Access Tracker for TechParks

A Group Project Submitted for Undergraduate Project-I Lab (BCA 581)

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SYNOPSIS

ABSTRACT

The Access Control App for Tech Parks is an innovative mobile application designed to enhance security and streamline access management within tech park environments. Utilizing Kotlin and machine learning (ML) focusing on facial recognition technology, the app provides a robust solution for both employee and visitor access control. Employees are granted access through facial recognition matching with an existing database, ensuring secure and efficient entry. Visitors must register via the app, specifying their purpose and the employee they intend to visit. Upon arrival, the visitor's face is scanned, and the associated employee is notified to approve or disapprove the visit. Additionally, employees can pre-register visitors for direct access on specified dates, with notifications sent upon their entry. This system also includes two-step verification of the visitors with time-sensitive entry codes to enhance security. The app also features movement history tracking for both employees and visitors, offering a comprehensive overview of access activities within the tech park.

In addition to managing personal access, our app also handles vehicle entry. The app includes a feature for scanning visitors' vehicle license plates and allocating parking spaces in the visitors' parking lot. This information is communicated to the visitor via the app, guiding them to their designated parking spot and reducing congestion and confusion in the parking area.

This app not only enhances security but also improves the overall user experience, making tech parks safer and more manageable environments.

OBJECTIVES

- **Enhance Security**: Implement robust facial recognition technology to ensure secure access control for employees and visitors within tech parks.
- **Streamline Access Management**: Facilitate seamless entry for employees through facial recognition matching with a pre-existing database.
- **Visitor Registration and Approval**: Enable visitors to register their visit details via the app, linking their visit to an employee and requiring approval for access.
- **Employee-Driven Access Control**: Allow employees to pre-register visitors for direct access on specified dates.
- **Two-Step Verification**: Introduce an additional layer of security with time-sensitive entry codes that must be entered within a specific time window after the facial scan of the visitors.

- **Reduce Administrative Burden**: Minimize the manual work of managing visitor logs and employee access by automating these processes through the app.

- **Vehicle and Parking Management:** Implement license plate recognition for visitors' vehicles. Allocate parking spaces in the visitors' parking lot and provide this information via the app.

Existing Systems

- **ThirdEye AI**: Third EyeAI provides facial recognition-based security solutions, primarily focusing on enterprise and commercial spaces. They offer seamless integration with existing security systems and emphasize high accuracy and speed in facial recognition.

- **Swift Lane**: Swift Lane offers AI-powered access control systems using facial recognition and mobile credentials. They focus on ease of use and integration with smart building systems.

- **Boon Edam**: Boon Edam specializes in physical security entrance solutions, including revolving doors and speed gates, integrated with facial recognition technology for secure access control.

Limitations of Existing Systems

- ThirdEye AI
    a) May lack comprehensive visitor management features tailored specifically for tech parks, such as dynamic visitor approvals and pre-registration options.
    b) Primarily focused on enterprise solutions, might not be tailored for tech parks specifically.
- Swift Lane
    a) Limited customization options for specific industry needs, potentially lacking features tailored to tech park environments.
    b) Heavy reliance on stable network connections which can be a limitation in areas with poor connectivity.
- Boon Edam
    a) Primarily focused on physical entrance solutions, with less emphasis on software and mobile app integration.
    b) May not provide advanced visitor management features like real-time notifications, time-sensitive entry codes, or detailed visit purpose tracking.

Functionalities

- **Employee Facial Recognition Access**: Employees can enter the tech park through facial recognition matching with the database. Immediate access is granted upon a successful facial scan.

- **Real-Time Visitor Approval:** When a visitor arrives, their face is scanned at the gate. A notification is sent to the respective employee for approval. The employee can approve or deny access through the app.

- **Pre-Authorized Visitors:** Employees can pre-register visitors for a specific date. These visitors can enter directly on the specified date without real-time approval. The employee is notified when the visitor arrives.

- **Two-Step Verification for Visitors (Time-Sensitive Entry Codes):** After the initial facial scan, the visitor receives a time-sensitive entry code via SMS or app notification. The code must be entered at the gate within a specific time frame (e.g., 15 minutes). Access is granted if the code is entered correctly within the allowed time.

- **Vehicle and Parking Management:** The app scans the visitor's vehicle license plate upon arrival. A parking space is allocated in the visitors' parking lot. The visitor receives information about their designated parking spot via the app.

- **Notifications and Alerts**: Employees receive notifications when a visitor arrives and is waiting for approval and also when a pre-authorized visitor enters the tech park.

- **Security and Compliance**: The app ensures that all personal data, including facial recognition data and vehicle information, is securely stored and processed. The system complies with relevant data protection regulations and industry standards.

- **Administrative Controls**: Administrators have access to a dashboard for managing user data and access records. They can monitor access patterns and generate reports for security audits.

Tools Proposed

- Kotlin for Front-End Development
- Kotlin and Java (Spring Boot) for Back End Development
- Tensor Flow for Machine Learning Models
- SQLite for Database Management
- Git and GitHub for Version Control