

Solution Document: IOB Secure AI Banking – Solution Seekers

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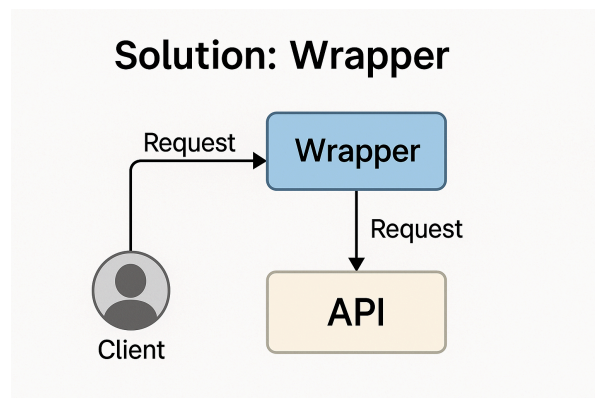
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1 Solution Design Overview

The entire model is meant to be built as a wrapper over the already existing api reducing the overall build time and cost meant for building. The wrapper will process every request before letting the banking API to process anything.



This solution addresses the challenge of modern banking threats—such as account takeovers, phishing, spoofing, and deepfakes—by integrating:

- Zero Trust Architecture: Trust no user, verify every action.
- AI Risk Scoring: Dynamic decision-making based on user behavior.
- Voice-Guided Facial Verification: AI-based biometric verification for real user authentication.
- Behavioral Biometrics: Detection of unusual behavior in mouse movement, typing rhythm, etc.
- Multi-Factor Authentication (MFA): Adaptive verification only when needed, based on risk score.

2 Component Purpose & Architecture

Component	Purpose
Login Module	Captures Customer ID and OTP for initial verification.
Biometric Verification (Face/Voice)	Captures a short video to check face, voice, and lip sync for spoof/deepfake detection.
AI Risk Scoring Engine	Evaluates user behavior and context to assign a real-time risk score.
Zero Trust Policy Enforcement	Uses risk score to decide if user should be allowed, blocked, or re-verified.
User Dashboard	Grants access to features like fund transfer, balance enquiry, and PIN change.
Monitoring & Logging	Tracks actions and anomalies for auditing and compliance.

3 Software Requirements

Tool/Framework	Purpose
Flutter (Mobile App)	Cross-platform mobile UI development
React.js (Web UI)	Admin panel and alternate user interface
Node.js + Express	Wrapper API layer and business logic
Postgres	Auth, database, and storage backend
TensorFlow / PyTorch	ML models for biometric verification
MongoDB	Stores user behavior logs, vector data
gRPC + HTTP/3	gRPC for communicating between api and wrapper and http/3 for the outside networks

4 Hardware Requirements

Hardware	Purpose
VPS (2+ vCPU, 4GB RAM)	Hosts backend API, ML inference models
Device Camera & Mic	Used for biometric capture, no extra accessories needed
Optional GPU (VRAM VPS)	For real-time inference speed during production

5 Source Code Structure (Simplified)

```

📁 /iob-secure-auth/
├── frontend/ (Flutter)
│   ├── lib/
│   │   ├── screens/, services/, models/
│   └── backend/
│       ├── app.js (Node.js entry)
│       ├── routes/, controllers/, services/
│   └── ai-models/
│       ├── face_model.py
│       └── voice_verification.py
├── supabase/ (DB config, RLS policies)
│   └── init.sql
└── README.md

```

6 Dependencies & Libraries

- `@supabase/supabase-js`
- `express, cors, jsonwebtoken`
- `tensorflow, scikit-learn, pyaudio, opencv-python`
- `grpc, dotenv`
- `flutter_secure_storage, http, camera` (Flutter packages)

7 Deployment Steps

🧱 Backend (Node + AI models)

```

git clone https://github.com/solution-seekers/iob-secure-auth.git
cd backend/

```

```
npm install
node app.js
```

AI Model Setup

```
cd ai-models/
python3 -m venv venv && source venv/bin/activate
pip install -r requirements.txt
python face_model.py # for testing
```

Frontend (Flutter)

```
cd frontend/
flutter pub get
flutter run
```

8 Database Setup

- Create a project at supabase.io
- Add `user_profiles` and `biometric_verifications` tables
- Apply Row Level Security (RLS) policies
- Update `.env` in both backend and frontend:

```
VITE_SUPABASE_URL=<your-url>
VITE_SUPABASE_ANON_KEY=<your-key>
```

9 How to Test the Solution

1. User Signup
 - Register via sign-up page
 - Submit face and voice biometric
2. Login Flow
 - Attempt login with facial-voice video
 - AI verifies match + AI risk score
 - Based on score: allow, reverify, or block

3. Dashboard Access

- View features like fund transfer, account enquiry
- Trigger unusual login to see adaptive MFA in action



Conclusion

Our solution offers end-to-end secure banking access using AI, behavioral biometrics, and zero-trust principles — all while being cost-effective, scalable, and inclusive. Ideal for deployment across Indian Overseas Bank branches nationwide.