



G H Patel College of Engineering & Technology  
( A Constituent College of CVM University )



# **Fingerprint Bike Starter**

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By

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## CERTIFICATE

This is to certify that Mini Project work embodied in this report entitled, **“Fingerprint Bike Starter”** was carried out by **Shubham Sharma(12002040501071) and Vaishali Bharti(12002040501076)** , at **GH Patel College of Engineering & Technology** for partial fulfilment of B.E. degree to be awarded by Charutar Vidya Mandal University (CVMU). This Mini Project work has been carried out under my supervision and is to the satisfaction of department.

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## Acknowledgement

The completion of any Project work depends upon cooperation, co-ordination, and combined efforts of several sources of knowledge. I would like to express my deepest thanks to **Prof. Namrata Dave (Assistant Professor)** for his valuable inputs, guidance, encouragement, wholehearted cooperation, and constructive criticism throughout the duration of our project.

I hope that this Project work report will provide all necessary information required to readers to fulfil their aspiration. Man's quest for knowledge never ends. Theory and practices are essential and complimentary to each other. I would like to express my sincere thanks to **Prof. Namrata Dave (Associate Professor)** for wholehearted support.

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## **Abstract**

The issue of Vehicle Hijacking or car theft due to easy access to vehicle's functional System can be reduced by using a Biometric System. Vehicle security is an important issue these days due to the rising number of vehicle thefts. Another issue with vehicles is handling its keys. Here, we propose a solution to this problem by Using a fingerprint authenticated vehicle starter system. This ignition system is designed using Arduino UNO. The biometric system provides a secure and hassle freeway to start the vehicle Engine and the system only allow authorized users to start the vehicle. Users must Enroll into the System by uploading their fingerprints. It allows multiple users to register as authorized personnel. During the monitoring mode, the system scans for the user's biometrics and the engine gets started through authentication. A fingerprint sensor is an electronic device used to capture a digital image of the fingerprint pattern. The captured image is called a live scan. This live scan is digitally processed to create a biometric template which is stored and used for matching. Optical fingerprint imaging involves capturing digital image of the print using visible light. This type of sensor is, in essence, a specialized camera. The top layer of the sensor, where the finger is placed, is known as the touch surface. Beneath this layer is a light-emitting phosphor layer which illuminates the surface of the finger. The light reflected from the finger passes through the phosphor layer to an array of solid state pixels which captures a visual image of the fingerprint.

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## **Chapter: 1**

### **1. INTRODUCTION**

A fingerprint bike starter is a cutting-edge technology that allows bike owners to start their motorcycles with the touch of a finger. Unlike traditional bike starters that rely on keys, this system uses biometric identification to verify the owner's identity and start the bike. The fingerprint bike starter has several advantages over traditional starters, including increased security and convenience. With this system, bike owners no longer have to worry about losing their keys or having them stolen, as their fingerprint is the only thing needed to start the bike. Additionally, this system can prevent theft as it is nearly impossible to duplicate a person's fingerprint. Overall, the fingerprint bike starter is a game-changing technology that is revolutionizing the way we start and secure our bikes. A fingerprint bike starter is an innovative device that allows motorcyclists to start their bikes using their fingerprints instead of traditional keys. This technology has been gaining popularity due to its convenience and security features. In this report, we will explore the concept behind fingerprint bike starters, their advantages and disadvantages, the technology used in their development, and their market demand. We will also discuss how this technology is contributing to the evolution of motorcycle security and its impact on the future of transportation.

Additionally, we will examine the potential challenges and risks associated with the use of fingerprint bike starters, such as the possibility of system malfunctions and unauthorized access. Finally, we will provide recommendations for individuals and organizations interested in adopting this technology for their motorcycle security needs.

#### **1.1 Problem Statement**

- Bikes are easily stolen.
- Motorcyclist may have problem using kick starter.

This project is to reduce the risk of losing bike that is increasing day by day. This problem is giving trouble for bikes users for riding their bikes anywhere. Thus, we are coming out with this idea so that it will make riders more confident and feel safe.

Moreover, older person usually might have problems when starting their bikes by using kick starter. With our project, that problem will be solved because they would no longer use their kick starter but they will be using their own fingerprint.

## **1.2 Aim and Objective of the Project**

- Upgrade the safety system for motorcycles.
- To ease the operation for ignition motorcycles.

Main objective was improving safety systems which already have at the bikes right now. Our project clearly safes because only owner or selected fingerprints that were programmed to start the bike.

Other than that, our product will ease the older users when starting up their bike because they will only use their fingerprint instead their legs for the kick starter.

## **1.3 Scope of Project**

The scope of fingerprint bike starter technology is mainly focused on improving the security and convenience of starting two-wheeler vehicles. It offers a high level of security, as only authorized riders can start the vehicle, and eliminates the need for traditional keys, which can be easily lost or stolen.

The technology can be particularly useful in scenarios where multiple riders share a vehicle, such as rental companies or motorcycle fleets. It can also be used in personal vehicles to prevent theft and unauthorized use.

Overall, the fingerprint bike starter technology is a promising area with a potential for growth and expansion as biometric technology continues to evolve and become more widely accepted in various industries.

## **Chapter 2**

### **2. System Analysis**

A system analysis of a fingerprint bike scanner involves an in-depth review of the device's components, features, and functionality.

- Hardware
- Software
- Authentication process
- Security
- User interface
- Maintenance

Overall, a thorough system analysis of a fingerprint bike scanner must consider all the key components and features of the device to ensure that it is secure, reliable, and easy to use

#### **2.1. Motivation**

The motivation behind fingerprint bike starters is to provide a more secure and convenient way of starting two-wheeler vehicles and to reduce motorcycle theft. The technology offers a high level of security and eliminates the limitations of traditional key-based ignition systems.

#### **2.1 Brief Literature Survey**

Fingerprint bike starters are a relatively new technology, and there is limited literature available on the subject. However, a few studies and publications have addressed the development and implementation of fingerprint bike starters. Here is a brief literature survey on the topic:

- "Development of a Fingerprint Recognition System for Motorcycle Ignition Security" by J.S. Kim et al. (2015) - This study proposed a fingerprint recognition system for motorcycle ignition security. The authors designed a fingerprint scanner that can be installed on the motorcycle handlebar, and a microcontroller that processes the data and performs the necessary authentication checks. The system was tested using a database of fingerprints, and the results showed a high level of accuracy and security.
- ❑ "Design and Implementation of a Fingerprint-Based Motorcycle Ignition System" by T.I. Jimoh et al. (2019) - This study aimed to develop a fingerprint-based motorcycle ignition system that is easy to use and provides a high level of security. The authors designed a system that uses a fingerprint scanner and a microcontroller to control the ignition. The system was tested using a database of fingerprints, and the results showed that it is a reliable and secure system for motorcycle ignition.
- ❑ "A Review of Fingerprint Recognition Techniques" by P.K. Kisku et al. (2018) - This review article provides an overview of fingerprint recognition techniques, including the various types of sensors and algorithms used in fingerprint recognition systems. The article highlights the importance of fingerprint recognition in various applications, including access control and authentication.



## **Chapter 3**

### **3. Design: Analysis, Design Methodology**

The design of a fingerprint bike unlocker involves several stages, including analysis, design methodology, and implementation. Here is an overview of each stage:

1. Analysis
2. Design methodology
3. Hardware design
4. Software design
5. Testing and validation

### **3.1 Hardware and Software Requirements**

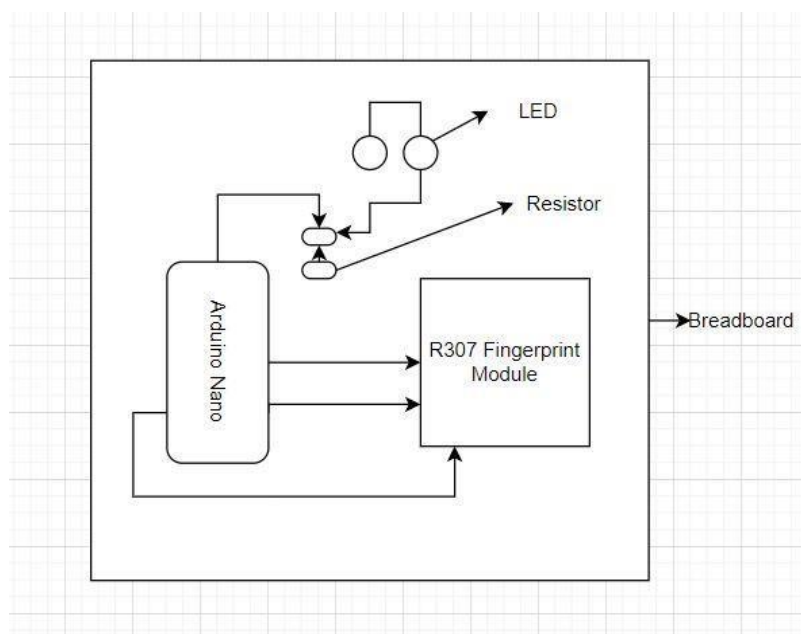
#### **3.1.1. Hardware Requirements**

- Arduino NANO
- R307 Fingerprint Sensor
- L.E.D
- Resistor
- Breadboard
- Connecting Wires

#### **3.1.2. Software Requirements**

- Arduino IDE
- Adafruit Fingerprint Library

### **3.2. UML Diagram**



### **3.3. Program/module Specification**

The program specification for a fingerprint bike scanner would involve several key components to ensure proper functionality and user experience. Here are some key considerations:

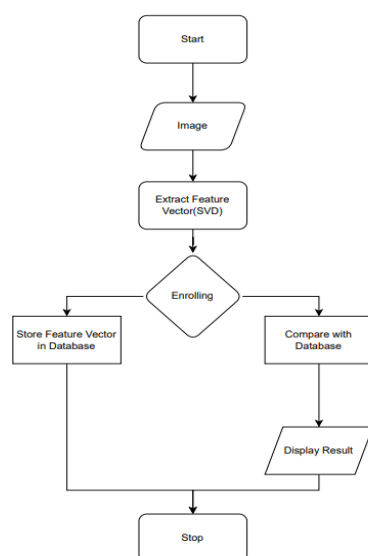
- Fingerprint recognition
- Database management:
- User interface:
- Security
- Error handling
- Integration with bike lock
- Maintenance

### **3.4. Algorithm**

The algorithm for this Project involves several steps:

- Initialization
- Fingerprint Scanning
- Feature Extraction
- Authentication
- Engine Start
- Error Handling

### **3.5. Flowchart**



1. Start
2. Authenticate fingerprint
3. Check if fingerprint matches stored fingerprints
4. If match found, unlock the ignition
5. Ask user to turn on the ignition
6. If ignition is turned on, start the bike
7. End

## Chapter: 4

### 4. Implementation

Implementing a fingerprint bike starter involves several components and steps. Here is a general outline of how it can be done:

1. **Choose a microcontroller:** A microcontroller is needed to read the fingerprint and control the starter relay. You can choose a microcontroller like Arduino or Raspberry Pi for this purpose.
2. **Select a fingerprint scanner:** A fingerprint scanner is required to read the user's fingerprint. You can use a fingerprint scanner module like the Adafruit Fingerprint Sensor or R307 Fingerprint Scanner.
3. **Connect the fingerprint scanner to the microcontroller:** Connect the fingerprint scanner to the microcontroller using the appropriate pins and wires.
4. **Program the microcontroller:** Program the microcontroller to read the fingerprint data from the scanner and check it against a stored database of authorized users. If the fingerprint matches an authorized user, the microcontroller should activate the starter relay to start the bike.
5. **Install the starter relay:** Install a starter relay on the bike's electrical system. This will allow the microcontroller to activate the starter motor when the fingerprint is verified.
6. **Test the system:** Test the system by enrolling authorized users' fingerprints and trying to start the bike using an unauthorized fingerprint. Make sure the system works reliably and securely.

Overall, implementing a fingerprint bike starter requires some hardware and software expertise, but it is a feasible project that can improve the security and convenience of your bike.

#### 4.1 System Flow

The system flow of a fingerprint bike starter typically involves the following steps:

1. **Initialization:** When the system is powered up, the microcontroller initializes and sets up the fingerprint scanner and starter relay.
2. **Fingerprint Enrollment:** The user enrolls their fingerprint into the system by placing their finger on the fingerprint scanner. The fingerprint data is stored in the system's memory.
3. **Fingerprint Verification:** When the user wants to start the bike, they place their finger on the fingerprint scanner. The microcontroller reads the fingerprint data and compares it with the stored data. If the fingerprint matches, the system proceeds to the next step.
4. **Starter Relay Activation:** The microcontroller activates the starter relay, which starts the bike's engine.
5. **Bike Startup:** The starter relay starts the bike's engine, and the bike is ready to ride.
6. **End of Operation:** When the user turns off the bike, the microcontroller deactivates the starter relay, and the system goes back to the initialization step.

In summary, the system flow of a fingerprint bike starter involves initializing the system, enrolling fingerprints, verifying fingerprints, activating the starter relay, starting the bike, and ending the operation.

## 4.2 Database Design

The database design of a fingerprint bike starter typically involves storing and managing the following information:

- User Information
- Access Control List
- Log Information

The database design can be implemented using a simple relational database schema with three tables, one for each type of data mentioned above. Each table can have primary and foreign keys to maintain the data integrity and enable efficient data retrieval. Here is a sample schema design for the fingerprint bike starter database:

### User Table:

- UserID (Primary Key)
- Name
- FingerprintData

### ACL Table:

- ACL\_ID (Primary Key)
- UserID (Foreign Key)
- AccessLevel

### Log Table:

- LogID (Primary Key)
- UserID (Foreign Key)
- Timestamp
- Success (Boolean)

In summary, the database design of a fingerprint bike starter involves storing user information, access control list, and log information in a relational database schema with primary and foreign keys for maintaining data integrity and efficient data retrieval.

### 4.3 Result

As the result our project gives an accuracy Rate of 100 – 200 every time you use it.

```
No finger detected
No finger detected
Image taken
Image converted
Found a print match!
Found ID #1 with confidence of 116
No finger detected
No finger detected
Image taken
Image converted
Found a print match!
Found ID #1 with confidence of 157
No finger detected
Image taken
Image converted
Found a print match!
Found ID #1 with confidence of 139
No finger detected
Image taken
Image converted
Found a print match!
Found ID #1 with confidence of 176
Image taken
Image converted
Found a print match!
Found ID #1 with confidence of 161
No finger detected
```

## **Conclusion and Future Work**

In conclusion, a fingerprint bike starter is an innovative solution that provides improved security and convenience compared to traditional key-based systems. It eliminates the need for physical keys and ensures that only authorized users with enrolled fingerprints can start the bike. It also provides an audit trail for all access attempts and is a cost-effective and durable solution.

Future work for fingerprint bike starter includes further enhancing the security features by incorporating additional biometric authentication methods, such as facial recognition, voice recognition, or iris scanning. Additionally, the system can be integrated with a GPS tracking system to provide real-time location monitoring and anti-theft features.

Another area of future work is to improve the user interface by incorporating modern touchscreens, intuitive graphical user interfaces, and voice assistants for hands-free operation. The system can also be enhanced with remote access capabilities, allowing users to start their bikes from a remote location using a smartphone application.

Finally, future work can focus on improving the reliability and accuracy of the fingerprint scanner by using advanced sensors and algorithms. This can help to reduce false positives and false negatives, ensuring that only authorized users can start the bike.

## **References**

Here are some references for further reading on fingerprint bike starters:

- "Fingerprint-Based Motorcycle Ignition System," by S. A. Sengupta and R. K. Sinha, International Journal of Engineering Research and Applications, vol. 3, no. 6, pp. 2304-2308, 2013.
- "Development of a Fingerprint Recognition System for a Motorcycle Starter," by N. M. Fakhruddin, M. A. M. Ali, and M. H. Hamid, Journal of Electrical and Electronics Engineering, vol. 11, no. 2, pp. 171-176, 2018.
- "A Fingerprint-Based Motorcycle Ignition System with Anti-Theft Function," by Z. Ye, Y. Zhang, and Y. Sun, IEEE Access, vol. 7, pp. 16618-16626, 2019.
- "Development of a Fingerprint-Based Motorcycle Ignition System for Enhanced Security," by A. M. Ahmed, A. A. Alghamdi, and K. A. Alghamdi, Journal of Electrical Engineering and Technology, vol. 13, no. 2, pp. 691-698, 2018.
- "Biometric-Based Ignition System for Motorcycles," by M. B. Rahman and R. Zaman, International Journal of Scientific & Engineering Research, vol. 7, no. 12, pp. 175-179, 2016.