

Fingerprint Base Bike Security System

Gajanan Ramdas Patil¹, Abhinav Sopanrao Solunke², Prof. S. P. Kharde³

Department of Electronics and Telecommunication Engineering

Shreeyash College of Engineering & Technology, Aurangabad, Maharashtra

Abstract -

An enhanced motorcycle security system incorporating a fingerprint sensor is devised, utilizing an Arduino Uno microcontroller. Unlike conventional motorcycle ignition systems that are susceptible to tampering, this security system leverages a fingerprint sensor to bolster vehicle protection. A two-channel relay module acts as the intermediary between the hardware and software components. The fingerprint sensor functions by comparing an individual's fingerprint pattern stored in its memory with the presented fingerprint, effectively replacing the traditional ignition key for motorcycle startup. By utilizing the Arduino Uno microcontroller, the security system can receive and process responses, ensuring that only the owner, whose fingerprints are registered in the sensor, possesses the authorization to activate the motorcycle. This security system operates on dual layers, combining the functionality of the ignition key as a handlebar lock and the fingerprint as a means of granting vehicle access rights. The fingerprint sensor is calibrated for accurate fingerprint identification, providing a success rate of 95% for authorized users to gain access to the motorcycle.

Key Words: Arduino Uno, Fingerprint module, buzzer, relay module.

1. INTRODUCTION

Fingerprint based smart bike is having functionality of reading users/owners fingerprint details (biometric details) and cross verified with recorded database data for the successful authentication. It also provides ignition start by the help of fingerprint sensors. A large number of vehicles currently on the roads have that record information in the event of crash. That's why it is important to have an accident detection system, which provides the exact vehicle location where the accident took place. It also records the number of accidents occurred in the database for the better investigation purposes. This system also provides anti-theft alarm from unauthorized access from theft or anyone who is not registered their biometric details.

At the point the bike can be only accessed using keys. This can be hijacked using cloned keys. In case of accident the emergency contacts cannot come to know about the accident occurred and safety is missing here. Apart from accident the theft is more often nowadays in case of theft existing system cannot provide any further securities. So in this we introducing anti-theft alarm and notification system. That is in case of theft the owner can get to know the exact live location updates and he can turn of the entire bike system remotely by using application or by sending commands as message.

We are proposing another technique for the authentication that is, fingerprint base authentication for the

bike and accident detection system. In case of theft we proposing a new security system that is tracking the bike and also we can turn of the entire the bike system

II. OBJECTIVES

Fingerprint biometrics can be used to authenticate a person based on matching the data within a system, or it can be used as a method of identity verification to ensure that a person is who they say they are. Fingerprint biometrics can add an extra layer of security over password and token security measures.

III. LITERATURE SURVEY

2.1 Fingerprint Based Smart Bike

The existing limitations in recording accident or theft data, as well as the difficulty in reaching emergency services in isolated areas, call for an innovative solution. This project aims to address these challenges by developing a self-starting motorcycle system based on fingerprint recognition. With this system, the owner is relieved from the burden of carrying a physical key at all times, while also gaining the ability to track the vehicle's location. Additionally, an advanced safety feature is implemented to alert the owner's five designated friends in case of an accident, providing them with the precise location of the incident. Moreover, the system incorporates a theft alert mechanism to promptly notify the owner if an unauthorized individual attempts to steal the vehicle. To achieve these objectives, the project proposes the integration of fingerprint-based authentication for bike access and an accident detection system equipped with real-time GPS tracking capabilities.

2.2 Fingerprint Sensor for Security and starting of Bike

With the increasing number of vehicle thefts, ensuring vehicle security has become a paramount concern. Another challenge faced by vehicle owners is the handling of keys. To address these issues, we propose a solution in the form of a fingerprint-authenticated vehicle starter system. This innovative ignition system is built using the Arduino UNO platform. By implementing a biometric system, we establish a secure and convenient method for starting the vehicle's engine, allowing only authorized users to activate it. To gain access, users must first enroll in the system by uploading their fingerprints. This system supports multiple users, enabling them to register as authorized personnel. During the monitoring mode, the system continuously scans

for the user's biometrics, and upon successful authentication, the engine is started, providing a seamless and secure experience for vehicle owners.

2.3 Fingerprint Ignition System in Bike

Our project is about the fingerprint based ignition in bikes which includes all two wheelers. Normally available locks in the bikes do not provide enough security to the bike owners. Traditional locks available in the bikes are well known to thieves and they can be easily broken by them. Thus there is a need for more security options to be available for the motorcycle which is unique and must be different from the traditional key locks. Biometrics system can be used as a good and effective security option. An important and very reliable human identification method is fingerprint identification. As fingerprint of every person is unique thus it can be used in various security options. In this paper we are focusing on the use of finger print recognition to start or ignite the motorcycle against the use of conventional methods of key locks. Related work include enhancing the security of the bikes by adding different types of locks and alarming unit to alert owner of the bike in case of danger.

IV. BLOCK DIAGRAM

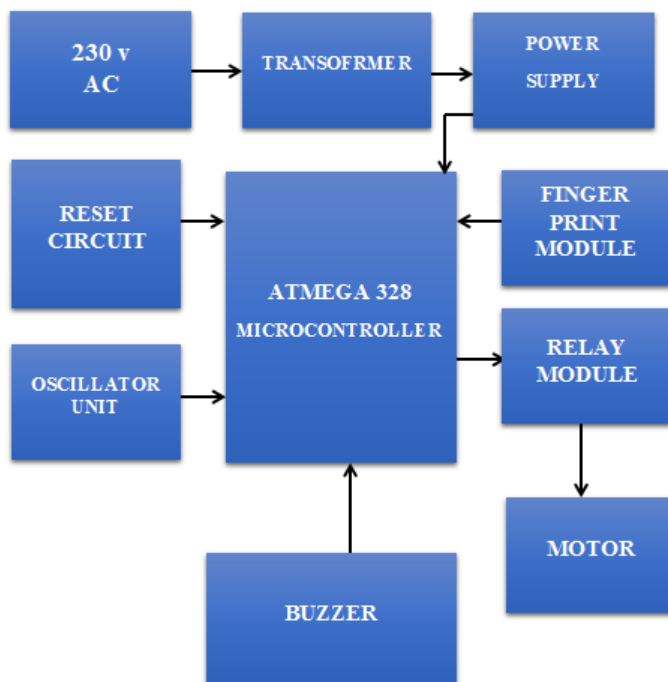


Fig.1: Block Diagram

V. SPECIFICATION OF COMPONENT

a. Arduino Uno

Arduino boards feature a number of digital I/O pins, which can be used for reading digital signals (input) or sending digital signals (output). The clock speed refers to the

frequency at which the microcontroller operates. Arduino boards commonly have clock speeds of 8 MHz or 16 MHz.



Fig.2: Arduino

b. Fingerprint Module

A fingerprint module, also known as a fingerprint sensor or fingerprint scanner, is a biometric device that can capture and analyze fingerprints for identification and authentication purposes. It is commonly used in security systems, access control systems, and various applications where secure and reliable user identification is required.



Fig.3: Fingerprint module

c. Relay module

A relay module is an electronic device that allows you to control high-power or high-voltage circuits using a low-power signal. It acts as an interface between a microcontroller or digital circuit and the external device or circuit that requires higher power. Relays are commonly used in various applications such as home automation, industrial control systems, robotics, and automotive systems.



Fig.4: Relay module

VI. WORKING

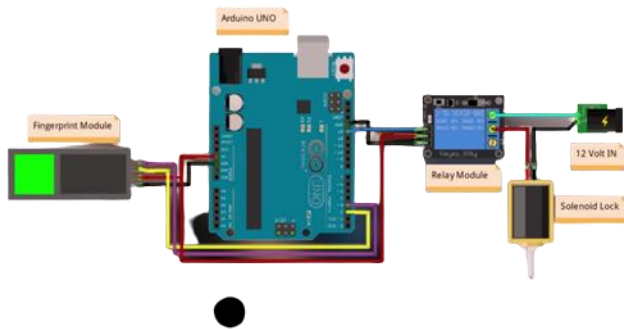


Fig.5: Circuit diagram

230v power supply is given to the step down transformer. Rating of the transformer is 12v. It can be given to bridge rectifier which consists of rectifier, filter and a voltage regulator. Rectifier converts the ac into pulsating dc and filter gives the pure dc signal by blocking ripples. The dc voltage is further regulated and Microcontroller receives this DC power from rectifiers. The working principle of the fingerprint sensor mainly depends on the processing. The fingerprint processing mainly includes two elements namely enrolment and matching. In fingerprint enrolling, every user requires to place the finger twice. So that the system will check the finger images to process as well as to generate a pattern of the finger and it will be stored. When matching, a user places the finger using an optical sensor then the system will produce a pattern of the finger & compares it with the finger library templates. For 1:1 fingerprint matching, the system will evaluate the exit finger with a precise pattern which is selected within the module. Similarly, for 1: N matching, the scanning system will look for the complete finger records for the finger matching. In both situations, the scanning system will go back to the corresponding result, success otherwise crash.

VII. CONCLUSIONS

The fingerprint sensor initialized as fingerprint identification is used to enable the motorcycle, able to read sensitivity detection of its user fingerprint. Based on the results of the accuracy equation calculation, that percentage of the user's fingerprint success to access the motorcycle is 95%. The motorcycle security system by using this fingerprint sensor can work well to turn on and off the relay with 5 users. The motorcycle security system can still work despite being tested with a different person on the condition that the person's finger is already registered into the security system.

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