is the Java Virtual Machine (JVM) that converts the given Embedded C code into Hex File

and is dumped into the Integrated Circuit that is ARM7 microcontroller.

VII. CONCLUSION

Emphasizing security as a critical part in today's hacking world, up gradations are done for locking devices. The most trending Smartphone technology is been brought in use for one more purpose apart from the one always being used. Besides entertainment and information utility aspect of Smartphone .devices, they also serve the purpose of unlocking the door. Wi-Fi technology will be adding an additional feature to the proposed module. This ongoing project proposes a system that allows for automatic door opening solution by sensing thumb impression of the user. Our system achieves this functionality with the help of fingerprint sensor. We have enhanced the working of remote accessing of the door using DTMF technology. Future enhancement of the system is done by integrating counter mechanism so as to keep track of the number of persons inside the facility. We have discussed a simple prototype in our paper but in future it can be extended to many other regions.

VIII. REFERENCES

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