Fingerprint Ignition and Security System

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Abstract: **To develop an embedded system for vehicle security and to operate the vehicle through biometric as well as GSM by increasing the security in parking areas and also to inform a user through GSM modem.Security is of primary concern and in this busy, competitive world, human cannot find ways to provide security to his confidential belongings manually. Instead, he finds an alternative which can provide a full fledged security as well as atomized. In the ubiquitous network society, where individuals can easily access their information anytime and anywhere, people are also faced with the risk that others can easily Security is of primary concern and in this busy, competitive world, human cannot find ways to provide security to his confidential belongings manually. Instead, he finds an alternative which can provide a full fledged security as well as atomized. In the ubiquitous network society, where individuals can easily access their information anytime and anywhere, people are also faced with the risk that others can easily access. Because of this risk, personal identification technology, which can distinguish between registered legitimate users and imposters, is now generating interest. The most secured system is fingerprint recognition because a fingerprint of one person never matches the other. This proposed system is a fine combination of "Biometrics technology" and "Embedded system technology". Fingerprint sensor is the main part of this system. It makes use of Biometric sensor to detect fingerprint. It is also called as Biometric sensor. Fingerprint sensor uses various types of techniques like ultrasonic method, optical method or thermal technique. In this project we have used optical fingerprint sensor. Main blocks of this project are Microcontroller, Fingerprint module, PIR sensor, Tilt sensor, GSM module, LCD display, Relay.**

I. INTRODUCTION

"BIOMETRIC" is derived from the term Biometry used in 20th century. Biometric system includes various types such as Face recognition, Voice recognition, Fingerprint recognition, Eye (iris) recognition. Among these techniques the fingerprint recognition is the most widely used. This is because fingerprint of every person on the earth is unique and can provide good reliability compared to the other conventional methods. Fingerprint biometrics are easy to implement. The two significant parts of Fingerprint biometric system is Identification and Authentication. Fingerprint recognition or Fingerprint authentication refers to the automated method of verifying a match between multiple human fingerprints. The process of identification tells you who the user is while the process of authentication tells you whether the user is valid or not.

Vehicle security system mainly concentrated on two wheeler bikes, starting ignition of the vehicle through BIOMETRIC and GSM modem, providing parking security through PIR sensors and accident alert through TILT sensor.

II. EXISTING SYSTEM

1.Most Bikes use **Basic key** for security. Simple key is the most common used tool for bike security.

 2.**Bike Alarms**- If someone touches your bike, Alarm is triggered and user is alerted. Which in turn protect the bike from any intruders and thus securing the bike.

3.**Remote** - Bike locking and engine status is controlled using remote.where the owner is provided with remote where

they can control many operations of the bike.

III. PROBLEMS FACED

1. **Duplicating of key**: Asit is quite common in bike theft as its been done very easily, this leads bike theft more easier.

2.**Alarm triggered by even small disturbance**: Installing alarms may also disturb the owner as well as the people who just pass by the vehicle may also lead to the triggering of the vehicle alarm which causes unwanted disturbance.

3.**Losing remote** to wrong hands may lead to bike theft, its more convenient as compared to others.

IV. METHODOLOGY

Here the proposed system consists of *Microcontroller*, programmed efficiently towards achieving the objective.It mainly controls the all function of the project. GSM Modem Abbreviated as Global system for mobile communication is a standard used to describe the second generation digital cellular networks used by mobile phones.GSM modem is used to send messages to the predefined numbers stored in the microcontroller. This GSM modem uses AT commands in order to send messages to the predefined number.

 The system mainly consists of the following Block elements as listed below
1. Microcontroller
 2. Tilt Sensor

3. Power Supply
4. LCD Display
5. PIR Sensors
6. GSM Modem

Here user needs to keep the finger on fingerprint sensor. The fingerprint sensor scans the finger and checks for validity of the fingerprint. If user fingerprint matches the fingerprint in the database the user will be able to start the vehicle. If user fingerprint doesn't match with the fingerprint in the database the user will not be able to start the vehicle. When someone tries to start a vehicle a wrong fingerprint no action takes place.

Added to this an Accident sensor is interfaced to the device, which further provides messages if found any damage to the bike. An accident sensor is a Tilt sensor which will used to detect the accident and intimates the user through messages. For theft control PIR sensors are used and in case found any intruder.

After parking, a message will sent to registered mobile number, also added to this PIR sensors are used to detect the movement or any presence of humans when it is parked. Added to this in case of any emergency permanent.

User can add the temporary user by registering the thumb of temporary user, further this temporary user registration can be deleted anytime by the permanent user through SMS.

V. INNOVATION AND USEFULNESS

1. Finger of an individual becomes the second key for the vehicle. There is very less chance of Vehicle getting theft or stolen.
2. Proposed system is installed to motorcycles.
3. **Biometric system** exists in only few cars but there is no option for temporary users fingerprint addition through owner authorization.
4. Parking security provided through PIR sensor, If there is any intruder owner is alerted.
4. Tilt sensor indicates the physical status of the bike, if the bike is meet with any accident both owner and any registered guardian mobile number receives the alert message.

VI. BLOCK DIAGRAM
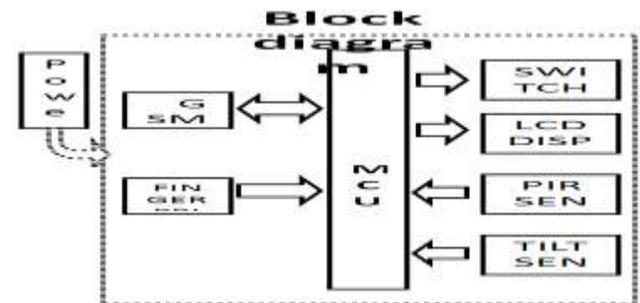
Power Supply Unit: The specially designed regulated power supply is needed for proper working of the system including fingerprint sensor and hence power supply unit is constructed.

Relay / Switch: It is an electrically operated switch; it is normally used to control / turn ON and OFF the vehicle by a low power signal from the microcontroller.

A **relay** is an electrically operated switch. Many relays use an electromagnet to mechanically operate a switch, but other operating principles are also used, such as solid-state relays. Relay are used where it is necessary to control a circuit by a separate low-power signal, or where several circuits must be controlled by one signal. The first relays were used in long distance telegraph circuits as amplifiers: they repeated the signal coming in from one circuit and re-transmitted it on another circuit. Relays were used extensively in telephone exchanges and early computers to perform logical operations.

A type of relay that can handle the high power required to directly control an electric motor or other loads is called a contactor. Solid-state relays control power circuits with no moving parts, instead using a semiconductor device to perform switching. Relays with calibrated operating characteristics and sometimes multiple operating coils are used to protect electrical circuits from overload or faults; in modern electric power systems these functions are performed by digital instruments still called "protective relays".

Magnetic latching relays require one pulse of coil power to move their contacts in one direction, and another, redirected pulse to move them back. Repeated pulses from the same input have no effect. Magnetic latching relays are useful in applications where interrupted power should not be able to transition the contacts.

Magnetic latching relays can have either single or dual coils. On a single coil device, the relay will operate in one direction

when power is applied with one polarity, and will reset when the polarity is reversed. On a dual coil device, when polarized voltage is applied to the reset coil the contacts will transition. AC controlled magnetic latch relays have single coils that employ steering diodes to differentiate between operate and reset commands.

Tilt Sensor: Tilt sensors are used to measure the gradient of the carrier, and acquire the input signals of the automatic follow and adjusting of the platform. Tilt sensors are applied in many fields, such as communication, consumer electronic products, toy, electro-mechanical equipment; and also applied in automobiles, tanks, ships, robots, stabilization system of radar and missiles.

Specifications
- Number of Axes
- Resolution
- Measuring Range
- Sensitivity
- Noise Tolerance
- Output
- Vibration

Applications of Tilt Sensors

These sensors are used in many different applications. They are:

- Cameras
- Video Cameras
- Aircraft Flight Controls
- Construction Equipment
- Robotic Technology
- Automobile Air Bags
- Videos Game Controllers
- Studying Human Movement
- Thermostats
- Automobile Security Systems

Microcontroller: The main controller is used to control all the various interrupts and manage / guides the entire system.
The P89V51RD2 is an 80C51 microcontroller with 64kB Flash and 1024 bytes of data RAM.
A key feature of the P89V51RD2 is its X2 mode option. The design engineer can choose to run the application with the conventional 80C51 clock rate (12 clocks per machine cycle) or select the X2 mode (6 clocks per machine cycle) to achieve twice the throughput at the same clock frequency. Another way to benefit from this feature is to keep the same performance by reducing the clock frequency by half.
The P89V51RD2 is also In-Application Programmable (IAP), allowing the Flash program memory to be reconfigured even while the application is running.

PIR Sensor: Here PIR sensor is used to detect the intruders when it is parked. If sends a message to the user when it detects intruders.An individual PIR sensor detects changes in the amount of infrared radiation impinging upon it, which varies depending on the temperature and surface characteristics of the objects in front of the sensor.

When an object, such as a human, passes in front of the background, such as a wall, the temperature at that point in the sensor's field of view will rise from roomtemperature to body temperature, and then back again. The sensor converts the resulting change in the incoming infrared radiation into a change in the output voltage, and this triggers the detection. Objects of similar temperature but different surface characteristics may also have a different infrared emission pattern, and thus moving them with respect to the background may trigger the detector as well.

PIRs come in many configurations for a wide variety of applications. The most common models have numerous Fresnel lenses or mirror segments, an effective range of about ten meters (thirty feet), and a field of view less than 180 degrees. Models with wider fields of view, including 360 degrees, are available—typically designed to mount on a ceiling. Some larger PIRs are made with single segment mirrors and can sense changes in infrared energy over thirty meters (one hundred feet) away from thePIR. There are also PIRs designed with reversible orientation mirrors which allow either broadcoverage (110° wide) or very narrow "curtain" coverage, or with individually selectable segments to "shape" the coverage.

GSM Modem: GSM modem is used to send and receive messages to the predefined numbers stored in the microcontroller. This GSM modem uses AT commands in order to send messages to the predefined number. This is a GSM/GPRS-compatible Quad-band cell phone, which works on a frequency of 850/900/1800/1900MHz and which can be used not only to access the Internet, but also for oral communication (provided that it is connected to a microphone and a small loud speaker) and for SMSs. Externally, it looks like a big package (0.94 inches x 0.94 inches x 0.12 inches) with L-shaped contacts on four sides **so that they can be**

soldered both on the side and at the bottom. Internally, the module is managed by an AMR926EJ-S processor, which controls phone communication, data communication (through an integrated TCP/IP stack), and (through an UART and a TTL serial interface) the communication with the circuit interfaced with the cell phone itself. The processor is also in charge of a SIM card (3 or 1,8 V) which needs to be attached to the outer wall of the module. In addition, the GSM900 device integrates an analog interface, an A/D converter, an RTC, an SPI bus, an I²C, and a PWM module. The radio section is GSM phase 2/2+ compatible and is either class 4 (2 W) at 850/ 900 MHz or class(1W). . The TTL serial interface is in charge not only of communicating all the data relative to the SMS already received and those that come in during TCP/IP sessions in GPRS (the data-rate is determined by GPRS class 10: max. 85,6 kbps), but also of receiving the circuit commands (in our case, coming from the PIC governing the remote control) that can be either AT standard or AT-enhanced SIMCom type. The module is supplied with continuous energy (between 3.4 and 4.5 V) and absorbs a maximum of 0.8 A during transmission.

Fingerprint / Biometric system: It uses as an identification system. It actually identifies the user and turns ON the ignition of the vehicle. An identification system is one which helps in identifying an individual among many people when detailed information is not available. It may involve matching available features of the user like fingerprints with those already enrolled in database.

Features

- Integrated image collecting and algorithm chip together, ALL-in-One
- Fingerprint reader can conduct secondary development, can be embedded into a variety of end products
- Low power consumption, low cost, small size, excellent performance
- Professional optical technology, precise module manufacturing techniques
- Good image processing capabilities, can successfully capture image up to resolution 500 dpi

Specifications

- Fingerprint sensor type: Optical
- Sensor Life: 100 million times
- Static indicators: 15KVBacklight: bright green
- Interface: USB1.1/UART(TTL logical level)
- RS232 communication baud rate: 4800BPS~115200BPS changeable
- Dimension: 55*32*21.5mm
- Image Capture Surface 15—18(mm)
- Verification Speed: 0.3 sec
- Scanning Speed: 0.5 sec
- Character file size: 256 bytes
- Template size: 512 bytes
- Storage capacity: 250
- Security level: 5 (1,2,3,4,5(highest))
- False Acceptance Rate (FAR) :0.0001%
- False Rejection Rate (FRR): 0.1%
- Resolution 500 DPI
- Voltage :3.6-6.0 VDC
- Working current: Typical 90 mA, Peak 150mA
- Matching Method: 1: N
- Operating Environment Temperature: -20 to 45° c.

LCD Display: LCD abbreviated as liquid-crystal display (LCD) is a flat panel display, electronic visual display, or video display that uses the light modulating properties of liquid crystals.

Liquid crystals do not emit light directly. Here LCD display used to display the status of the vehicle. Here we are using character LCD display to display the status. The name and functions of each pin of the 16×2 LCD module is given below.

Pin1(Vss):Ground pin of the LCD module.

Pin2(Vcc): Power to LCD module (+5V supply is given to this pin)

Pin3(VEE):Contrast adjustment pin. This is done by connecting the ends of a 10K potentimeter to +5V and ground and then connecting the slider pin to the VEE pin. The voltage at the VEE pin defines the contrast. The normal setting is between 0.4 and 0.9V.

Pin4(RS):Register select pin.The JHD162A has two registers namely **command register** and **data register**. Logic HIGH at RS pin selects data register and logic LOW at RS pin selects command register. If we make the RS pin HIGH and feed an input to the data lines (DB0 to DB7), this input will be treated

as data to display on LCD screen. If we make the RS pin LOW and feed an input to the data lines, then this will be treated as a command (a command to be written to LCD controller – like positioning cursor or clear screen or scroll).

Pin5(R/W): Read/Write modes. This pin is used for selecting between read and write modes. Logic HIGH at this pin activates read mode and logic LOW at this pin activates write mode.

Pin6(E): This pin is meant for enabling the LCD module. A HIGH to LOW signal at this pin will enable the module.

Pin7(DB0) to Pin14(DB7): These are data pins. The commands and data are fed to the LCD module though these pins.

Pin15(LED+): Anode of the back light LED. When operated on 5V, a 560 ohm resistor should be connected in series to this pin

Pin16(LED-): Cathode of the back light LED.

VII. FLOW DIAGRAM
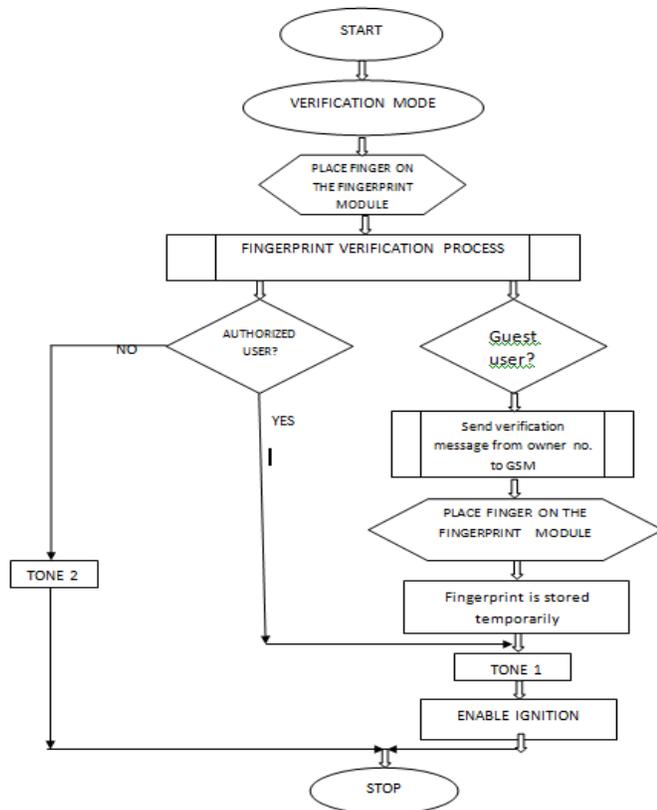
VIII. HARDWARE DESCRIPTION

LCD to PORT0 of Microcontroller.
PIR to INT1 (Vcc,Gnd)
Tilt to INT0 (Vcc,Gnd)
GSM Rx, Tx, Gnd to Microcontroller
FingerprintRx,Tx,Vcc,Gnd to Microcontroller

IX . SOFTWARE DESCRIPTION

KEIL software
Programmer used *FLASH MAGIC*

X. ADVANTAGES

1.High level security to vehicle, no worries of bike getting lost.

2.Using GSM we can turn on the ignition from any part of the world, which enables the user to give access of the vehicle to others. Also the user will get alert messages every time regarding the status of the vehicle.

3. Tilt sensor is used to detect the status of the vehicle, during parking and also while riding the vehicle. Incase accident of the vehicle will be detected and sends the messages to the registered number

4.PIR Sensors are used to detect the movement of humans or any intruders when vehicle is parked. Thus increases the security and provides theft protection.

XI. RESULT AND CONCLUSION

STEP 1: BIKE IS UNLOCKED

The owner is unlocking the bike by a key, then the power supply is supplied to fingerprint module. Initially the power supply is supplied to all of the components later by unlocking the bike fingerprint module gets a power supply.

STEP 2: FINGER PRINT SCAN

Here owner needs to keep his finger on fingerprint sensor. The fingerprint sensor scans the finger and checks for validity of the fingerprint. If user fingerprint matches the fingerprint in the data base the user will be able to start the vehicle, If user

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fingerprint doesn't match with the fingerprint in the data base the user will not be able to start the vehicle.

STEP 3: GUEST MODE

If user wants to give bike to guest in case of any emergency. Permanent user can add the temporary user by registering the thumb of the temporary user. It can be done by sending command by messaging REG# to the GSM. Further this temporary user registration can be deleted anytime by the permanent user through registering another user.
Command is matched and ignition is turned on.

STEP 4: ACCIDENT AND THEFT (INTRUDERS) DETECTION.

When someone tries to start a vehicle a wrong finger print will detect and message will be sent to the registered mobile number along with the beep sound. Here the accident sensor is interfaced to the device, which further provides messages if found any damage to the particular part. An accident sensor is TILT SENSOR which will used to detect the accident and intimates the user through messages. For theft control PIR SENSORS are used and incase found any intruders while vehicle is parked.it is used to detect the movement or any presence of human when it is parked.

When someone tries to start a vehicle a wrong finger print will detect and message will be sent to the registered mobile number along with the beep sound

After all the process ignition is turned off and the message is displayed and owner is indicated through message.

thus the proposed system enhances the security features of the two wheeler vehicles and prevents from getting theft.

by developing embedded system for vehicle security and to operate the vehicle through biometric as well as gsm by increasing the security in parking areas and also to inform a user through gsm modem.

XII. FUTURE SCOPE

In future the system can be installed with **camera**, so the facial recognition of any intruder is possible.
System operations can be controlled through **app** in future.

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