

FingerPrint-Based Student's Teacher Feedback System

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❖ Date : 23-02-2025

Introduction

- **Project Overview:** A hardware-software integrated system that collects student feedback for teachers using fingerprint authentication
- **Core Components:** Fingerprint sensor connected to PC, web-based interface, database backend
- **Key Features:**
 - Biometric student identification
 - Subject-specific feedback
 - Teacher performance analytics
 - Secure and tamper-proof feedback collection
- **Objective:** Create an electronic system that ensures authentic student feedback while maintaining a hardware-focused approach to demonstrate electronics knowledge

Problem Statement

- **Current Feedback Collection Issues:**
 - Paper-based surveys are wasteful and inefficient
 - Online surveys lack authentication (anyone can submit multiple times)
 - No verification of legitimate student feedback
 - Low participation rates due to complex processes
 - Difficulty in correlating feedback to specific subjects/teachers
- **Why This Matters:**
 - Teaching quality assessment requires authentic feedback
 - Educational institutions need reliable metrics for faculty evaluation
 - Students deserve an efficient way to provide meaningful input
 - Manual feedback processing is time-consuming and error-prone

Literature Review / Background

- **Existing Technologies:**

- Online survey platforms (Google Forms, SurveyMonkey)
- University learning management systems
- Mobile app-based feedback systems
- RFID badge-based systems

- **Inspiration:**

- Attendance systems using fingerprint recognition
- Electronic voting machines with verification protocols
- Modern banking authentication systems
- Biometric devices that are used for capturing the biometric data inputs i.e Fingerprint / Iris /both the information from Aadhaar number holders.

Methodology

- **Hardware Components:**
 - R305/R307 Optical Fingerprint Sensor
 - USB-TTL Converter (CP2102)
 - Connection wires
 - **Software Technologies:**
 - ❑ Backend: Python with Flask framework
 - ❑ Frontend: HTML5, CSS3, JavaScript
 - ❑ Database: SQLite for data storage
 - ❑ Drivers: CP2102 drivers
 - ❑ Fingerprint SDK/libraries : PyFingerprint
- **Serial Communication:** PySerial library
- **Development Approach:**
 - Hardware circuit design and testing
 - Fingerprint module integration and communication
 - Database schema development
 - Web interface design and implementation
 - System integration and testing

Implementation / Working Model

Fingerprint Module → USB-TTL Converter → Computer
(R305/R307) (CP2102) (PC/Laptop)

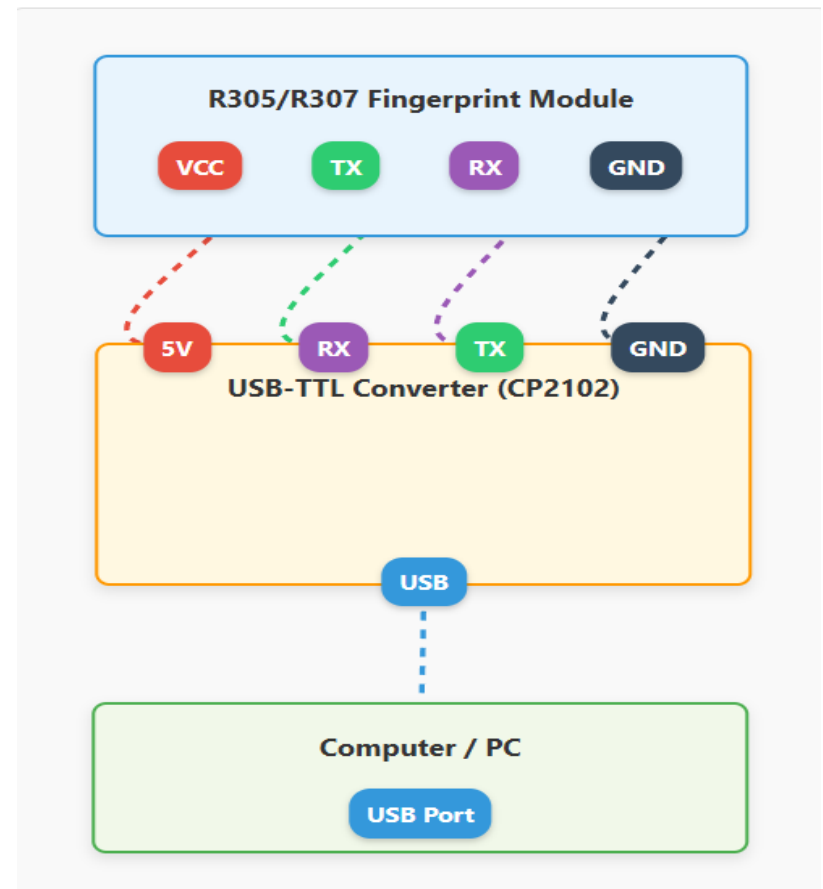
- **Database Schema:**
 - Students Table: ID, Name, Department, Fingerprint_ID
 - Subjects Table: ID, Name, Teacher_Name, Department
 - Feedback Table: ID, Student_ID, Subject_ID, Rating, Timestamp
- **Fingerprint Recognition Process:**
 - Capture fingerprint image
 - Extract minutiae features
 - Search database for matching template
 - Return student ID if match found

Fingerprint-Based Student Feedback System				
Students	Subjects	Feedback		
Feedback Records				Add Feedback
ID	Student	Subject	Rating	Timestamp
1	John Smith	Database Systems	★★★★☆	2025-03-01 10:15:30
2	Emma Johnson	Circuit Theory	★★★★★	2025-03-02 14:22:45
3	Michael Brown	Thermodynamics	★★★★☆	2025-03-03 09:30:12

Results & Analysis

Fingerprint-Based Student's Teacher Feedback System

Flow Diagram



- Outcomes of your project
-----Pending-----

Challenges & Limitations

- **Technical Challenges:**
 - USB driver compatibility across different operating systems
 - Fingerprint sensor accuracy with dirty/wet fingers
 - Web security considerations for sensitive biometric data
 - Serial port management and error handling
- **Limitations:**
 - Requires initial fingerprint enrollment for all students
 - System depends on continuous computer connection
 - Limited to environments with stable power supply & a computer should available
 - Requires technical support for maintenance

Conclusion & Future Scope

- **Conclusion:**

- Successfully implemented a hardware-focused electronic feedback system
- Achieved secure student identification using fingerprint technology
- Created an efficient and user-friendly feedback collection process
- Demonstrated integration of electronics with web technologies
- Improved feedback authenticity through biometric verification

- **Future Enhancements :**

- Multi-biometric authentication - Adding face recognition or RFID cards as alternative authentication methods when fingerprint scanning isn't feasible
- Analytics dashboard - Implementing data visualization tools to track feedback patterns, student performance trends, and teacher evaluation metrics
- Automated reporting - Scheduling periodic feedback reports for students, parents, and administrators
- Custom feedback templates - Allowing teachers to create standardized feedback forms for different assessment types

References & Acknowledgment

- **References**

- Adafruit. "Fingerprint Sensor Library Documentation."
<https://docs.arduino.cc/libraries/adafruit-fingerprint-sensor-library>

- **Acknowledgments**

- [Robu.in](https://www.robu.in) for providing the R305/R307 fingerprint module and hardware components
- OpenAI community for code optimization suggestions