Dr. Vishwanath Karad
MIT WORLD PEACE UNIVERSITY | PUNE
TECHNOLOGY, RESEARCH, SOCIAL INNOVATION & PARTNERSHIPS

School of Computer Science and Engineering

Department of Computer Engineering and Technology

Mini Project
Third Year B. Tech, Semester 6

Project Synopsis for
Attendence Assistant

Software Development, Machine Learning, AI

Prepared By

PA10. Krishnaraj Thadesar - 1032210888
PA07. Parth Zarekar - 1032210846
PA25. Sourab Karad - 1032211150
PA24. Saubhagya Singh - 1032211144
Cyber Security and Forensics

2024

Contents

1 Abstract **1**

2 Objectives **1**

3 Hardware and Software Requirements **2**
3.1 Hardware Requirements 2
3.2 Software Requirements 2
3.2.1 Amazon S3 (Simple Storage Service): 2
3.2.2 Amazon EC2 (Elastic Compute Cloud): 2
3.2.3 Amazon DynamoDB: 2
3.2.4 Raspberry Pi High-Quality Camera and Raspberry Pi: 3

4 Cost Estimates from AWS **3**

5 Activity Diagram **4**

6 Block Diagram **7**

1 Abstract

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.

In the cloud infrastructure, Amazon S3 acts as the secure repository for images captured by the Raspberry Pi High-Quality Camera, facilitating organized storage and seamless integration with other AWS services. Amazon EC2 instances play a crucial role in managing continuous processes, serving as the backbone for route management and backend operations. Amazon DynamoDB, a fully managed NoSQL database, anchors the system, efficiently handling dynamic client data and recognition results.

At the edge, the Raspberry Pi High-Quality Camera handles real-time image capture, working in tandem with the Raspberry Pi as the edge computing device. This dynamic combination ensures preliminary image processing tasks are executed seamlessly, allowing for real-time interaction with the local environment.

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.

Keywords

Facial Recognition and Machine Learning, Artificial Intelligence Integration, Big Data Analysis and Attendance Tracking, Hybrid Architecture with Cloud Services, Cloud Services - AWS, Edge Computing with Raspberry Pi High-Quality Camera, Automated Attendance and Modernization, Educational Technology Integration, Scalability and Efficiency, Real-time Image Capture and Processing, NoSQL Database for Data Management, AWS Services Integration, sectionProject Objectives

2 Objectives

1. Develop an automated attendance tracking system using computer vision for MITWPU Campus.
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.

3 Hardware and Software Requirements

3.1 Hardware Requirements

1. Raspberry Pi 4 Model B with 2GB RAM
2. Raspberry Pi High-Quality Camera
3. Raspberry Pi Camera Module 3
4. Micro SD Card
5. Power Supply
6. Internet Connection

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

Table 1: Hardware Requirements

3.2 Software Requirements

3.2.1 Amazon S3 (Simple Storage Service):

Amazon S3 serves as the central cloud storage solution for our facial recognition project. Its secure, scalable, and organized storage infrastructure accommodates images captured by the Raspberry Pi High-Quality Camera connected to Raspberry Pi. S3's versatile bucket structure facilitates efficient organization of images and associated metadata, enabling seamless integration with other AWS services.

3.2.2 Amazon EC2 (Elastic Compute Cloud):

Amazon EC2 instances play a pivotal role in handling continuous, long-running processes essential for route management and backend operations. Offering a customizable and scalable computing environment, EC2 instances efficiently manage client routes, coordinate responses, and serve as the backbone for the facial recognition application.

3.2.3 Amazon DynamoDB:

Amazon DynamoDB, a fully managed NoSQL database, serves as the cornerstone for storing dynamic client data, images, and recognition results. Leveraging DynamoDB's scalability and low-latency access, the system efficiently manages diverse and dynamic data associated with facial recognition.

3.2.4 Raspberry Pi High-Quality Camera and Raspberry Pi:

The hardware components, Raspberry Pi High-Quality Camera, and Raspberry Pi form the edge computing segment of the project. The Raspberry Pi High-Quality Camera, equipped with a high-quality camera module, interfaces seamlessly with the Raspberry Pi to capture crisp facial images. The Raspberry Pi, acting as an edge computing device, executes preliminary image processing tasks and ensures real-time interaction with the local environment.

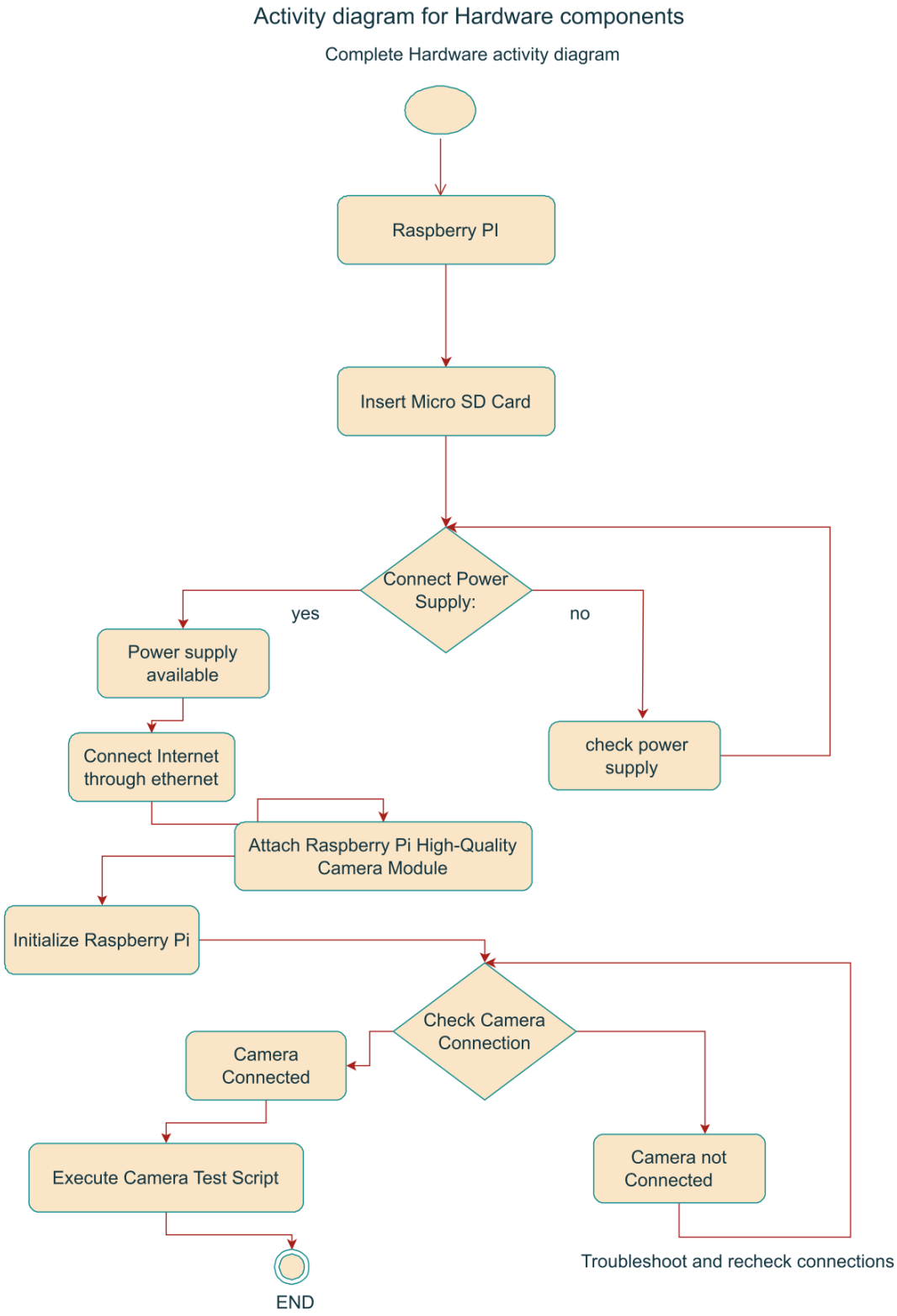
4 Cost Estimates from AWS

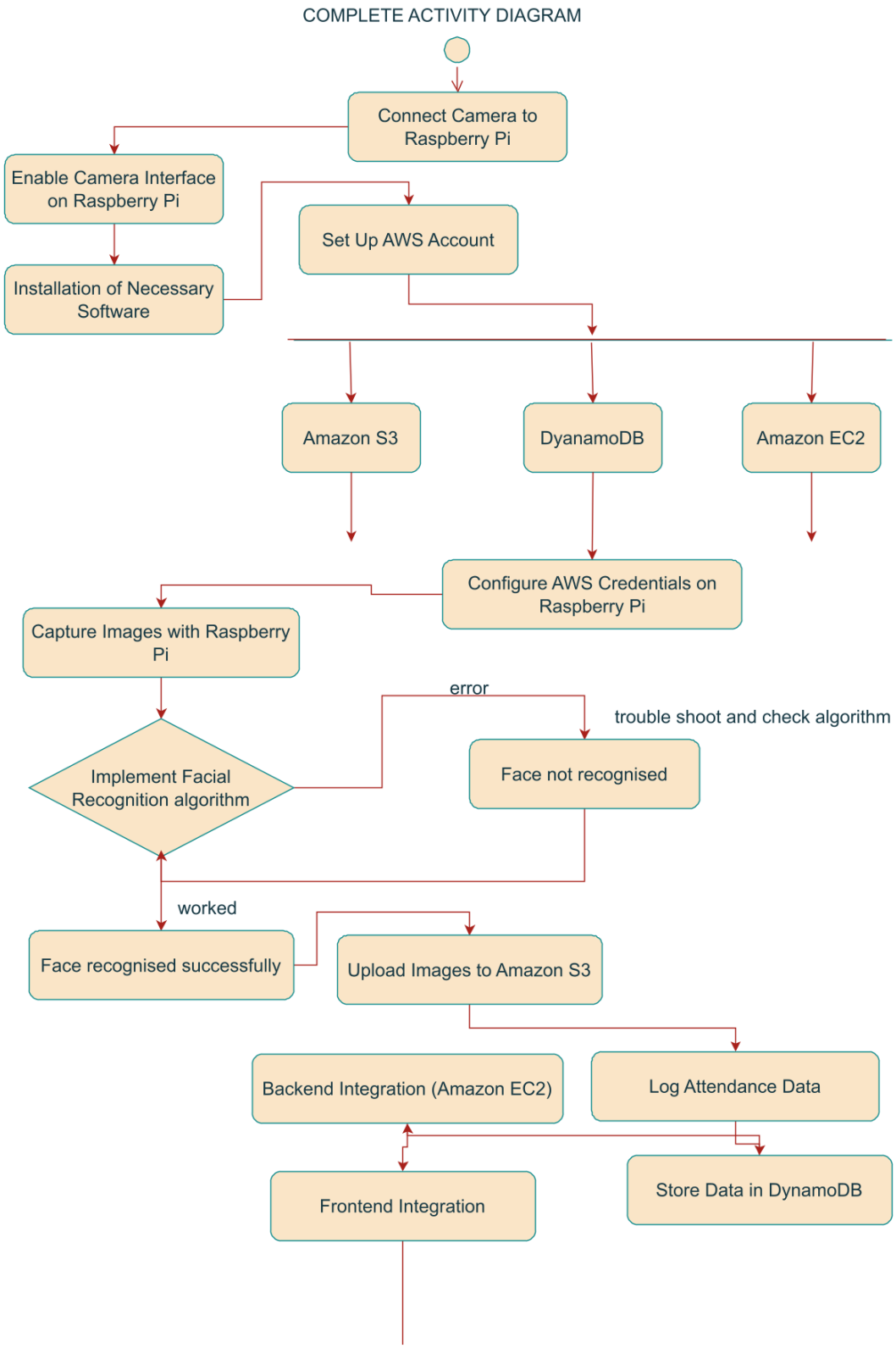
Detailed Estimate

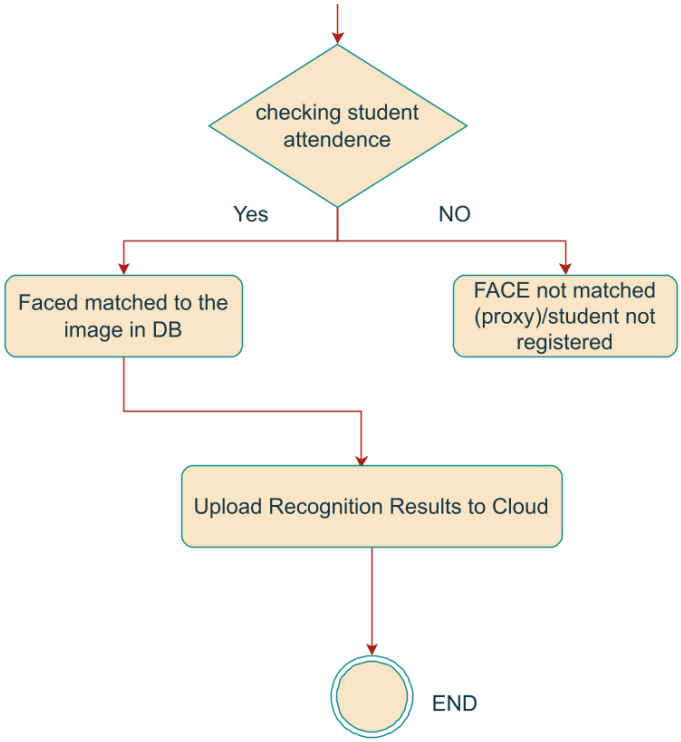
Name	Group	Region	Upfront cost	Monthly cost
Amazon DynamoDB	No group applied	Asia Pacific (Mumbai)	205.20 USD	34.39 USD
Status: - **Description:** **Config summary:** Table class (Standard), Average item size (all attributes) (1 KB), Write reserved capacity term (1 year), Read reserved capacity term (1 year), Data storage size (10 GB) On-demand backup data storage (15 GB)				
Amazon EC2	No group applied	Asia Pacific (Mumbai)	0.00 USD	78.40 USD
Status: - **Description:** **Config summary:** Tenancy (Shared Instances), Operating system (Linux), Workload (Consistent, Number of instances: 1), Advance EC2 instance (c6g.2xlarge), Pricing strategy (EC2 Instance Savings Plans 1yr No Upfront), Enable monitoring (disabled), DT Inbound: Not selected (0 TB per month), DT Outbound: Not selected (0 TB per month), DT Intra-Region: (0 TB per month)				
Amazon Simple Storage Service (S3)	No group applied	Asia Pacific (Mumbai)	0.00 USD	3.57 USD
Status: - **Description:** **Config summary:** S3 Standard storage (100 GB per month), PUT, COPY, POST, LIST requests to S3 Standard (150000), GET, SELECT, and all other requests from S3 Standard (150000), Data returned by S3 Select (10 GB per month), Data scanned by S3 Select (100 GB per month) DT Inbound: Internet (1 TB per month), DT Outbound: Not selected (0 TB per month)				

Figure 1: Estimate from AWS

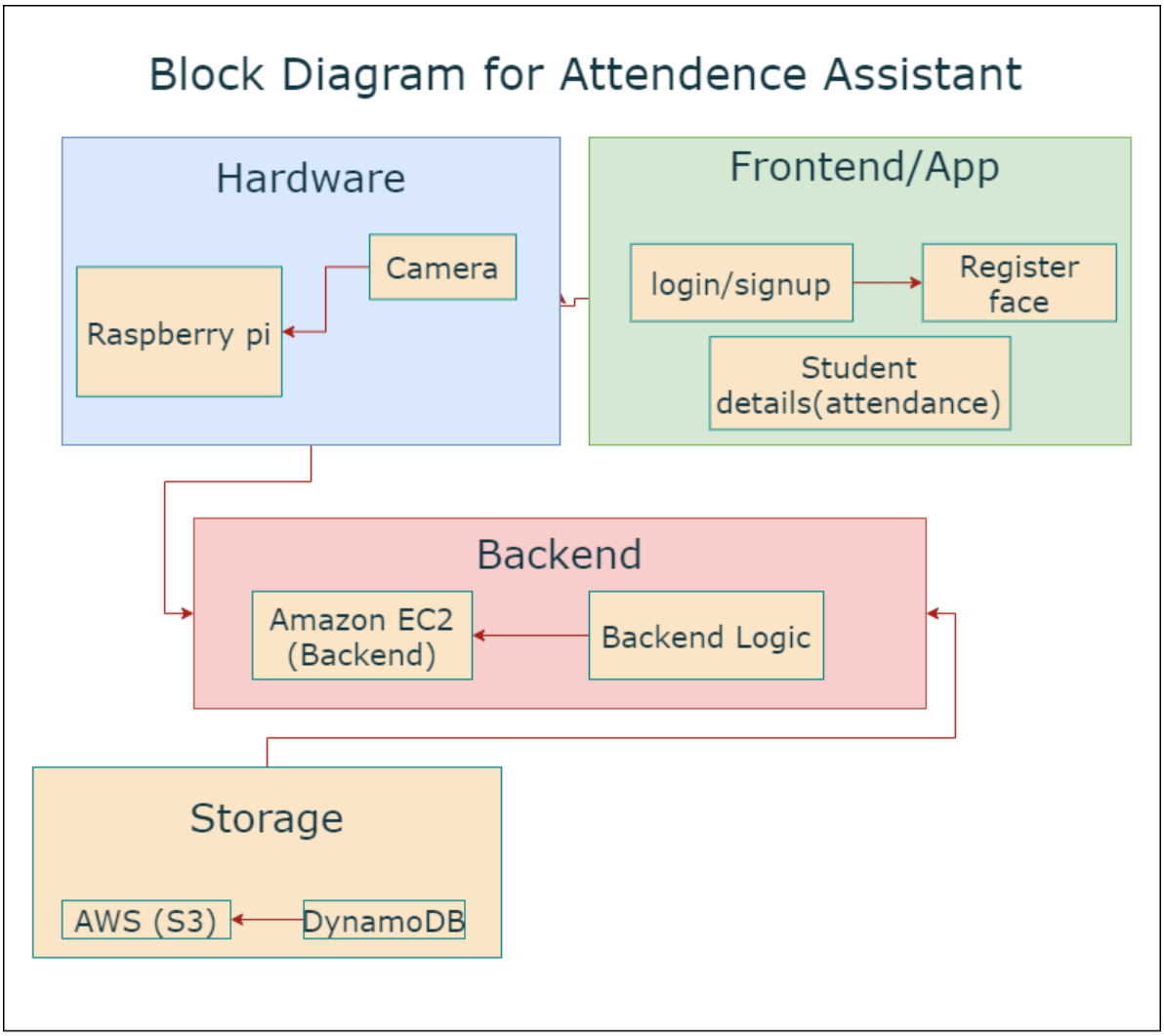
5 Activity Diagram




COMPLETE ACTIVITY DIAGRAM
Connect Camera to Raspberry Pi
Enable Camera Interface on Raspberry Pi
Set Up AWS Account
Installation of Necessary Software
Amazon S3
DyanamoDB
Amazon EC2
Configure AWS Credentials on Raspberry Pi
Capture Images with Raspberry Pi
error
trouble shoot and check algorithm
Implement Facial Recognition 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


checking student attendence
Yes
NO
Faced matched to the image in DB
FACE not matched (proxy)/student not registered
Upload Recognition Results to Cloud
END

6 Block Diagram



Mini Project Guide / Mentor

Name

Signature

Member 1: PA10. Krishnaraj Thadesar

Member 2: PA07. Parth Zarekar

Member 3: PA25. Sourab Karad

Member 4: PA24. Saubhagya Singh