Third Year B. Tech. CSE (Cybersecurity and Forensics)

Department of Computer Engineering and Technology

CET2009B: Mini Project

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Mini Project Topic Approval Presentation

Topic: Attendence Assistant

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Content

- Project Introduction
- Aim
- Objectives
- Motivation
- Problem Statement
- Literature Review
- Research Gaps Identified / Implementation Scope
- Hardware and Software Requirements
- Proposed System Architecture / Block Diagram
- Proposed Methodology/ Algorithm
- References

Project Introduction

The "Attendance Assistant" presents a forward-thinking solution for revolutionizing conventional attendance tracking in educational settings. Integrating cloud services such as Amazon S3, Amazon EC2, and Amazon DynamoDB with the official Raspberry Pi High-Quality Camera, the project offers a sophisticated hybrid architecture for efficient and scalable face recognition capabilities.

The "Attendance Assistant" represents a significant leap towards modernizing attendance tracking processes. By adopting a hybrid architecture that blends the strengths of cloud services with edge computing, the project offers flexibility and scalability, catering to the evolving demands of attendance management in educational institutions.

Aim

Implement an Automated Attendance Tracking System at our Campus using computer vision, cloud infrastructure, and advanced data science techniques. The goal is to streamline attendance management, reduce manual tracking time, and enhance overall efficiency while ensuring security and tamper resistance.

Objectives

1. Develop an automated attendance tracking system using computer vision for any organization

2. Utilize cloud infrastructure for efficient storage and processing of attendance data.

3. Create a user-friendly application for both teachers and students to simplify attendance management.

4. Implement advanced data science techniques for processing large attendance datasets and performing analytics.

5. Significantly reduce per-class time spent on attendance tracking through automated processes, enhancing overall efficiency.

6. Mitigate the risk of malpractices in attendance tracking by implementing secure and tamper-resistant mechanisms.

Motivation

1. Time taken to take attendance is about 5 minutes in each class. That amounts to around 5 times 6 which is 30 minutes wasted each day per class. For 2 CSF, 2 AI, and 1 CSBS, and 8 CSE Panels, 13 panels for CSE alone waste more than 13 x 30 = _390 Minutes, which is more than 6 hours daily, just marking attendance_.

2. This amounts to 6 Hours * 5 * 4 * 10 = 1200 Hours per year _just for CSE (50 Days) or 2 months_

3. Even after all that time, several more hours are spent on arguments, discussions and manual entry and marking by teachers and students, just for attendance. We do not find this an ideal use of time, and would like to combat this.

4. Malpractices still happen despite of all efforts and time spent. Attendance is mismarked by human error as well. We aim to reduce this error.

Problem Statement

Manual attendance tracking at MITWPU Campus is a time-consuming process prone to inefficiencies and potential malpractices. The current system lacks automation, leading to increased per-class time spent on attendance management.

To address these challenges, there is a need for the development of an Automated Attendance Tracking System. The solution should leverage computer vision for accurate data capture, utilize cloud infrastructure for efficient storage and processing, and incorporate advanced data science techniques for analytics.

The system should be user-friendly, providing both teachers and students with a seamless experience while ensuring security and tamper resistance to mitigate the risk of malpractices in attendance tracking. The goal is to enhance overall efficiency and significantly reduce the manual effort involved in attendance monitoring.

Literature Review

- Several Research Papers like the ones mentioned below were referred.
- The gaps between their implementations and our implementations were noted.
- The gaps in Pricing were also noted.
- These observations are shown in successive slides.

Existing Products in Market and Cost Comparison

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+$19 base fee per month	+$19 base fee per month	+$19 base fee per month	
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Cost Comparison

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1 ● ———————————————————— 500+

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✓ Require 2FA

Premium

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✓ Clock out when GPS is off
✓ Public API
✓ Commuter Mileage
✓ Suggested Mileage
✓ HIPAA Compliance
✓ Location Addresses
✓ Signatures

Most Popular

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✓ Integrations
✓ Scheduling
✓ Geofencing
✓ Message Blast
✓ Time Off

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✓ Track GPS
✓ Track Mileage
✓ Maximum of 10 Users

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Contact Sales

✓ Dedicated Account Manager
✓ Priority Support
✓ Single Sign On
✓ Custom Implementation

fareclock

Get started in minutes, no credit card needed.

Monthly ⚫ Yearly

# of Users (slide to adjust)

5 Users

Free	Pro	Premium	Enterprise
Free	$**19.50** USD /MO	$**26.00** USD /MO	**Custom pricing**
	$ 12.00 base + $ 1.50 per user	*$ 16.00 base + $ 2.00 per user*	
Everything in Premium		**Everything in Pro, plus**	**Everything in Premium, plus**
● Up to 5 Users	● GPS time tracking	● Alert notifications	● Enterprise Account Manager
● Free for 30 Days	● Shift scheduling	● Attendance points	● Priority Support
	● Payroll calculation		

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Existing Market Competitors

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- Timeero
- FareClock
- Jibble
- QuickBooks

Research Gaps Identified / Implementation Scope

Gap 1: Lack of Specific Facial Recognition Libraries and Models Documentation

Existing literature fails to provide a comprehensive overview of specific facial recognition libraries and models. The omission of detailed discussions on these crucial components hinders a holistic understanding of the technological landscape.

Gap 2: Absence of Hardware Elements Documentation

A significant gap is identified in the absence of detailed documentation regarding the hardware elements employed. The current body of work overlooks crucial insights into the hardware aspects, limiting the understanding of the complete facial recognition system.

Gap 3: Insufficient Information on Interlinking Hardware and Software

The interplay between hardware and software components is a critical aspect of facial recognition systems. However, the existing literature lacks substantial information on how these elements are intricately interlinked, hindering a comprehensive grasp of the system's architecture.

Gap 4: Inadequate Details on Storage and Integration of Information

The literature review reveals a gap in information pertaining to the storage and seamless integration of facial recognition data. Understanding the mechanisms for data storage and integration is essential for evaluating the system's overall efficiency, and this aspect requires further exploration.

- ## Gap 5: Lack of Seamless Integration

    The current research landscape highlights a significant gap concerning the seamless integration of services. Notably, existing systems rely on manual user initiation, requiring individuals to independently open dedicated services on their personal devices. This operational hurdle indicates a crucial area for improvement in achieving a more streamlined and user-friendly experience. Addressing this gap is paramount for enhancing the overall efficiency and user adoption of the services, warranting further exploration and innovation in the integration protocols employed.

Hardware Requirements

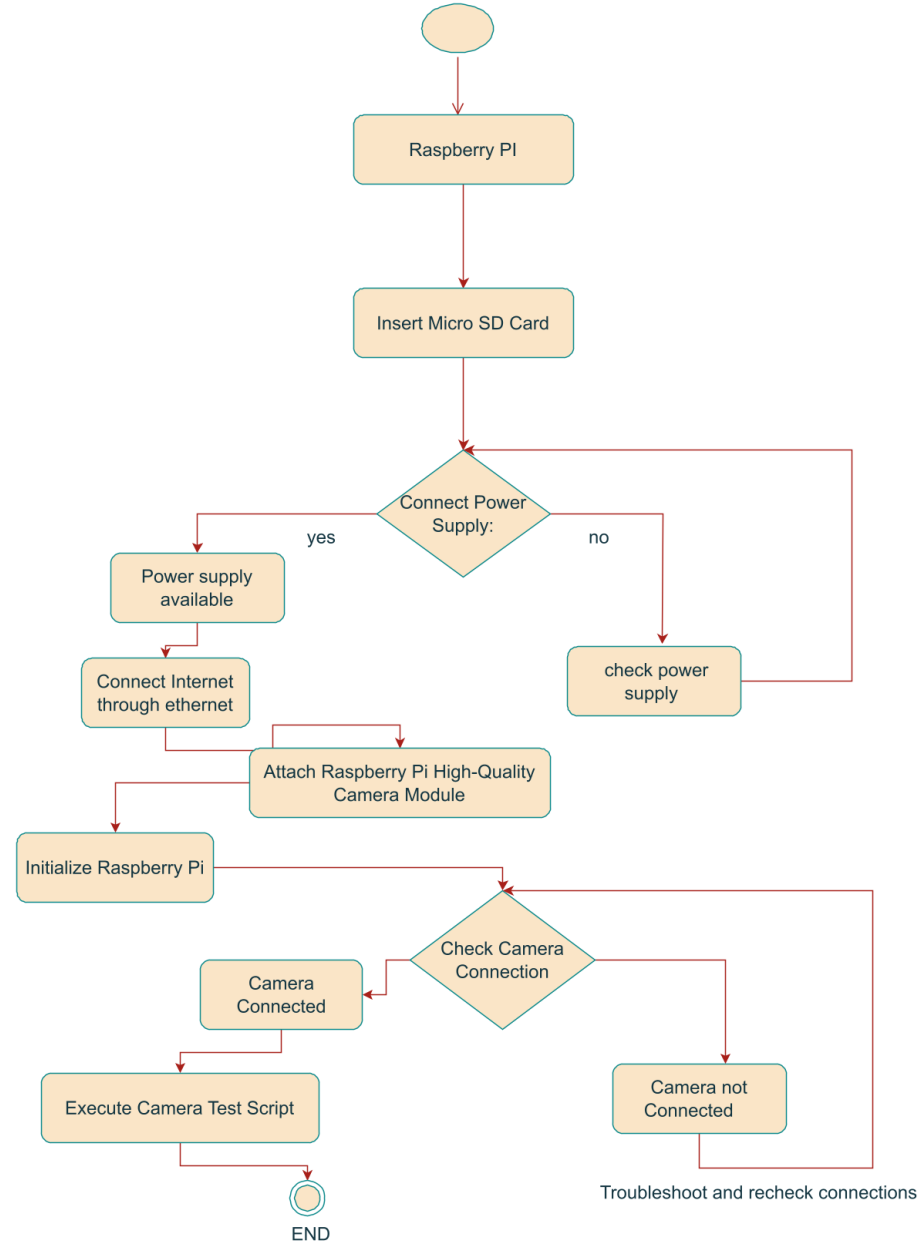| Name	Purpose	Cost
Raspberry Pi Hi Quality Camera	Official camera from Raspberry Pi, more expensive for High resolution.	8000
Raspberry Pi Camera Module 3	Official camera from Raspberry pi, cheaper and highest resolution for cheapest cost.	3000
Raspberry PI 4 Model B with 2 GB RAM	To send image from camera to server.	5000

Hardware components
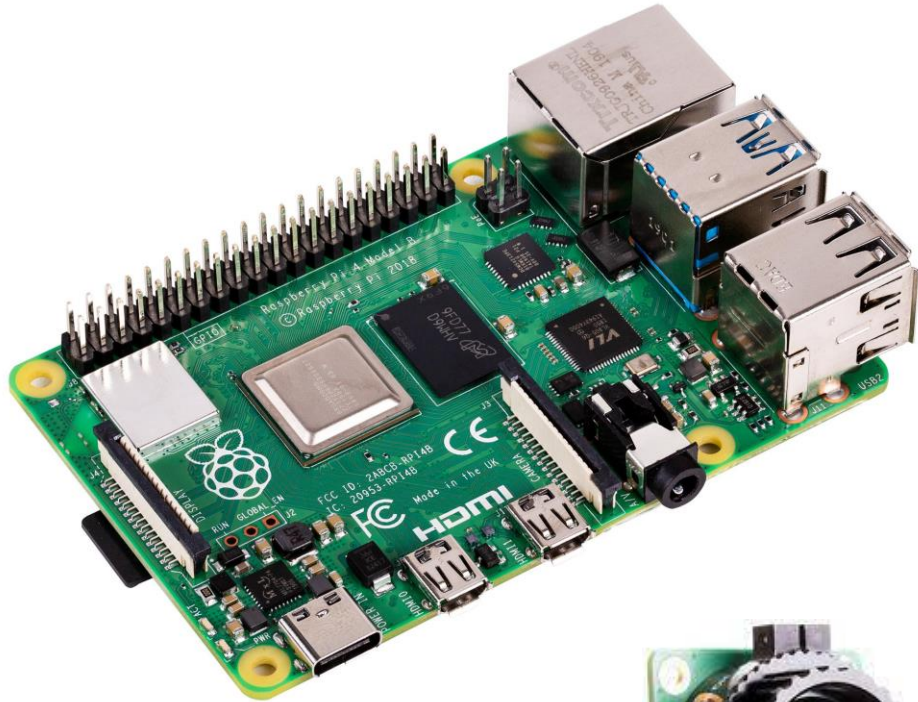
Software components

1. Amazon S3
2. Amazon EC2
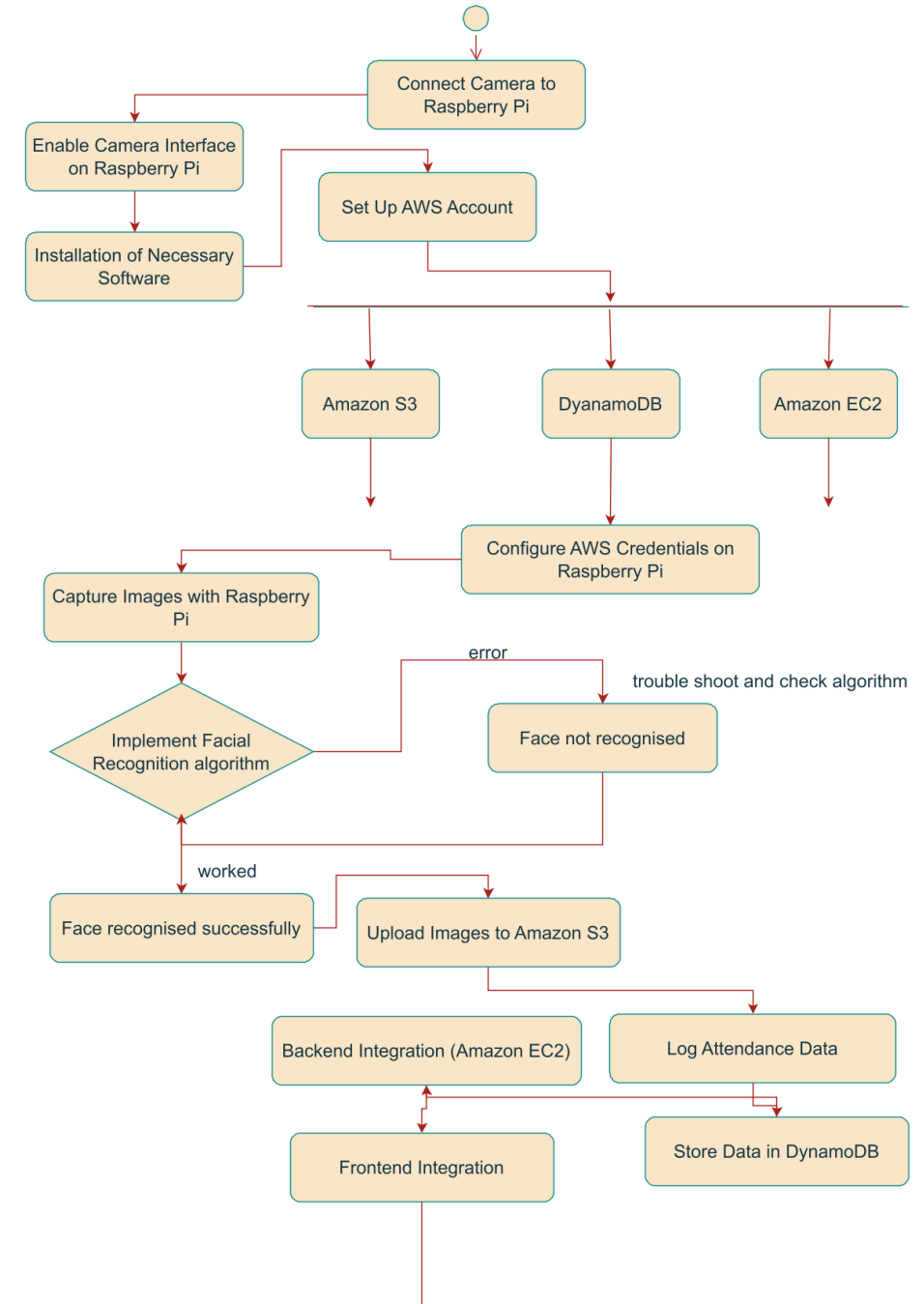3. Amazon DynamoDB
4. Raspian OS
5. Python Libraries

Activity Diagram

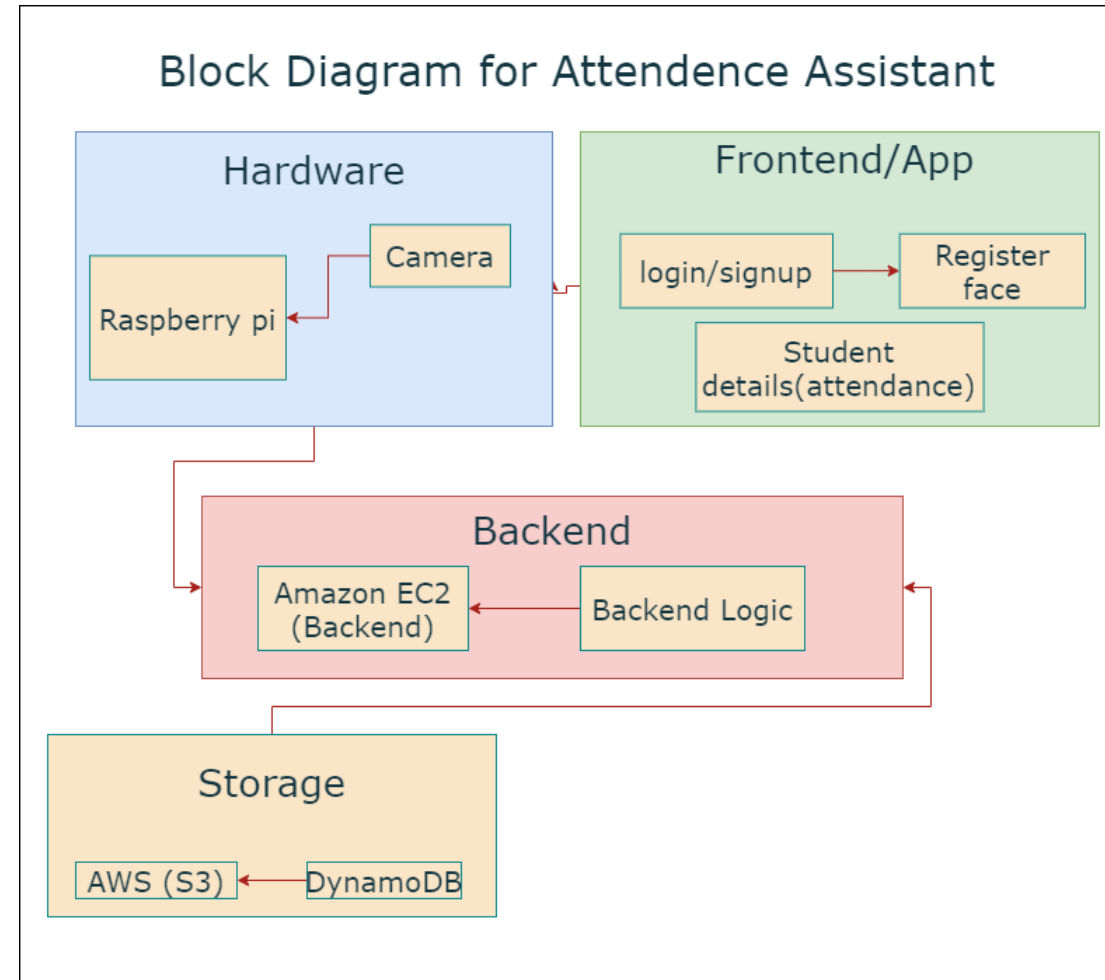Activity diagram for Hardware components

Complete Hardware activity diagram

Raspberry PI

Insert Micro SD Card

Connect Power Supply:

yes

no

Power supply available

check power supply

Connect Internet through ethernet

Attach Raspberry Pi High-Quality Camera Module

Initialize Raspberry Pi

Check Camera Connection

Camera Connected

Camera not Connected

Execute Camera Test Script

END

Troubleshoot and recheck connections

Connect Camera to Raspberry Pi

Enable Camera Interface on Raspberry Pi

Set Up AWS Account

Installation of Necessary Software

Amazon S3

DynamoDB

Amazon EC2

Configure AWS Credentials on Raspberry Pi

Capture Images with Raspberry Pi

Implement Facial Recognition algorithm

error

trouble shoot and check algorithm

Face not recognised

worked

Face recognised successfully

Upload Images to Amazon S3

Backend Integration (Amazon EC2)

Log Attendance Data

Frontend Integration

Store Data in DynamoDB

Proposed System Architecture / Block Diagram

Proposed Methodology/ Algorithm

- The algorithm for face recognition is yet to be finalized, as a very thorough and comparative analysis of these algorithms is required.

- Methodology is explained through the block diagram.

References for Attendance Systems

- Nirmalya Kar, Mrinal Kanti Debbarma, Ashim Saha, Dwijen Rudra Pal
  - *Study of Implementing Automated Attendance System Using Face Recognition Technique*

- Samuel Lukas, Aditya Rama Mitra, Ririn Ikana Desanti, Dion Krisnadi
  - *Student attendance system in classroom using face recognition technique*

- Akshara Jadhav, Akshay Jadhav, Tushar Ladhe, Krishna Yeolekar
  - *AUTOMATED ATTENDANCE SYSTEM USING FACE RECOGNITION, Dept. of Information Technology, University of Pune, NDMVP's KBT COLLEGE OF ENGINEERING, NASHIK*

References for Raspberry Pi

- Dhvani Shah and Vinayak Haradi
  - *IoT Based Biometrics Implementation on Raspberry Pi*
- L. Arunkumar and A. Arun Raja
  - *Biometrics Authentication Using Raspberry Pi*

Thank you!