SlipGuard

📌 **Detailed Features Overview**

🧑‍💼 **User Roles & Permissions**

1️⃣ Student 🧑‍🎓

- View slip status & violations.

- Request violation slips (if required).

- Use QR Code for entry.

- Receive notifications for approvals, rejections, and slip expiry.

2️⃣ Guard 🧑‍✈️

- Scan QR codes for verification.

- Approve or reject entry with reasons.

- Manually log violations for students without QR slips.

- Track flagged students who exceed violation limits.

3️⃣ Admin 🛠️

- Approve/reject slip requests.

- Set slip expiration rules (default: 24 hours from first scan).

- Manage violation limits per semester.

- Configure auto-approval rules.

- Monitor flagged students & security alerts.

- View audit logs for system transparency.

🔳 **QR Code-Based Slip System**

✅ **Auto-Approved Slips**

- Students below **X violations** per semester get pre-approved slips (QR code always active).

- Each scan reduces the available slip count.

- If no more pre-approved slips are available, students must manually request a slip.

✅ Violation Slips (Admin-Approved)

- For students exceeding the violation limit, slips must be requested manually.

- Admin reviews and decides on approval/rejection.

- Once approved, the slip activates upon first scan.

✅ One-Day Expiration (After First Scan)

- A slip becomes valid only after it is scanned for the first time.

- The slip expires **24 hours** after the first scan.

- Guards cannot scan expired slips.

✅ Slip Status Indicators

- **Active Slip** → Available for use.

- **Expired Slip** → Cannot be used.

- **Pending Approval** → Waiting for admin decision.

- **Rejected** → Student must visit the Guidance Office.

📌 Slip Request & Violation Management

✅ Slip Request Workflow

1. Select reason (e.g., lost ID, medical, official activity).

2. Request goes to Admin Dashboard for review.

3. **Approval** → Slip is generated.

4. **Rejection** → Student is notified and redirected to Guidance Office.

✅ Violation Tracking

- Violations are recorded per semester.

- If a student exceeds **X violations**, slips require manual approval.

- If a student is rejected **3 times** at the gate, they must report to the Guidance Office.

✅ Manual Violation Logging (Guards Only)

- Guards can log violations for students without QR slips.

- The system auto-checks if the student has exceeded violations.

📊 Admin Dashboard Features

✅ Real-Time Request Monitoring

- View pending, approved, rejected, and expired slips.

- Track flagged students who exceed violations.

✅ Slip Expiry & Custom Duration

- Default slip validity = 24 hours after first scan.

- Admin can extend duration for special cases (e.g., medical excuses).

✅ Violation & Auto-Approval Settings

- Define maximum violations per semester before requiring manual approval.

- Configure auto-approval rules based on violation count or slip history.

✅ Audit Logging & Security

- Every approval, rejection, scan, and violation log is recorded for transparency.

- Ensures accountability and prevents abuse.

✅ Alerts & Notifications

- **Students** receive notifications for slip status updates.

- **Guards** are alerted when scanning flagged students.

Firestore Database Structure

Users Collection (users****)

- Each user has a document with their details.

- **Document ({userId}****):**
    - name: string
    - role: "admin" | "guard" | "student"
    - email: string
    - createdAt: timestamp
    - hasActiveSlip: boolean (True if slip is active: scanned/approved)
    - remainingSlips: number (Auto-approved slips left, resets per semester)
    - totalViolations: number (Accumulated violations for the semester)

Student Details (studentDetails**** Subcollection)

- Only for students. Each student has their own document.
- **Document ({studentId}****):**
    - yearLevel: string
    - section: string
    - slipStatus: "expired" | "none" | "approved" | "pending" | "active"
    - violationCount: number (Count of violations for the semester)

Violations (violations**** Subcollection)

- Each student can have multiple violations recorded.
- **Document ({violationId}****):**
    - type: string
    - description: string
    - date: timestamp
    - status: "pending" | "resolved"

Violation Slip Requests (violationSlipRequests****)

- Tracks requests for violation slips.
- **Document ({requestId}****):**
    - studentId: string

- reason: string

- status: "pending" | "approved" | "rejected"

- requestedAt: timestamp

- reviewedBy: string (Admin ID)

- firstScanAt: timestamp (null until scanned)

- expiresAt: timestamp (null until scanned)

- slipType: "auto-approved" | "requested"

Violations Collection (violations****)

- Independent record of all violations.

- **Document ({violationId}****):**

  - studentId: string

  - type: string

  - description: string

  - status: "pending" | "resolved"

  - recordedBy: string (Guard ID)

  - recordedAt: timestamp

Audit Logs (auditLogs****)

- Records actions taken by admins and guards.

- **Document ({logId}****):**

  - action: "approve" | "reject" | "flag" | "resolve" | "scan"

  - performedBy: string (Admin/Guard ID)

  - timestamp: timestamp

  - details: string

Auto-Approval Rules (autoApprovalRules****)

- Admin-defined rules for auto-approval.

- **Document ({ruleId}****):**

- condition: "violationCount" | "slipHistory"
- threshold: number
- autoApprove: boolean

System Configurations (systemConfigs****)

- Stores system-wide settings.

- **Document ({configId}****)**:

  - semesterStart: timestamp (Used to reset violation/slip counts)
  - semesterEnd: timestamp
  - violationLimit: number (Threshold before requiring manual slip approval)
  - slipValidityDuration: number (default: 24 hours)

Error Handling & Edge Cases

Common Error Scenarios:

1. **Scan post-24h with 0 slips**: Slip status changes to "expired," and student receives a notification ("Slip quota exhausted").

2. **Attempt to reuse expired slip**: System blocks the scan and notifies the student ("This slip is no longer valid").

3. **Network failure during deduction**: Scan is queued for retry, and the student is notified ("Scan will complete when online").

User Notifications

Student Notifications:

- **Slip Rejected**: Sent via Push, SMS ("Reason for rejection").

- **Violation Threshold Reached**: Email and in-app alert ("Manual approval required").

- **Slip Expired**: Push notification ("New request needed").

- **Account Flagged**: SMS and Email alert ("Visit Guidance Office").

Guard Alerts:

- **Expired QR Scan**: Sound + red flash alert.

- **Flagged Student**: Vibration + modal alert.

- **System Failure**: Persistent banner.

- **Double Scan Attempt**: Warning toast notification.

Admin Alerts:

- **Violation Spike**: Email + dashboard bell.

- **System Config Changed**: Slack/Teams notification.

- **Manual Override Used**: Audit log entry.

- **Failed Scan Sync**: Error report after 3 retries.

Audit Log & Security

Role-Based Access Control (RBAC):

- **Students**: View their own logs.

- **Guards**: Cannot view logs, only create.

- **Admins**: View, export, and manage all logs.

Security Measures:

- **Immutability**: Logs are cryptographically protected to prevent tampering.

- **Automated Security Checks**: Detect anomalies like rapid scan attempts or unusual locations.