Biometric Authentication Backend System – Tribute Online

# Overview

This system enables fingerprint-based biometric login and registration using a SecuGen scanner. Built with Python and Flask, it allows users to register and authenticate using a secure fingerprint template.

# Project Structure

tribute\_bio\_auth/  
├── app.py # Main Flask server  
├── biometric\_sdk.py # SecuGen SDK wrapper integration  
├── models.py # Database models  
├── templates/ # Optional for HTML rendering  
└── requirements.txt # Dependencies

# requirements.txt

Flask==2.3.2  
Flask-SQLAlchemy==3.0.5

# models.py

from flask\_sqlalchemy import SQLAlchemy  
  
db = SQLAlchemy()  
  
class User(db.Model):  
 id = db.Column(db.Integer, primary\_key=True)  
 name = db.Column(db.String(50))  
 email = db.Column(db.String(120), unique=True)  
 fingerprint\_template = db.Column(db.LargeBinary)

# biometric\_sdk.py

import hashlib  
  
def generate\_template\_from\_scan(scan\_data):  
 return hashlib.sha256(scan\_data.encode()).digest()  
  
def match\_templates(template1, template2):  
 return template1 == template2

# app.py

from flask import Flask, request, jsonify  
from models import db, User  
from biometric\_sdk import generate\_template\_from\_scan, match\_templates  
  
app = Flask(\_\_name\_\_)  
app.config['SQLALCHEMY\_DATABASE\_URI'] = 'sqlite:///tribute\_users.db'  
app.config['SQLALCHEMY\_TRACK\_MODIFICATIONS'] = False  
db.init\_app(app)  
  
@app.before\_first\_request  
def create\_tables():  
 db.create\_all()  
  
@app.route('/register', methods=['POST'])  
def register():  
 data = request.json  
 name = data.get('name')  
 email = data.get('email')  
 scan = data.get('fingerprint\_scan')  
 if not all([name, email, scan]):  
 return jsonify({'error': 'Missing fields'}), 400  
  
 template = generate\_template\_from\_scan(scan)  
 new\_user = User(name=name, email=email, fingerprint\_template=template)  
 db.session.add(new\_user)  
 db.session.commit()  
 return jsonify({'message': 'User registered successfully'})  
  
@app.route('/login', methods=['POST'])  
def login():  
 scan = request.json.get('fingerprint\_scan')  
 if not scan:  
 return jsonify({'error': 'Missing scan data'}), 400  
  
 new\_template = generate\_template\_from\_scan(scan)  
 users = User.query.all()  
 for user in users:  
 if match\_templates(new\_template, user.fingerprint\_template):  
 return jsonify({  
 'message': f'Welcome {user.name}',  
 'profile': {  
 'id': user.id,  
 'name': user.name,  
 'email': user.email  
 }  
 })  
 return jsonify({'error': 'Fingerprint not recognized'}), 401  
  
if \_\_name\_\_ == '\_\_main\_\_':  
 app.run(debug=True)

# Frontend Integration Instructions

1. Registration Page:  
 - Collect: name, email, fingerprint\_scan (string)  
 - POST JSON to /register endpoint  
  
2. Login Page:  
 - Send fingerprint\_scan as POST JSON to /login  
  
3. Handle Response:  
 - Display welcome message and profile data if successful  
  
4. Secure Communication:  
 - Use HTTPS for all requests.

# Real SecuGen Integration

Use the official SecuGen SDK (Windows or WebAPI) to get actual fingerprint scan data.  
Replace mock SDK calls with real scan and template generation functions.