Employee Attendance Management System

SEP 769:Cyber Physical Systems

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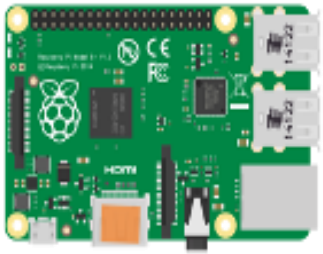
Introduction

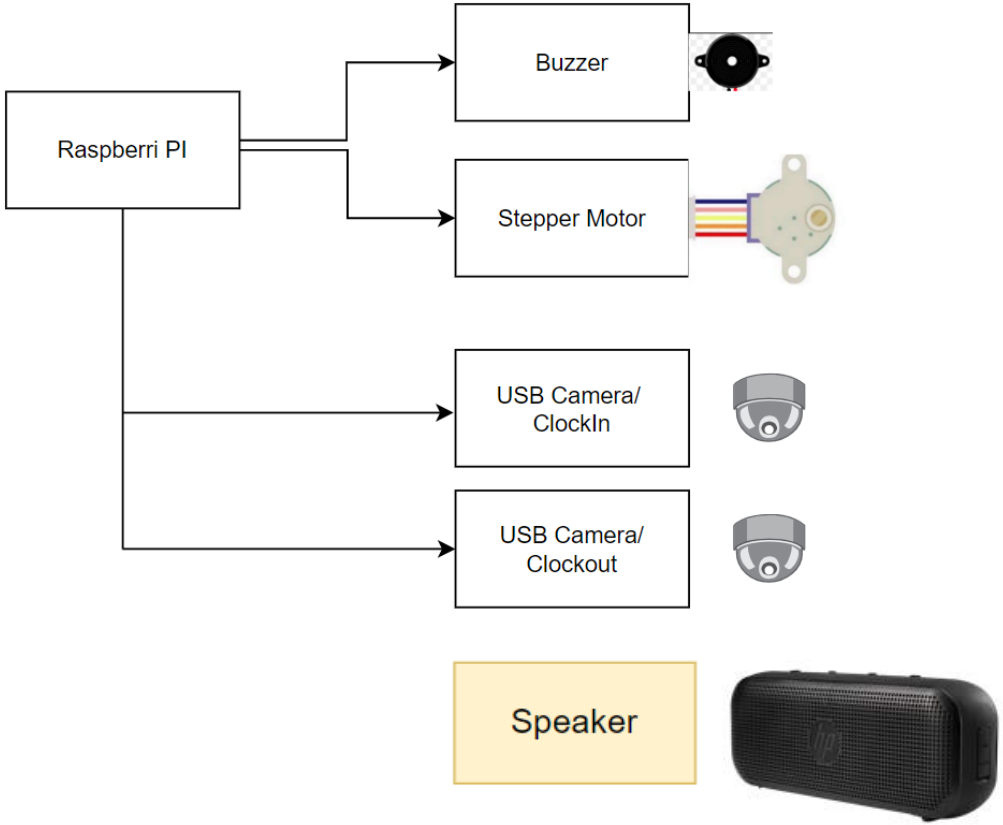
- In today's fast-paced corporate environment, efficient management of employee attendance stands as a cornerstone for maintaining productivity and accurate administrative records.
- Traditional methods of attendance tracking, relying heavily on manual input or outdated electronic systems, are proving increasingly inadequate. These methods are not only time-consuming but also prone to errors and manipulation.
- Recognizing the need for a modern solution, our project introduces an innovative Employee Attendance Management System (EAMS) that leverages cutting-edge Internet of Things (IoT) technology.
- Through the integration of IoT technologies and sophisticated software solutions, our system aims to streamline the attendance tracking process, offering a more reliable, efficient, and user-friendly alternative to conventional methods.
- By harnessing the power of Raspberry Pi technology, coupled with advanced components such as the Camera Module, Buzzer, and Speaker, our solution provides a comprehensive and automated approach to recording employee attendance.
- This presentation will delve into the intricacies of our automated attendance system, exploring its architecture, functionalities, and the transformative potential it holds for revolutionizing traditional attendance management practices.

Components Used

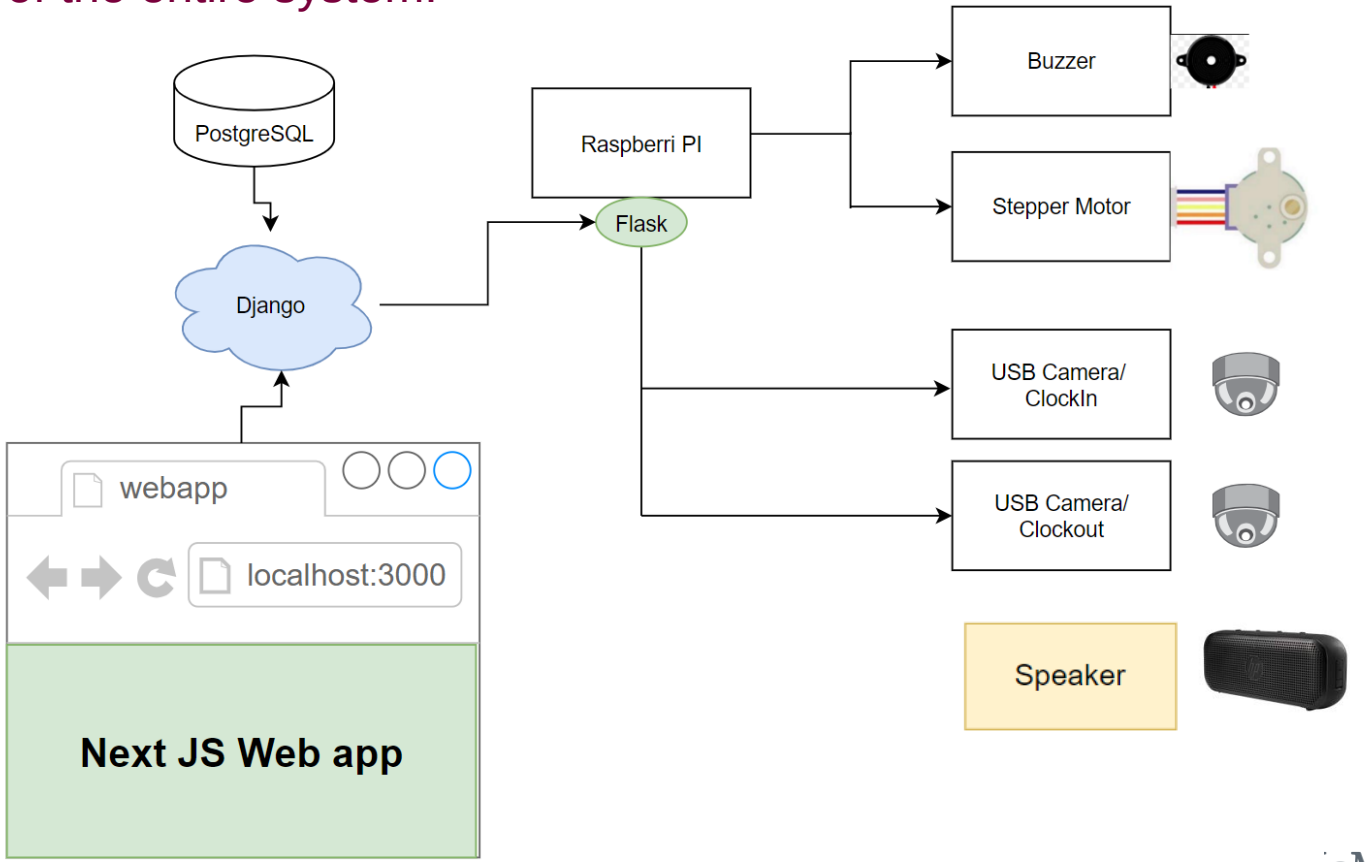
- Raspberry Pi: Controls the system and manages interactions.
- Camera Module: Captures employee images for attendance verification.
- Buzzer: Provides audible feedback for successful attendance recording.
- Speaker: Gives real-time feedback for a better user experience.



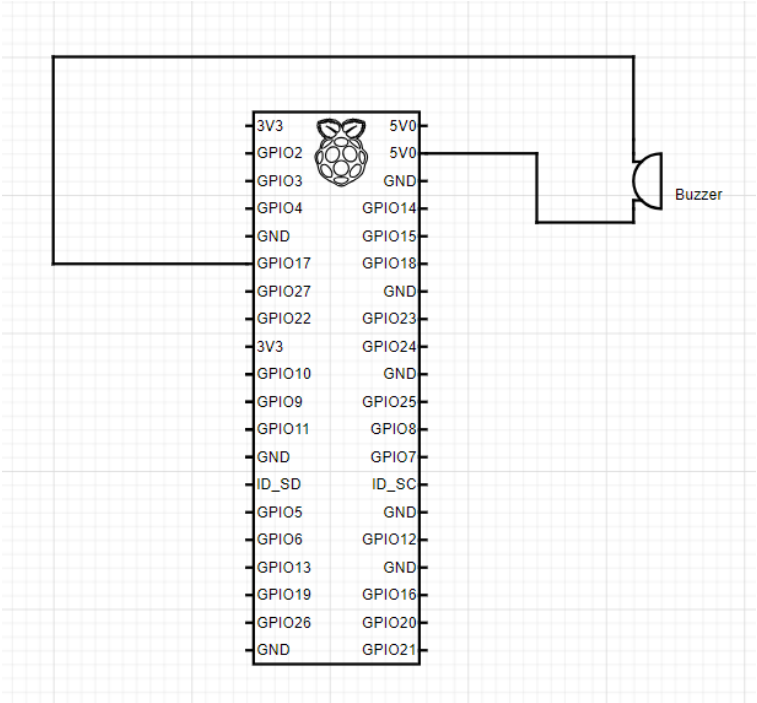
Block Diagram

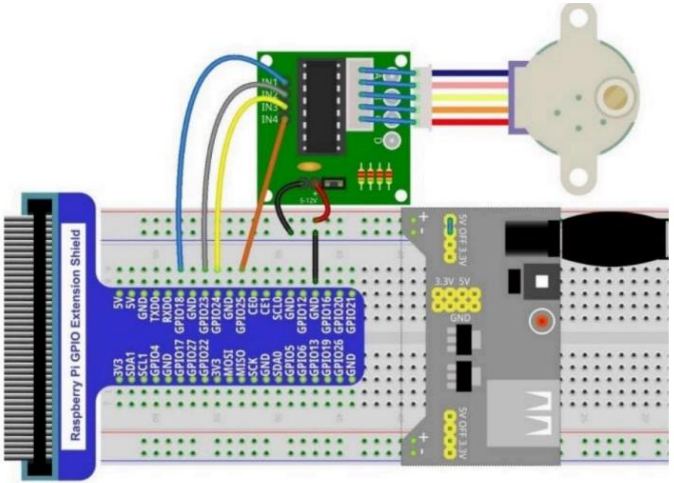


Block Diagram of the entire system.



Circuit Diagram





Employee Management Process

Image Capture
- Raspberry Pi takes photos of employees using the Camera Module and using flask app it send the video to Django backend.

Image Processing
- Backend algorithms in Django check these images for attendance verification and send data to flask backend database to confirm employee presence.

Facial Recognition
- Deep learning algorithms recognize employee faces for accurate identification.

Attendance Recording
- Verified attendance data, including check-in and check-out times, is securely stored in the system's database.

Feedback
- Buzzer and speaker provide instant feedback to users regarding attendance status.

Dataset Management
- Users can be added to the dataset for recognition. If an unknown person is detected, their photo is captured, and their photo and other details like date and time is captured into the database table.

Work Time and Routine Monitoring:
- Utilizing Next.js, employees can view their work hours and daily routines on the website.

Features of the web app

User creation and user management.

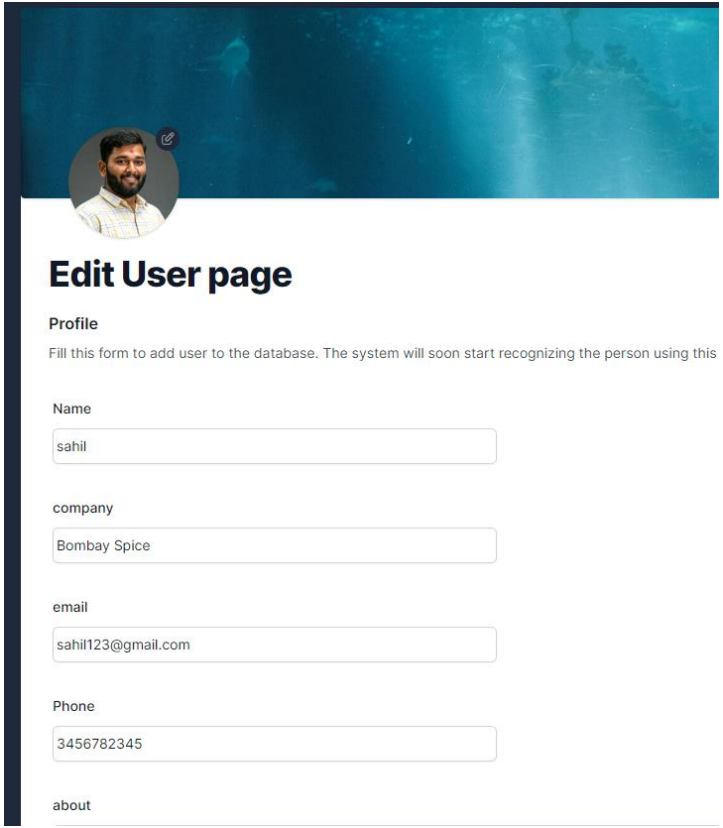
Users

A list of all the users in your account including their name, title, email and role.

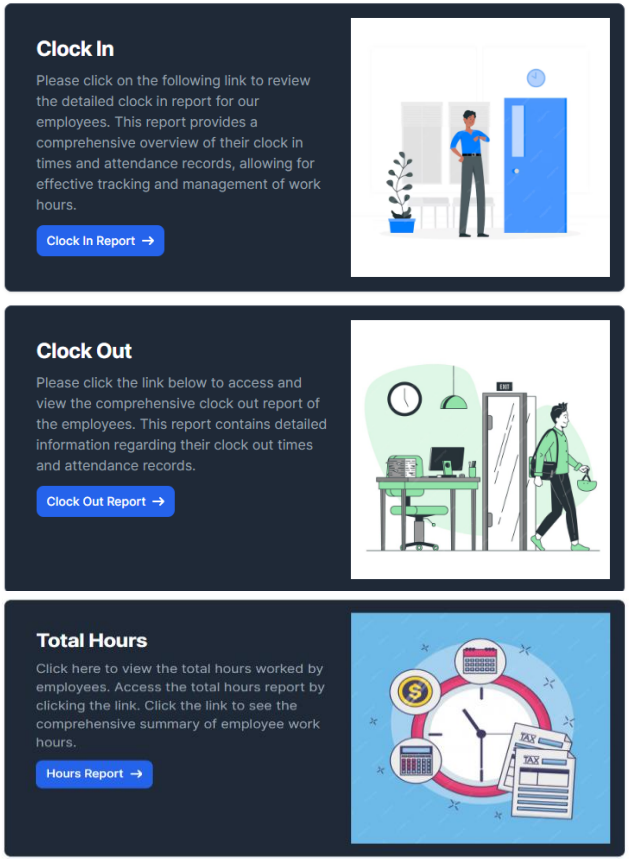
Add user

PHOTO	NAME	COMPANY	PHONE	EMAIL	ID	EDIT	DELETE
	Darshan	Direct Cell	3456782345	darshan@gmail.com	3	Edit	
	sahil	Bombay Spice	3456782345	sahil123@gmail.com	31	Edit	
	Hetvi	Tim hortons	2535235235	hetvi@gmail.com	65	Edit	
	Hardik	walmart	6575758	hardik@gmail.com	66	Edit	

Features of the web app



Attendance Management Panel



Clock In and clock out Records

Attendance clock in Records

A list of all the attendances in your account including their ID and dates.

Add user

USER ID	USER NAME	DATE	TIME	ATTENDANCE ID
3	Darshan	2024-02-26	10:19:10	110

Clock out Records

A list of all the attendances in your account including their ID and dates.

USER ID	USER NAME	DATE	TIME	CLOCKOUT ID
3	Darshan	2024-02-26	20:19:10	14

Hours Calculation

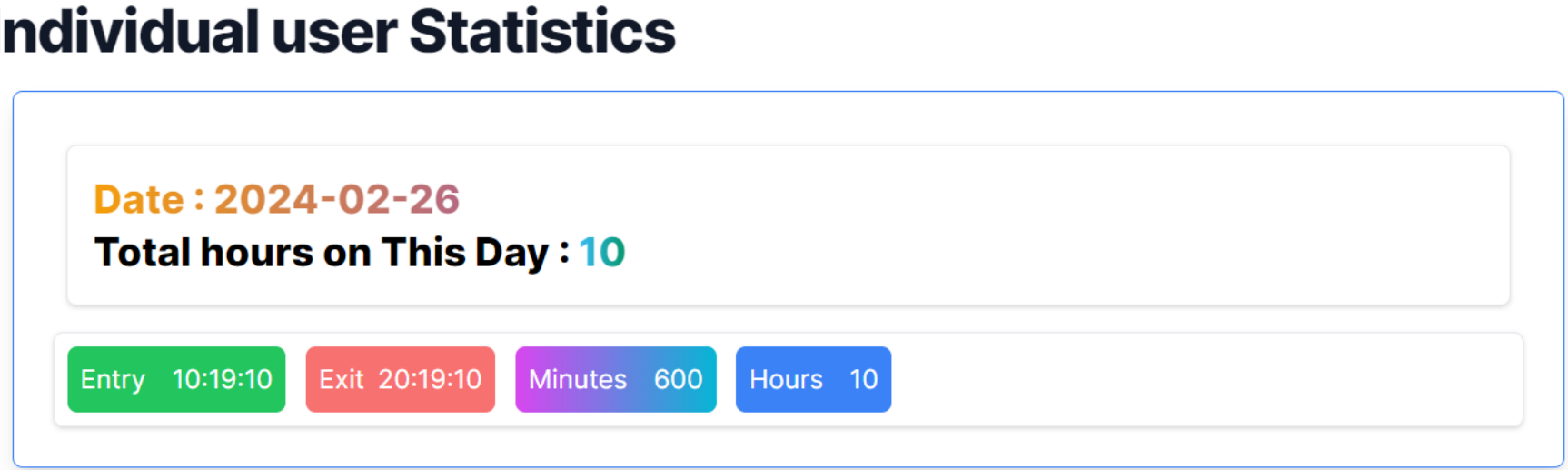
Users

A list of all the users in your account including their name, title, email and role.

Add user

NAME	COMPANY	SALARY	EMAIL	ID	TOTAL HOURS
Darshan	Direct Cell	2000	darshan@gmail.com	3	28.36
sahil	Bombay Spice	0	sahil123@gmail.com	31	0.34
Hetvi	Tim hortons	0	hetvi@gmail.com	65	0
Hardik	walmart	0	hardik@gmail.com	66	0

Individual user hours report



Live streaming of USB Cameras

Security

If unknown person is detected then image of that person will be stored.

Intrusion Detection

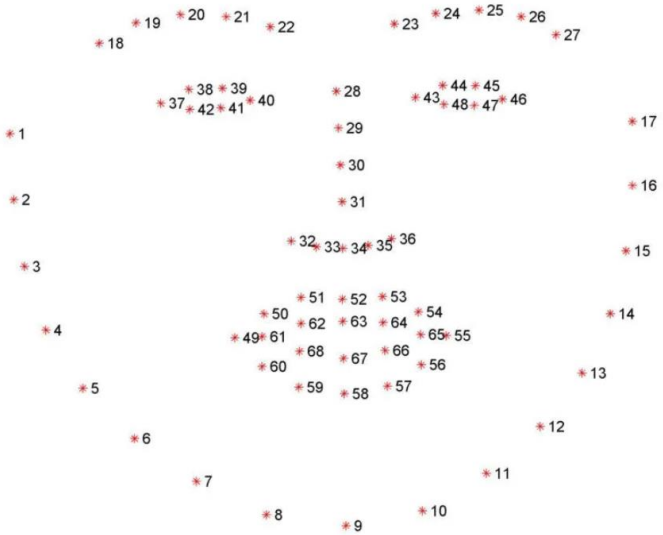
A list of all the unknown persons.

PHOTO	ID	DATE	TIME	DELETE
	25	2024-02-29	00:49:19.064165	

How Face Detection and recognition works

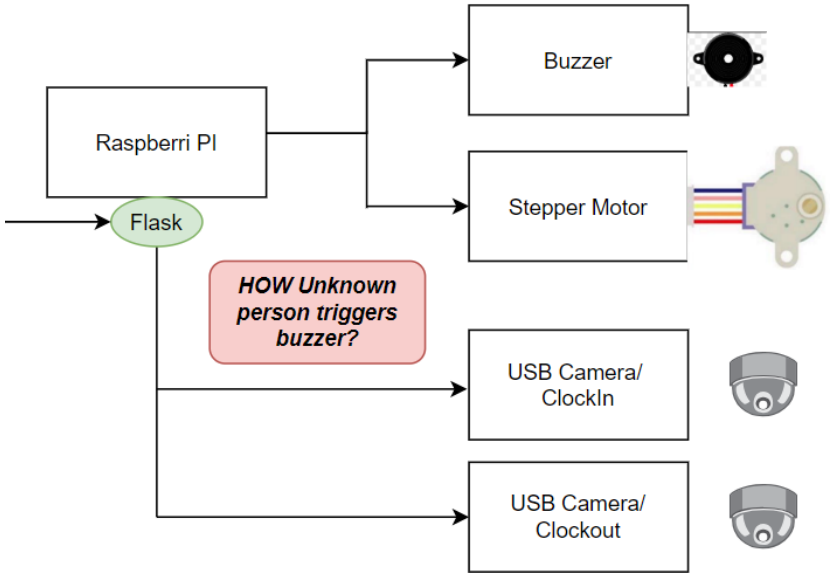
This system uses dlib face recognition library :

- It‘s a landmark’s facial detector with pre-trained models, the dlib is used to estimate the location of 68 coordinates (x, y) that map the facial points on a person’s face like image below. This is why one image is also enough for face detection.



How the speaker, buzzer and motor is controlled using Django and Nextjs.

Django facilitates REST API calls to a Flask application, which is running on a Raspberry Pi to control the speaker, buzzer, and motor. This setup enables remote execution, allowing actions to be triggered on the Flask app, thereby controlling various sensors. With this configuration, we can efficiently manage and execute commands to interact with the hardware components, providing seamless control over the speaker, buzzer, and motor through Django and Next.js integration.



Results

Demo Video

Limitations/ Challenges

- Physical Presence Verification : The attendance system records individuals' attendance upon showing their photo without physically verifying their presence.

Future Work

- Physical Presence Verification : Using depth-sensing cameras or similar technologies helps estimate the distance of the detected face from the camera, aiding in verifying physical presence.


Thank you