

# Remote Operated Shutter System with Fingerprint Lock

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## ABSTRACT

The ultimate purpose of this project is to develop a remote-controlled rolling shutter using a sensor. In this project the main objective is the shutter operate as manual and also motor, this is two in one process. In the project the bevel gear mechanism is used to sensor this type is INFRARED. This remote control is used to ON-OFF the motor. The final outcomes the project is the running the shutter using remote control. The scope of the project is to reduce the manual work and human injuries due to shutter operation.

**KEYWORDS:** Infrared sensor, human fatigue, bevel gear, roller shutter, microcontroller, Fingerprint, Biometric, stepper motor

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## I. INTRODUCTION

Our project is developed to provide security for an Organization. In this project the fingerprint sensor senses the thumb impression of the corresponding person and that image will be compared with registered image, if the both images are unique, then the finger print device activates particular task like access control to a secured area, identification of the employee etc. The project contains 2 modes, the first one is master mode and the second is user mode.

The master mode is used to register the new user and gives the mode of authorization. The master mode has the ability to create and delete the users. The user mode is an ordinary mode used for the authentication of the employees. In user mode of authorization, creation and deletion of a user cannot be performed.

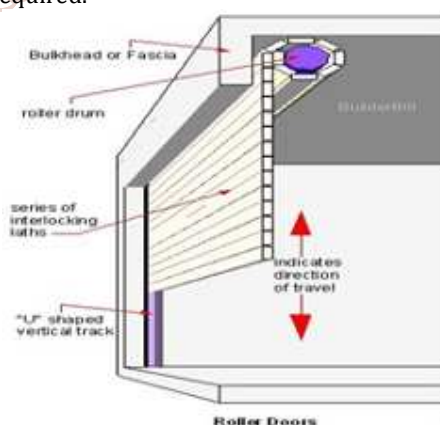
## II. Shutter System:

Types of existing shutter:

1. Sectional shutter
2. Rolling shutter

1. Sectional Shutters are created out of various inflexible segments/boards that are pivoted together and move vertically in the opening, then evenly along the roof, guided by tracks and balanced springs. The Sectional door offers the best level of stylish flexibility. It includes various vast segments or boards.

2. Rolling Shutter consist of a ribbed steel shutter that moves vertically while opening and rolls up and around the drum, guided by tracks and counterbalanced with springs. They are particularly suitable for s where there is plenty of headroom above the opening and where an old-fashioned look is required.



## Advantages of Remote Operated Shutter:

- > Suitable for low headroom.
- > Great for accommodating vehicles that require extra height.
- > They open upwards and parallel to the ceiling.
- > Vehicles can be parked right in front of the door.
- > Robust & striking Roll-A-Door curtain.

**Main Parts:**

1. Lead Screw- It is a screw used as a link into the machine, to convert rotational motion into linear motion. Because of the large area of sliding contact between their male and female members, screw threads have larger frictional energy losses compared to other linkages. They are not typically used to carry high power, but more for intermittent use in low power actuator and positioner mechanisms.
2. A Stepper Motor - It is a brushless DC electric motor that divides a full rotation into a number of equal steps. The position of the motor can be commanded to move and hold at one of the steps without any feedback sensor, as long as the motor is carefully sized for the requirement.
3. Torsion Spring - A torsion spring is a spring that works by torsion or twisting; which means, a flexible elastic object storing mechanical energy when twisted then it exerts a force (actually torque) in the opposite direction, proportional to the amount (angle) it is twisted.

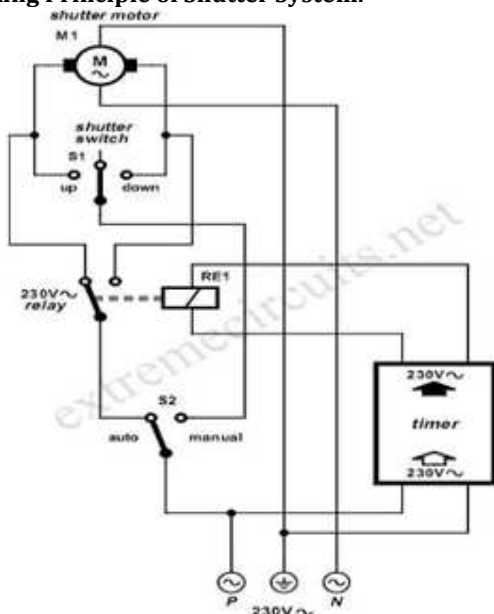
**III. Operation:**

An electric drive is exceptionally valuable in client accommodation, they are controlled by remote controls. The electric drive follows up on a toothed sash which opens and shuts the door without any exertion from the client. The drive framework opens and shuts the door at a palatable rate. The electric engine is secured to the ceiling. One can drive in as well as out with the shutter without any issue.

At the point when the button of remote control is pressed then it offers signal to the receiver which is inside the and the recipient on getting the sign reactions bringing about exchanging on the engine.

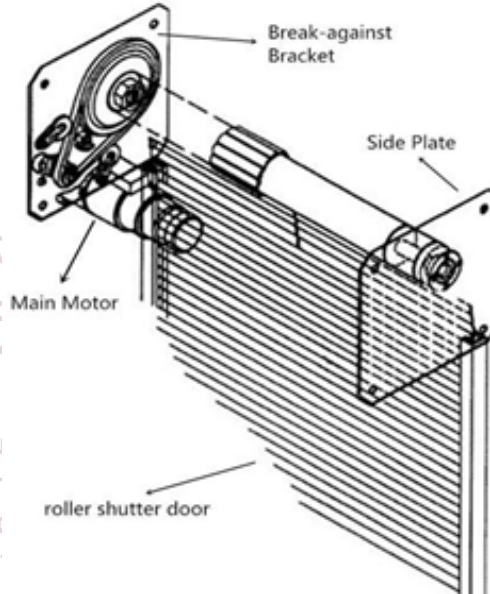


**Working Principle of Shutter System:**



In this prototype the working principle used is different and easier in functioning from the one contemporarily used for them. Here, a lead screw is coupled with the motor and the motor is attached to the roof of the planks. Lead screw has a nut whose rotational movement is fixed i.e. it will not show any rotational movement when motor will rotate. So, there will be a lateral movement of the bolt along with the lead screw and the top section of the sectional door is attached with the bolt, so the bolt will pull to open or push to close the door. Therefore, when power is supplied to the motor, it will rotate together with the coupled screw and nut meshed with the screw will make translational motion and the door will open or close depending on the direction of motion of the motor.

A working model shutter is fabricated.

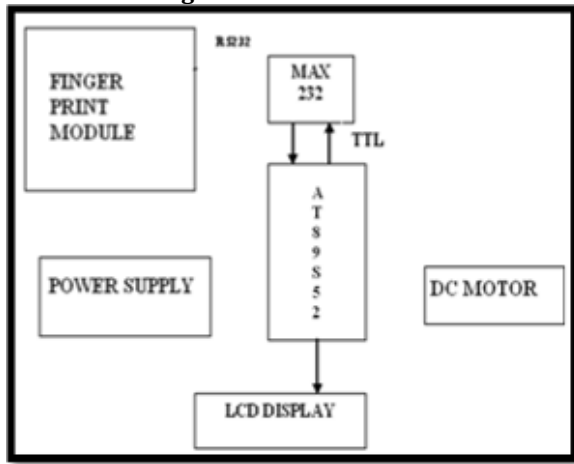


**IV. Fingerprint Lock and Password:**

When a finger is kept at the finger print reader, it will give the information accordingly to microcontroller by sending appropriate commands to the reader and which is displayed on the LCD. If the information matches with the one within the device then the DC motor interfaced to the microcontroller responds accordingly. And if the information provided by the user is incorrect or mismatch in finger prints is detected then access is denied. Finger print reader and the microcontroller unit are connected using serial interface.



**V. Block Diagram:**



**Microcontroller 8051:**

The major heart of this project is 8051 microcontroller, the reasons why we selected this in our project. The 8051 provides the following standard features: 8K bytes of Flash, 256 bytes of RAM, 32 I/O lines, Watchdog timer, two data pointers, three 16-bit timer/counters, a six-vector two-level interrupt architecture, a full duplex serial port, on-chip oscillator, and clock circuitry. In addition, the 8051 is designed with static logic for operation down to zero frequency and supports two software selectable power saving modes. The Idle Mode stops the CPU while allowing the RAM, timer/counters, serial port, and interrupt system to continue functioning. The Power-down mode saves the RAM contents but freezes the oscillator, disabling all other chip functions until the next interrupt or hardware reset

**LCD Module:**

A liquid crystal is a material (normally organic for LCDs) that will flow like a liquid but whose molecular structure has some properties normally associated with solids. The Liquid Crystal Display (LCD) is a low power device. The power requirement is typically in the order of microwatts for the LCD. However, an LCD requires an external or internal light source. It is limited to a temperature range of about 0C to 60C and lifetime is an area of concern, because LCDs can chemically degrade

**AC Motors:**

In this project AC motors can be used to drive the gates. There are always two options in front of the designer whether to use an AC motor or a stepper motor. When it comes to speed, weight, size, cost. AC motors are always preferred over stepper motors. There are many things which you can do with your AC motor when interfaced with a microcontroller. For example, you can control the speed of motor; you can control the direction of rotation. In this part of tutorial, we will learn to interface and control of an AC motor with microcontroller. Usually H-bridge is preferred way of interfacing an AC motor

**Fingerprint Module:**

In the 21st century the use of biometric based systems has seen an exponential growth. This is all because of tremendous progress in this field making it possible to bring down their prices, easiness of use and its diversified use in everyday life. Biometrics is becoming new state of art method of security systems. Biometrics aroused to prevent unauthorized access to ATM, cellular phones, laptops, offices,

cars and many other security concerned things. Biometric have brought significant changes in security systems making them more secure than before, efficient and cheap. They have changed the security system from what you remember (such as password) or what you possess (such as car keys) to something you embody (retinal patterns, fingerprints, voice recognition).

**VI. Biometrics:**

Biometrics is the science of verifying the identity of an individual through physiological measurements or behavioral traits. Since biometric identifiers are associated permanently with the user, they are more reliable than token or knowledge-based authentication methods.

**Accuracy and Security:**

Biometrics based security systems are far most secure and accurate than traditional password or token-based security systems. For example, a password-based security system has always the threat of being stolen and accessed by the unauthorized user. Furthermore, the traditional security systems biometrics which is more accurate.

**One individual, Multiple IDs:**

Traditional security systems face the problem that they don't give solution to the problem of individuals having multiple IDs. For examples a person having multiple passports to enter a foreign country. Thanks to biometrics!!! They give us a system in which an individual can't possess multiple IDs and can't change his ID throughout his life time. Each individual is identified through a unique Biometric identity throughout the world.

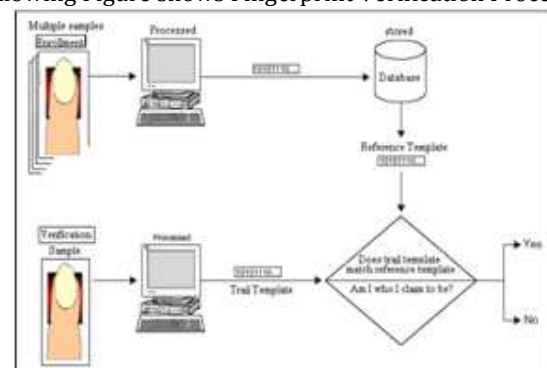
**VII. Fingerprint:**

A fingerprint the feature pattern of one finger. It is believed with strong evidences that each fingerprint is unique. Each person has his own fingerprints with the permanent uniqueness. So, fingerprints have been used for identification and forensic investigation for a long time.



**Position of the fingerprint:**

In order to capture the most minutiae, maximize the surface area of the fingerprint on the fingerprint input window. Following Figure shows Fingerprint Verification Process



### VIII. Advantages and Disadvantages :

#### Advantages:

1. Easy access and keyless entry with more time consuming.
2. A fingerprint is unique and is not identical for one or more human imprints.
3. Highly accurate in terms of security of the vehicle.
4. Manual error is not possible while the use of fingerprint module.
5. Intrusions with false imprint is strictly not possible in this case.

#### Disadvantages:

1. The fact that biometric door locks require an electrical current to operate means that, for some models, you may be locked out of your house if there is an electrical problem or a blackout.
2. While this can be somewhat offset by purchasing a biometric door lock that comes with backup battery

power, it is still something to keep in mind, especially if you live in a rural area with frequent power outages

### IX. Conclusion:

The project has been successfully implemented. In conclusion, "FINGER PRINT BASED SECURITY SYSTEM" is used to provide security and authentication for an organization using finger prints as forgery of that is not possible. The project report began with the introduction to the basic functioning of Microcontroller based Identification, Authentication and Setup of Security system.

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