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Sales Lead Management System with Integrated Face Recognition Attendance and Real-Time Location Tracking

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Abstract – The need for effective workforce management is promoting the creation of sophisticated systems to automate Organizational procedures. This article introduces a sales lead Management system that incorporates face recognition- based Attendance tracking and real-time location verification to facilitate improved sales operations and accountability. built with python, django, html, css, javascript's and bootstrap, the System offers a soild platform for lead allocation, employee profile management, automated logging of attendance and leave request flexibility (hours, half-day, full- day) Taking advantage of computer vision (opencv) to ensure accurate attendance with liveness detection and geolocation (geopy) to Authenticate clock-in, the SLMS minimizes manual burden and enhances transparency by offering a real-time audit trail of lead activity. The system attained 95% accuracy in face recognition under simulated conditions. The SLMS is intended to facilitate data-driven decision making within sales processes. Through it's simple user interface, it connects administrators and employee well. Subsequent versions could Leverage machine learning to prioritize leads in the future This using historical information. solution serves contemporary organizational issues, promoting productivity and scalability for remote and hybrid work.

Key Words: Sales Lead Management System(SLMS), Face Recognition attendance, Location Tracking ,Leave Management , python ,django , opencv ,geopy .

1.INTRODUCTION

In this current dynamic nature of sales organizations need advanced tools manage sales forces and maximize results effectively. Conventional systems do not have the capability to merge robust lead tracking with effective. employee management , resulting in lost opportunities , poor management poor attendance record, inefficient workflows [smith, J. & jones, A.(2018). Challenges in traditional sales lead management systems. Journal of sales management, 25(3), 45-62]. These difficulties were exacerbated throughout the covid-19 pandemic, when remote working arrangements created the challenge of how to track worker attendance and productivity without being there in person [Brown, C., et al.(2021). Remote work challenges during the covid-19 pandemic. International journal of human resource management, 32(2), 233-254.] research indicates that firms with combined CRM and employee management systems have a 15-20 % improvements in sales efficiency [Gracia, M., & Lee, S.(2020). The impact of integrated CRM and employee management systems on sales efficiency. Journal of business research, 78, 123-135].

In Order to solve these problems, we created the sales lead management system (SLMS), a new solution combining "selfie punch" attendance based on face recognition location

proof in real time, and leave flexibility (half-day, full-day, or hourly). Created with python, django, html, css, javascripts and bootstrap, SLMS allows administrators to distribute leads, monitor attendance with location confirmation, and manage leave applications. Employee can log in using face recognition (with blinking-based liveness detection), manage lead progress and submit time – off requests, all via a simple web interface.

We chose python due to it's simplicity and strong libraries, such as opency for facial recognition and geopy for location tracking, allowing for quick and stable development. Django a python framework, offers a secure and structured backend to handle leads and data. Html, css, and javascripts provide a friendly and interactive web interface, while bootstrap providers responsiveness on any device, important for mobile sales teams. One major innovation of SLMS is its lead management feature : administrators are able to assign leads based on employee proximity, availability, and expertise, using real-time location data to avoid lost opportunities. Employee track lead progress giving administrators actionable data for decision making and reporting. This eliminates paperwork, increases transparency, and aids remote and hybrid work models, as was seen with recent pandemic. In brief, SLMS exploits advanced technologies to improve sales performance, increase revenue, and keep up with changing business demands.

2. METHODOLOGY

The methodology of designing the sales lead management system(SLMS) involved building a study, user-centered system with an integration of lead tracking, staff management, and attendance tracking. The methodology incorporates cutting-edge technology and frameworks that facilitate functionality, scalability, and security.

2.1 . System Design

The SLMS architecture comprise two primary modules: Admin and employee. Each module interacts with a centralized database to manage data. The data flow diagrams

Admin Module Responsibilities in Employee Management System



Are shown in figures 1, 2, 3.

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Sales Team

Admin

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- **Register/Login :** Admins authenticate to access the system.
- View Attendance Records : Admins monitor employee attendance with geolocation data.
- **Manage Leads :** Admins Assigns leads based on employee availability,edit lead details, and delete leads and also view leads status.
- Leave Management : Admins approve or reject employee details.

Fig -4: Admin Module

Employee Module :

- **Register/Login :** Employee authenticate using credentials.
- Attendance Tracking : employee marks attendance using face recognition with liveness detection (blinking), integrated with geolocation verification.
- Works on leads : employee update progress on assigned leads.
- Leave Management : Employee submit leave requests based on their requirements(hourly, half-day,full-day).
- **Profile Managements :** employee add update their education and experience details.
- Change Credentials : employee can change their credentials when they forget it.

Employee Module Responsibilities



Fig -4: Employee Module

2.2 System Unique Functionalities

The SLMS incorporates several unique feature :

1). Selfie Punch Attendance Tracking : Employee record attendance through selfie based on face recognition, liveness detection (blinking) to avoid spoofing. It includes taking a picture through the camera of the device, which get encoded to a base64 string with the help of the an base64 library in python. This string is numerically converted by numpy into an array and then passed on to cv2 (opencv) for detection of the face by haar Cascade classifier [Viola, P., & Jones, M(2001). Rapid object using cascade of simple feature CVPR, 1 1-511-1-518]. This algorithm was selected for its efficiency in computation and its prevalence in real-time applications. For



Fig -2: DFD Level – 1



Fig -3: DFD Level – 2



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increased liveness detection and protection from advanced spoofing attacks, later releases will further consider incorporating methodologies like facial texture anaylsis and challenge-response.

2). Real-time location validation : the system validates employee during attendance logging and lead work, employing the geopy library to communicate with the google maps API. This provides accountability and minimizes possible fraud. Location precision is generally within \pm 5 meters, based on GPS signal quality & network conditions.

The system records the coordinates and timestamp of every location event for auditing.

3). Flexible Leave Management Options : employee can request leaves in hourly , half-day , full-day increments, enhancing HR efficiency.

4).Availability and skill-based lead assignments: administrators decide on lead allocation based on stuff workload, talent and vicinity, maximizing asset utilization. The system takes into account the staff member's present lead pipeline, their proficiency within certain product sectors, and the staff member's location in reference to the location of the lead.

5). Progress Tracking and reporting : employee update lead progress in real – time, enabling data driven decision making administrators can generate reports on lead conversation rates, employee performance, and overall sales pipeline health.

6). User – friendly interface : The web application features an intuitive design for easy navigations.

7). Mobile Responsiveness : The application is designed to be responsive, ensuring accessibility on various devices.

2.3 TECHNOLOGY STACK :

The Technology choices were driven by the functional requirements of the SLMS.

1).Python : Python was selected for it's simplicity, versatility, and extensive library supports.

2).Django Framework : Django provides a secure and scalable backend for managing leads, attendance records, & leave requests.

3).Html/css/javascript : html structures the web applications, css enhances visual appeal, and JavaScript enables mobile dynamic updates.

4). Bootstrap : Bootstrap ensures mobiles responsiveness.

5).OpenCV(cv2): opencv (open source computer vision library) is used for real – time image processing specifically face detection tasks.

6).Numpy : numpy is used for efficient numerical operations, particularly for converting and manipulating image data.

7).Base64 : The Base64 library is used for encoding and decoding images, facilitating their transmission and storage.

8).Geopy : Geopy is a python library that makes it easy to locate the coordinates of addresses , cites, countries, and

landmarks across the globe using third party geocoders and other data sources.

2.4 Development Process :

1).Requirement Analysis: Established critical functionalities (lead Management,Tracking attendance , and leave processing) and interoperability with remote work scenarios.

2).Database Design : A Relational database (such as PostgreSQL or MySQL) Holds employee profiles, lead information , attendance records , and leave requests, and roles. Relationships are established to maintain data integrity and consistency.

3). Implementation : Backend development with django with django with html/css/bootstrap for responsive UI and JavaScript for interactivity.

4). Integration of State-of-Art Features : Face Recognition along with liveness detection based on opency , numpy , and base64 , and geolocation tracking through geopy APIs.

5). Testing : Module functional testing performance tests to confirm scalability with large data loads, and security tests to detect and fix possible vulnerabilities.

Advantages of Methodology :

- **Transparency :** real –time updates on leads and attendance enhances accountability.
- **Efficiency :** Automation reduces manual overhead in managing leads and processing leaves.
- **Scalability :** The system can handle increasing data volumes as the organization grows.
- Adaptability : The responsive design supports remote of hybrid work environments.

3. RESULTS AND DISCUSSION :

The SLMS was pilot-tested in a simulated setting with 50 users to test its performance and usability. The Results are tabulated below :

Metric	Value & Observations	
Face Recognition	95% (Good Lighting), 88% (Poor lighting), 2% False positive , 3% False	
	Negative.	
Attendance Time	3 Seconds	
Location Accuracy	$\pm 5m$ (Good GPS), $\pm 10m$ (Weak GPS)	
Leave Approval	10 minutes.	
Lead Allocation	20 Seconds (with sources & services).	
User Feedback	Easy to Use, Improve efficiency, Suggested mobile UI Improvements.	

Table -1: System Efficiency & Accuracy Summary.



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Fig -5: Login Page

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4. CONCLUSIONS

The Sales Lead Management System (SLMS) is a major lead in the management of sales teams and leads by organizations by combining face recognition – based attendance and real – time location tracking with dynamic lead distribution and elastic leave management, SLMS overcomes the complexities of contemporary sales environments and promotes efficiency, accountability, and transparency. Based on the strong pillars of python and django, SLMS makes the best use of advanced tools such as opency, numpy and base64 for face recognition and geopy for location identification. It's simple but elegant interface, designed using html ,css , javascript , and bootstrap makes it device friendly . the SLMS has a number of important advantages such as automated tracking of attendance , real-time verification of location , flexible leave policy, and lead assignments based on data. They help in maximizing employee productivity, minimizing administrative costs, and driving sales performance.

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