Fingerprint Scanner with Arduino for Data Storage and Detection

Description:

The "Fingerprint Scanner with Arduino" project aims to create a biometric authentication system using an Arduino board and a fingerprint sensor. This system allows users to scan and store fingerprint data securely on a computer connected via the COM port, and a software application running on the PC/laptop will facilitate fingerprint input detection. The project combines hardware, software, and biometrics to provide a reliable and secure method for user authentication.

Project Details:

Components Required:

1. Arduino board (e.g., Arduino Uno)
2. Fingerprint sensor module (e.g., Adafruit Fingerprint Sensor)
3. USB to UART converter for PC/laptop connectivity
4. Jumper wires
5. Computer with Arduino IDE installed
6. Custom software for fingerprint detection (Developed in C# Application)

Hardware Setup:

1. Connect the fingerprint sensor module to the Arduino board using jumper wires.
2. Connect the USB to UART converter to the Arduino, creating a serial communication bridge with the computer.
3. Ensure the fingerprint sensor is powered and connected to the Arduino.

Software Development:

1. Develop a custom software application for the PC/laptop using a programming language C#. The software will interact with the Arduino through the COM port and manage fingerprint data.
2. Implement a user interface to capture and store fingerprint templates securely in the computer's database. Ensure data encryption and protection for privacy and security.
3. Create a functionality to compare scanned fingerprints with stored templates for user authentication.

Arduino Programming:

1. Program the Arduino board using the Arduino IDE to establish communication with the fingerprint sensor.
2. Configure the Arduino to send the fingerprint data to the computer through the COM port using Serial communication.

Operation:

1. A user places their finger on the fingerprint sensor connected to the Arduino.
2. The Arduino captures the fingerprint data and sends it to the custom software on the computer via the COM port.
3. The custom software saves the fingerprint data, allowing for secure storage and management.
4. During subsequent authentication attempts, the user's fingerprint is scanned and compared with the stored data to grant access or perform the desired action.

This project combines hardware and software to create a practical fingerprint scanner system with the ability to store and detect fingerprint data efficiently, offering an added layer of security for various applications.