No Key - Smart Door Unlock System using Fingerprint from Bluetooth Device

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Abstract —

Technology has improved, and smart locking systems have become more sophisticated. In this case, the android-based Smart System is primarily intended for multimode operations. Such a system is necessary in banks and businesses since it provides functions that let users control locks. The implementation's efficiency the system is incredibly helpful because of its functionality and user-friendly interface. Some homeowners aim to connect their home's numerous home automation devices. Those connected to a Windows-based PC are the most popular home controllers. In our study, we introduced a form of smart technology that utilized Bluetooth while using a mobile smartphone. Consequently, using it will be simpler and more effective.

Additionally, it supported the free and open-source Android and Arduino platforms. This paper proposes a door lock automation system that uses an Android smartphone with Bluetooth as the first piece of hardware. Following a description of the design and software development process, a Bluetooth-based Smartphone application for locking and unlocking doors is demonstrated. The task module acts as the agent in the hardware design for the door-lock system, the Arduino microcontroller serves as the controller and data processing hub, and the solenoid acts as the door lock output. The results of each test show that it is compatible with the original plan for this study.

Keywords:

1) Bluetooth Door Lock

2) Biometrics

3) Internet Ignored Authentication

4) Un-Hackable Bluetooth Paired

5) Home security

I. INTRODUCTION

In spite of abundant benefits of [1-3] biometrics-based private confirmation structures over traditional freedom orders established tokens or information, they are susceptible to attacks that can decrease their protection considerably. Biometrics-located individual authentication scheme that use corporeal (mark on finger, face) or behavioral (talk, manuscript) characteristics are becoming more and more well-known, distinguished to traditional holes that are established tokens (key) or information(password).

Fingerprint-located labelling is individual of the most main biometric sciences that have drawn a solid amount of consideration currently. Fingerprint technology is so low in individual identification that it has existed well settled. Each human has singular owns mark, even the twin has various marks on finger. So, fingerprint acknowledgment is a valuable instability law request.

The [4-6]photoelectric lock utilizing fingerprint acknowledgment includes a process of proving the user's similarity by utilizing mark on finger recognition as a key to the photoelectric lock. This work climaxes the happening of fingerprint acknowledgment plans using ARDUINO 1.6.3. To perceive the recommendation mark on finger image from the stocked samples in bmp, tif; argument; jpg;jpeg; gif file type. Then the facts of the recognized dab countenance will be stored in a table for verification approved by the consumer. These marks on finger recognition orders establish the theory that the human fingerprint is singular. It is mainly to confirm the individuality of dab in consideration of using the dab image for protection

II. LITERATURE SURVEY

Paper-1 :Wireless Biometric Lock using Arduino with the IOT: Published by Prof. Sumedh V Dhole, Akshay Kumar, Mayank Gupta and Rishabh Arora. The paper was published in 2020. High security and assurance. Biometric identification provides the answers to something a person has and helps verify identity. Convenient and fast. Non-transferrable.

Paper-2 :Short term Fourier transforms. Contextual filtering in Fourier domain: Published by Sherlock. Published in 1994. Fingerprint image can be computed using single unified approach. More formal approach for analyzing the non-stationary fingerprint image.

Paper-3 : Log Gabor Filter: :Published by Wang, Li Huang, Feng . Overcomes the drawbacks of traditional Gabor filter, Improves fingerprint enhancement performance.

Paper-4 :Smart Door Unlock System Using Fingerprint. Published by K.Rajesh, B.Venkata Rao, P.AV.S.K.Chaitanya, A.ruchitha Reddy. Explains the overall perspective of use of IOT in Fingerprint technology and using of the Arduino nano System for Integration.

III. EXISTING SYSTEM

Most doors in the current system are managed by individuals using Keys, security cards, and a password to enter locked doors. [7-9]The development of wireless controlling technology is a result of this. With a skillful fusion of modern technology and embedded systems, purpose is achieved. However, we're planning to make a modification that will make things more secure when compared to the current system the existing system used regular, conventional locks that have been around since quite previous times Traditional locks do have a drawback, though, in that they may be readily broken by burglars, or they can go missing. Then we upgraded to the modern locks that can be used with pin numbers, passwords, and other security measures. The drawback of these locks is that we can forget our passwords or pin numbers. We also have biometrics that can be used to open the door lock itself, but we are now proposing a new style of modern wireless door lock utilizing the same biometric.

IV. PROPOSED SYSTEM

We are developing a door lock that can be opened using biometrics in the proposed system. These days, it is fashionable for them to be secure and simple for the owner or administrator to open. We used a biometric door lock to create this, however a cell phone will be used to unlock the lock.

We are developing an app that will enable mobile phone door lock access. Can be connected through Bluetooth. To build an app, we're using Kotlin, and we've given Bluetooth access to operate the door lock. Using Android Studio, we are developing a kotlin application in which we will use the kotlin programming language. Kotlin was used to create the code to communicate with the [10-13]HC-05 Bluetooth module.

To connect with the HC-05 module, a basic Bluetooth adapter and a Bluetooth socket (integrated within the software) were utilized. Additionally, this connection allowed data to be sent across the socket from the [14] Rx and Tx pins of the Arduino Nano. The software instantly establishes a connection with the HC-05 Board, and the device's fingerprint scanner serves as an authentication factor.

V. METHODOLOGY

Through Arduino, we must provide a power source with an appropriate voltage. Open the app that was developed using the Kotlin application after providing electricity. The mobile device must turn on for Bluetooth and connected to the HC-05 Bluetooth Module before the Bluetooth symbol in an app change to a lock icon . Next, we must tap the fingerprint symbol . It will notify us that the fingerprint is required to unlock it . Keep your finger on the fingerprint reader on your phone right now. If the fingerprint is recognized by our phone, the lock is turned on and the lock icon is changed to an unlock icon.

Elements used:

- Bluetooth module HC-05
- Arduino Nano
- The Solenoid lock
- Relay module
- Connecting Wires
- Battery

Connect the HC-05 module's Tx and Rx pins to the Arduino's Rx and Tx pins, respectively. With the Arduino mini, align the ground and vcc pins. Connect the Arduino's D9 pin to the Relay modules "in" input. Connect the relay and the solenoid lock to the 12-volt battery system. With the aid of the app, the relay, which functions as a switch, will be changing its state.

A. Bluetooth Model HC-05:

A Bluetooth module called HC-05 is created for wireless communication. This module may be set up as either a grasp or a slave. The HC-05 contains a red LED that indicates the connection status, including whether or not Bluetooth is involved. Before being connected to the HC-05 module, this red LED constantly pulses periodically.

[16]Its blinking reduces to two seconds when it is linked to another Bluetooth device. The 3.3 V needed for this module. We can also connect a 5V supply voltage because the module includes a built-in 5 to 3.3 V regulator. There is no need to change the HC-05 Bluetooth module's transmit level because it contains a V stage for RX/TX and the microcontroller can sense 3.3 V levels.

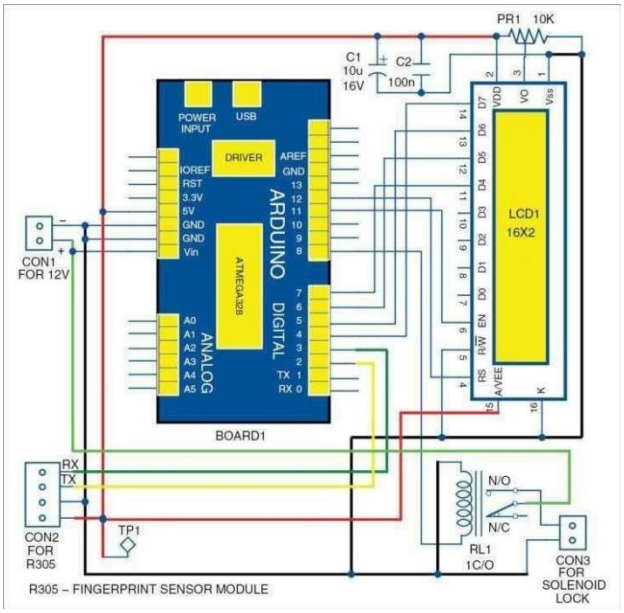
B. Ardunio Nano:

Arduino nano is an open-source tool for prototyping electronic devices that relies on flexible, easy-to-use hardware and software. For artisans, architects, and professionals, and everyone was fascinated by creating clever articles or situations. It's a large figuring step based on an open source

microcontroller board, and advancement environment for writing board programming programmers. Simply put I n other terms, Arduino is a tiny microcontroller board with a USB connector to connect to your computer and some networking add-ons that could be connected to external devices, such as engines, transfers, light sensors, laser diodes, amplifiers, mouthpieces, etc.

Both may be powered by a 9V battery or by a USB connection from a computer.

They can be managed or changed through a computer, then detached and given free rein to operate. Compared to their ancestors, which were designed to cover greater area and were thus more expensive and capable of performing fewer features, electronic gadgets are becoming increasingly compact, flexible, and lightweight.



C. The Selenoid lock:

It is available in opening in the force-on mode type as well as bolting and protecting in this type, which may be used individually for circumstances. Only when the solenoid is powered on is opening possible with the strength-on opening type. When an entrance of this kind is guarded, it won't open in the event of an energy outage or twine separation, providing excellent assurance. This kind is used specifically in locations where it is necessary to prevent misconduct. When the solenoid is turned on, the strength-on locking type can bolt a door. The entrance is made available if the strength is severed. [17]This kind opens the door in the case of a string separation caused by a fire or an unforeseen incident, and it is used for emergency exits where extinguishing fires, leaving, or making specific arrangements for departure are required instead of providing assurance for wrongful counteraction. The keeping type maintains the no-power country in every job while doing two tasks—bolting and opening—by applying a good or bad heartbeat voltage to the solenoid.

This type of capability can save energy because it is simple to turn the solenoid on continuously. The continuous rating is intended to maintain an assessed voltage power continuously for a significant amount of time without exceeding a targeted temperature upper push limit, whereas the irregular rating is intended as a method to maintain a specified voltage with ease for a predetermined amount of time without going over a specific temperature upper limit.

D. Relay module:

An electromechanical device known as a relay can be used to create or sabotage an electrical connection. In essence, a relay is just like a mechanical change, except that you may control it with a digital sign rather than alternately turning it

on and off. It consists of a flexible transferable mechanical phase that can be managed electronically using an electromagnet. Once more, this relay functioning principle is only appropriate for electromechanical relays.

Therefore, a relay is a switch that electromechanically regulates (opens and closes) circuits. The main function of this device is to create or disrupt contact with the assist of an assign without the need for human intervention to turn it ON

or OFF. It is mostly used to control an overpowered circuit by applying a weak electrical signal. Typically, a DC signal is used to operate a circuit that is driven by high voltage, such as controlling AC household appliances using DC signals from microcontrollers.

E. Connecting Wires:

In contemporary connections and energy links, artificial polymer protection that resembles elastic is employed. Because of its chief moisture hindrance, it was built underground.

The most severe working temperature at the conductor surface and the recommended working voltage are used to evaluate protected connections. A link may also provide several program usage scores, such as one rating for dry venues and another when exposed with moisture or oil.

F. Battery :

A battery is a tool that is constructed of one or more electrochemical cells with external connections and is used to power electrical devices including mobile phones, flashlights, and electric vehicles. When a battery is connected to an external electric load, a [18] redox reaction transforms the high energy reactants. The battery's good terminal is the cathode, while its bad terminal is the anode. The terminal marked "poor" is the supply of the electrons that will drift via an external electric-fueled circuit to the tremendous terminal.

Regarding the low-energy products, And the Free Power Distinction Is Brought to External Circuit Known As Electricity Clearly The Term "Battery" Specifically Referred To Device Made Out of More Than One Cell, But The Usage Is Developed To Include Devices Made Of An SingleCellular.

APPLICATIONS

1} They are playing a very important role in many disciplines today.

2} This is used in smart homes across multiple cities.

3} Used in Defense and Security for advanced secure and protected system.

4} These locks are used in industries and modern warehouses.

5} Used in medical and research centers to keep high end database hardware secure.

FUTURE SCOPE

While doing the project, we faced problems with the project's door closing automatically after a while of time it was open until we could close it from the android application. For a future purpose we are planning to create an application such that the doors will be closed automatically after some seconds of not using the door or directly through the application.

In the current application we are planning to access the system within a certain distance which would not be that much long as it might be expected because of the Bluetooth connectivity it can be only accessed in that specific range of Bluetooth.

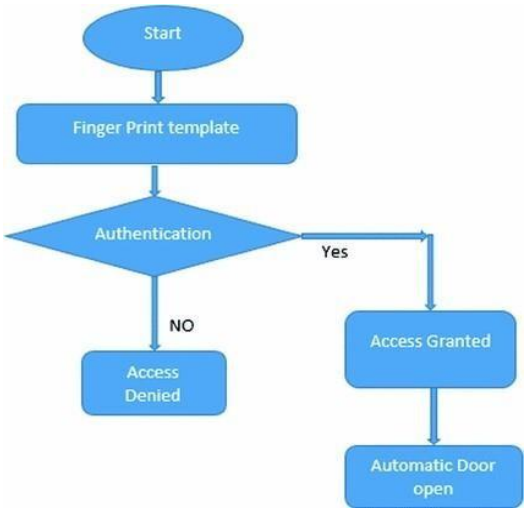
RESULTS

The program for ARDUINO NANO was written in C++ language. It was then compiled using ARDUINO IDE. After that code is dumped or uploaded into a microcontroller. We have created android app by using KOTLIN Java Language. After that we are connecting the hardware after giving power supply. [19-21]The android app communicating with ARDUINO NANO using wireless Bluetooth communication. If the communication happens in a correct way, the door lock opens and closes. The communication and result flow below using flow chart.

DISCUSSION

Project gives idea how to control door locks. Carbon paper locking (Password, iris detection, RFID) is used as prototype for indoor and outdoor locking system. This project is based on smart phone and ARDUINO platform both are free open source. So the implementation of project is inexpensive and it can hold reasonable for common person now these days.

The system is designed and prototyped to control the condition of door locking using Bluetooth enabled smart phone and Bluetooth communication through HC-05 Bluetooth module. A simple prototype is discussed for this project.



Fingerprint Access Verification

Conclusion

Fingerprint labeling embellishes the safety of a Door and makes it likely only for a few picked nations to use the Door. Thus, by achieving this comparably inexpensive and surely free scheme on a Door, individuals can guarantee much better safety and uniqueness than that offered by a normal lock and key. It may be understood that the use of biometric safety orders offer a much better and fool proof wealth of confining the use of Doors by unjustified consumers. The grown prototype serves as a force to drive future research, equip towards evolving a stronger and more entrenched real-opportunity mark.

References

[1] Kavita Gupta "ARDUINO BASED SMART IoT Palm print Recognition" International Journal of Engineering Applied Sciences and Technology, 2020 Vol. 4, Issue 12, ISSN No. 2455-2143, Pages 592-597 Published Online April 2020 in IJEAST (http://www.ijeast.com)

[2] Debnath Bhattacharyya,Rahul Ranjan, "Biometric Authentication : A Review" International Journal of u- and e-Service Science and Technology,Volume-3,Issue-5, September 2009.

[3] S. Prabhakar, S. Pankanti, A. K. Jain, "Biometric Recognition: Security and Privacy Concerns", IEEE Security &Privacy, MarcWApril2003, pp. 33-42.

[4] D. Maltoni, D. Cappelli, R. Wayman, J.L& Jain "Fingerprint Verification Competition" IEEE Transactions on Pattern Analysis and Machine Intelligence, A. K. (2002). FVC2000, Vol. 24, No. 3, pp. 402-412

[5] Baswaraju Swathi, Abhishek Kumar, Ishu Kumar, Vathsavi Venkat. Implementation of Improved Billing System. International Journal of Scientific Research in Computer Science, Engineering and Information Technology © 2020 IJSRCSEIT | Volume 6 | Issue 3 |ISSN: 2456-3307.

[6]J. Feng, A. K. Jain, A. Ross, "Fingerprint Alteration", MSU Technical Report, MSU-CSE-09-30, Dec. 2009 "

[7] Ketan Rathod, Rambabu Vatti, Mandar Nandre and Sanket Yenare, "Smart door security using Arduino and Bluetooth application", International Journal of Current Engineering and Scientific Research, vol. 4, no. 11, pp. 73-77, 2017

[8] O. Agbo David, Madukwe Chinaza and O. OdinyaJotham, "Design And Implementation Of A Door Locking System Using Android App", International Journal Of Scientific & Technology Research, vol. 6, no. 08, pp. 198-203, 2017.

[9] Mounica, B., & Merlin Mathew, & Aishwarya Balakrishnan, & Bikky Kumar Goit, (2019). Learning Dynamic Toll Charge using openCV and Spark. International Journal of Scientific Research in Computer Science, 3(5), (33-37).

[10] Karen Scarfone and John Padgette, Guide to Bluetooth Security. Special Publication 800–121 Recommendations of the National Institute of Standards and Technology, 2008

[11] G.V. Zaruba and I. Accelerating, "Bluetooth inquiry for personal area networks".

[12] S. Krco, "Bluetooth based wireless sensor networks implementation issues and solutions", 10 th Telecommunications forum (TELEFOR 2002) , NOV. 2002

[13] S. Rajkiran and C. Balakrishnan, "RSSI estimation using Bluetooth in smart phones", 2015 2nd International Conference on Electronics and Communication Systems (ICECS), pp. 1431-1434, 2015..

[14] S.B. Sagarkumar, P. Chatur and B.V. Wakode, "Data Logger System: A Survey", *National Conference on Emerging Trends in Computer Science & Information Technology, pp. 24-26, 2011..*

[15] Baswaraju Swathi and Harshvardhan Tiwari, "Integrated Pairwise Testing based Genetic Algorithm for Test Optimization" International Journal of Advanced Computer Science and Applications (IJACSA), 12(4), 2021. http://dx.doi.org/10.14569/IJACSA.2021.0120419.

[16] Baswaraju Swathi, Harshvardhan Tiwari. Test Case Generation Process using Soft Computing Techniques. International Journal of Innovative Technology and Exploring Engineering (IJITEE) ISSN: 2278-3075, Volume-9 Issue-1, November 2019.

[17]K. S. Kow, J. k. Yang, D.H. Hwang, H.S. Ko, C.O. Ga and J.P. Cho, "Building Fire Prediction Model Study Using AI", The Journal of Korean Institute of Communications and Information Sciences 20-07, vol. 45, no. 07, pp. 1210-1218, 2020

[18] Shobha, T., Anandhi R.J. Adaptive strategy operators based GA for rule discovery. Int. j. inf. tecnol. 12, 1365–1375 (2020). https://doi.org/10.1007/s41870-019-00303-z.

[19] B. Swathi, "Automated Test Case Prioritization and Evaluation using Genetic Algorithm," 2022 International Conference on Computing, Communication, Security and Intelligent Systems (IC3SIS), 2022, pp. 1-5, doi: 10.1109/IC3SIS54991.2022.9885535.

[20] B. Swathi, P. T, P. K. S, S. Y and G. V, "Survey on IoT based Farm Freshness Mobile Application," 2022 International Conference on Advanced Computing Technologies and Applications (ICACTA), 2022, pp. 1-7, doi: 10.1109/ICACTA54488.2022.9752796.