A PROJECT REPORT

on

"College Automation System"

Submitted to

KIIT Deemed to be University

In Partial Fulfillment of the Requirement for the Award of

BACHELOR'S DEGREE IN
Computer Science and System Engineering

BY

Pratham Maheshwari	**2028027**
Umang Pathak	**2028039**
Sudipta Mali	**2028185**
Shivans Awasthi	**2028195**

UNDER THE GUIDANCE OF

Meghna G. Raj

SCHOOL OF COMPUTER ENGINEERING

KALINGA INSTITUTE OF INDUSTRIAL TECHNOLOGY

BHUBANESWAR, ODISHA -751024

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KIIT Deemed to be University

School of Computer Engineering
Bhubaneswar, ODISHA 751024

CERTIFICATE

This is certify that the project entitled

"College Automation"

submitted by

Pratham Maheshwari	**2028027**
Umang Pathak	**2028039**
Sudipta Mali	**2028185**
Shivans Awasthi	**2028195**

is a record of bonafide work carried out by them, in the partial fulfillment of the requirement for the award of Degree of Bachelor of Engineering (Computer Science & Engineering OR Information Technology) at KIIT Deemed to be university, Bhubaneswar. This work is done during the year 2022-2023, under our guidance.

Date:14/04/2023

(Meghna G. Raj)
Project Guide

Acknowledgement

We are profoundly grateful to **Mrs. Meghna G. Raj** of **School of Computer Science and Engineering, KIIT University** for her expert guidance and continuous encouragement throughout to see that this project meets its target since its commencement to its completion.

Pratham Maheshwari
Umang Pathak
Sudipta Mali
Shivans Awasthi

ABSTRACT

The title of the project is COLLEGE AUTOMATION SYSTEM (CAS). CAS is an Internet based application that aims at providing information to all the levels of management within an organization. A college automation system is an application that digitizes and streamlines the operation of colleges and universities. CAS helps to manage admin, academic, and non-academic activities.This system can be used for marking presence(student and faculty),automatically power up appliances,monitor resource utilization,management for meeting rooms of the college.

Keywords: IOT Bases Cloud Platform, Face Recognition, Google Sheet, Arduino, ESP32, home automation

Contents

Chapter 1

Introduction

The manual mode of operation is slow and very inefficient as there is always a chance of inducting errors which can lead to confusion among students and the faculty members,to avoid this if the whole system is automated then the chances of failure will decrease significantly.Another main issue is,when the student and faculties leave the classroom,the lights and fans are not switched-off which wastes the earth's resources and adds up to the cost of the university.

This software and hardware system will be a College management system for the members of an organization. This system will be designed to maximize the administrative, academic and overall productivity by providing tools to assist in automating the technical procedures and processes, which would otherwise have to be performed manually. By maximizing the users work efficiency and production the system will meet the users needs while remaining easy to understand and use. It is a user-friendly portal to interact, manage and access information.

Chapter 2

Basic Concepts/ Literature Review

The basic functionality of using or making the college automated is to ease off the work of teachers and other staffs who are involved in this process and if we see the real world scenario then this manual mode of operation takes a lot of time and sometimes the there is chance of errors which can cause chaos.The project's target audience will mainly be the students and teachers,for the students the process will be smooth and there will be clarity about things and for teachers it will make their work a lot more easier.

Esp32, ir sensor, arduino iot cloud, Google API , Python, Basic Knowledge of Electronics

2.1 ESP 32 WROOM 32:

ESP32-WROOM-32 is a powerful, generic Wi-Fi + Bluetooth® + Bluetooth LE MCU module that targets a wide variety of applications, ranging from low-power sensor networks to the most demanding tasks, such as voice encoding, music streaming and MP3 decoding.
ESP32 is used as the central microcontroller for this project.

2.2 Arduino IoT Cloud Platform:

The Arduino IoT Cloud is a platform that allows anyone to create IoT projects, with a user friendly interface, and an all in one solution for configuration**,** writing code**,** uploading and visualization**.**
In this project it is used to create a dashboard to control the lights and also monitor its use.

2.3 Google API:

Google Cloud APIs are programmatic interfaces to Google Cloud Platform services. They are a key part of Google Cloud Platform, allowing you to easily add the power of everything from computing to networking to storage to machine-learning-based data analysis to your applications.

Here, in this project it is used for updating Google Sheets.

2.4 Python:

Python is a high-level, general-purpose, and very popular programming language. Python programming language is being used in web development, Machine Learning applications, along with all cutting-edge technology in the Software Industry.

In the project it is used for facial recognition as it has a wide range of modules to implement different algorithms.

2.5 Basic Knowledge of Electronics:

Basic knowledge of electronics in terms of making useful circuits that solve a problem or that perform a specific action. Here we need a basic knowledge of IoT hardware systems such as microcontrollers, switching devices, basic circuit designing,etc and some basic knowledge of communications protocols such as wifi, bluetooth, etc.

Chapter 3

Problem Statement / Requirement Specifications

The manual mode of operation is slow and very inefficient as there is always a chance of inducting errors which can lead to confusion among students and the faculty members,to avoid this if the whole system is automated then the chances of failure will decrease significantly.Another main issue is,when the student and faculties leave the classroom,the lights and fans are not switched-off which wastes the earth's resources and adds up to the cost of the university.

3.1 Project Planning

● Need to use various sensors and actuators for scanning and acting upon the input.
● Need for other wireless communication,electronic boards like micro-controllers.
● Need of various softwares and network protocols to facilitate the system and use of databases to store the information.
● Development of an application which will help to control the process and see the updates taking place in system though the application

3.2 Project Analysis

A. Biometric Attendance
● This technology enables a student/faculty to mark their attendance with the help of facial Recognition, which serves as an alternative to the traditional method of taking attendance.
● It's a faster method to store and analyze the attendance details as the biometric information will be automatically stored in the database , which can further be analyzed by the faculty

B . Appliance controller:
●The appliances such as light and air conditioners can be controlled based on the presence of a student or faculty.
● The appliance can either be manually controlled or be automated , an automated light system would provide us with a light control feature where the lights would turn on when any human is present in the room and light intensity levels will be controlled by sensors which monitor the room's ambient lights.

C. Meeting Scheduler:
● Provides us with the feature of scheduling a meeting for the faculties based on the availability of rooms , the system will provide a list of available rooms with

the help of a database to the faculty and the faculty chooses a room for his meeting. Faculty can also provide names of other faculty members with whom the meeting is scheduled and the system will send an email to them with relevant meeting information.

3.3 System Design

A. User Interfaces

- GUI
The user interface for this program is the interface provided in the web application, which is for monitoring the attendance of the students and faculties, updation or deletion of the biometric information by the administrator and monitoring of classrooms being occupied and options for scheduling the meetings.

- CLI
There is no command line interface
- API
Google API is used in the system for accessing and updating the google sheets for records

- Hardware Interfaces
The program uses the camera, a local data storage device, the microcontroller with wifi and a sensor to detect the presence of a person.
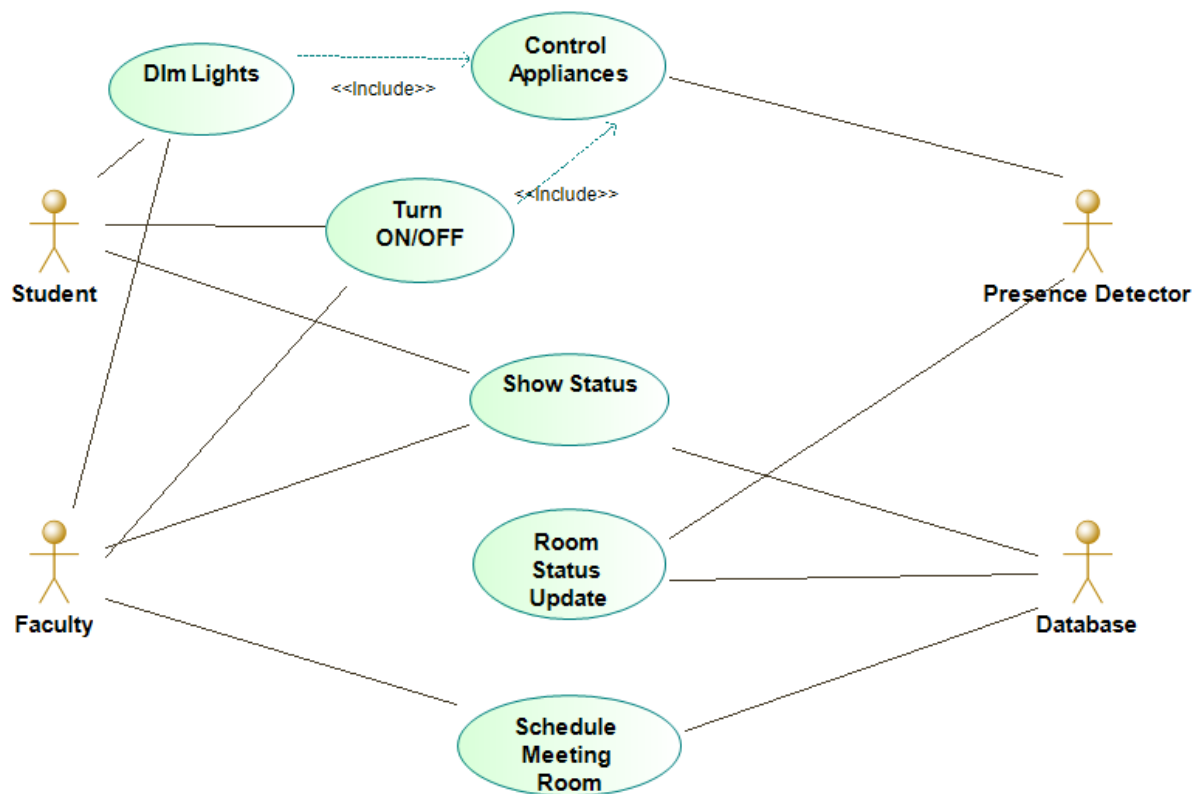
- Communications InterfacesCommunication is done via wifi to access the internet and send the relevant information to the cloud and a website.
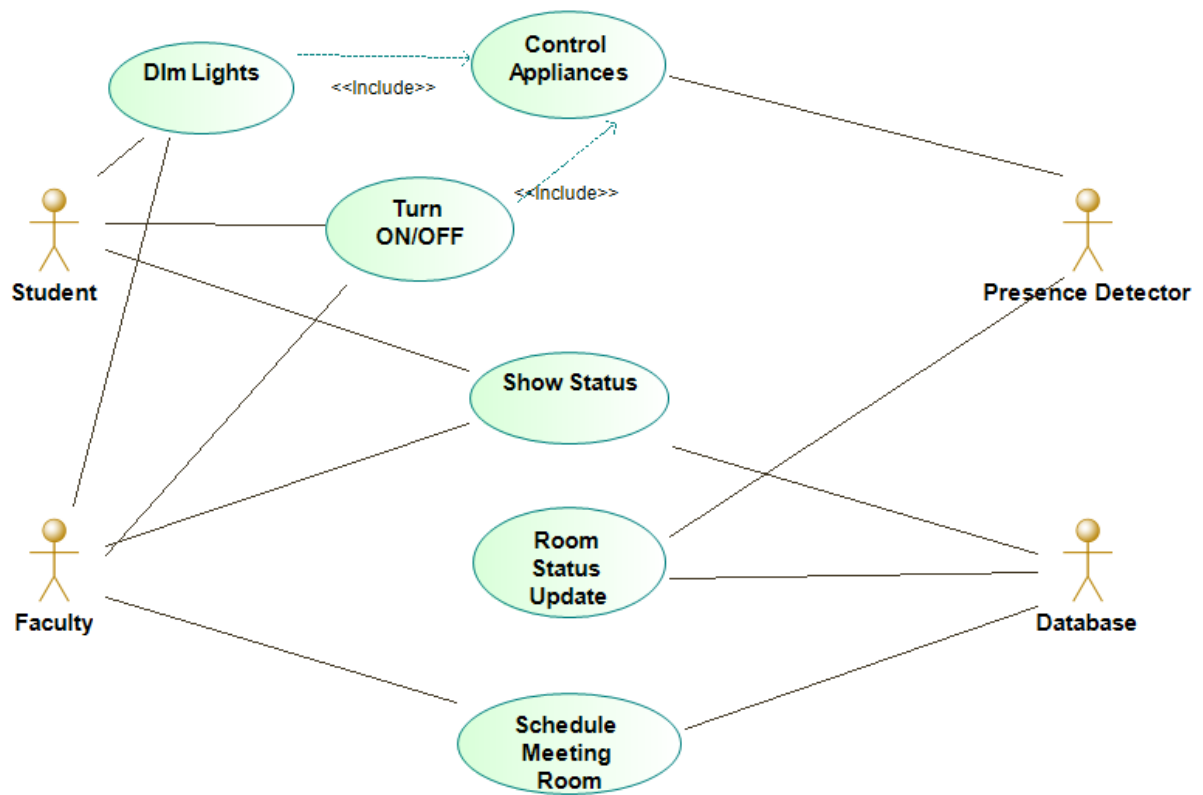- Software Interfaces
The software uses multiple libraries for communication with the sensors and sending the data using wifi through the internet.
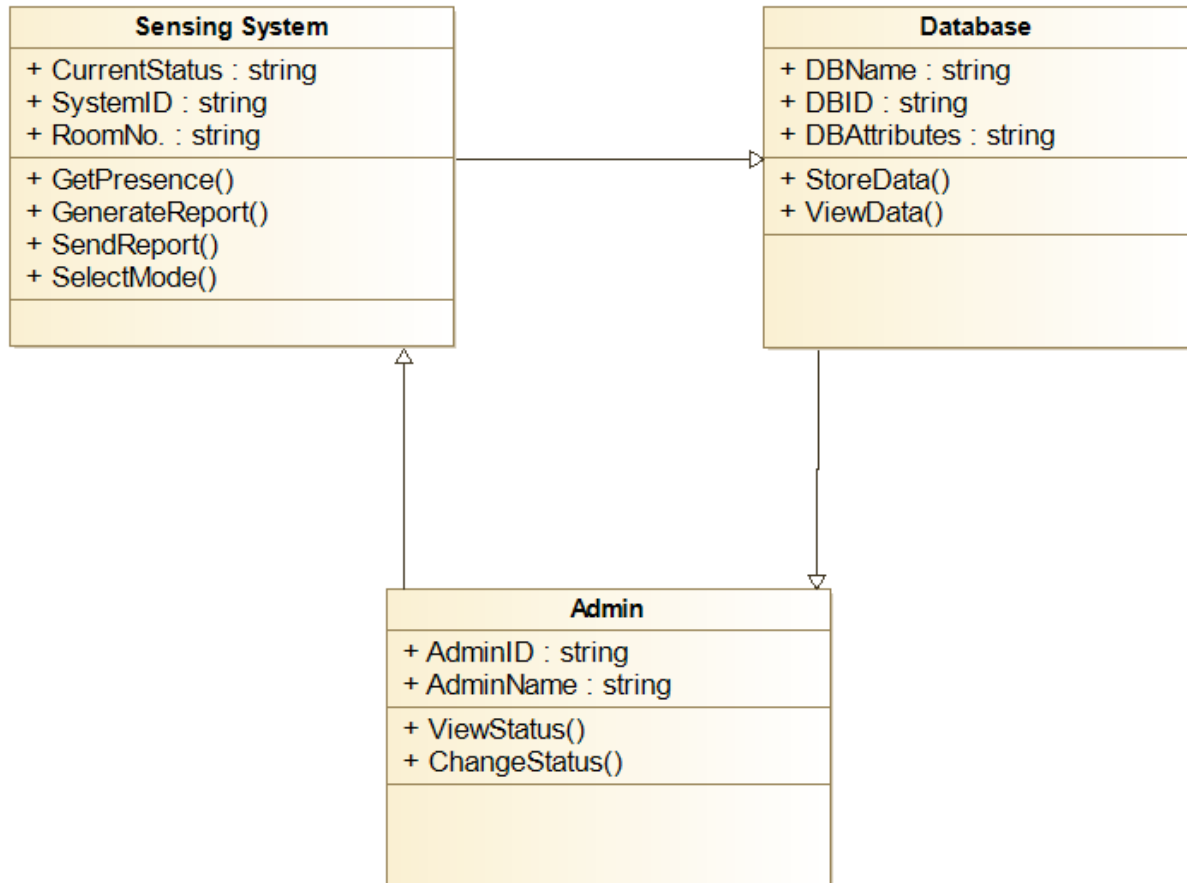
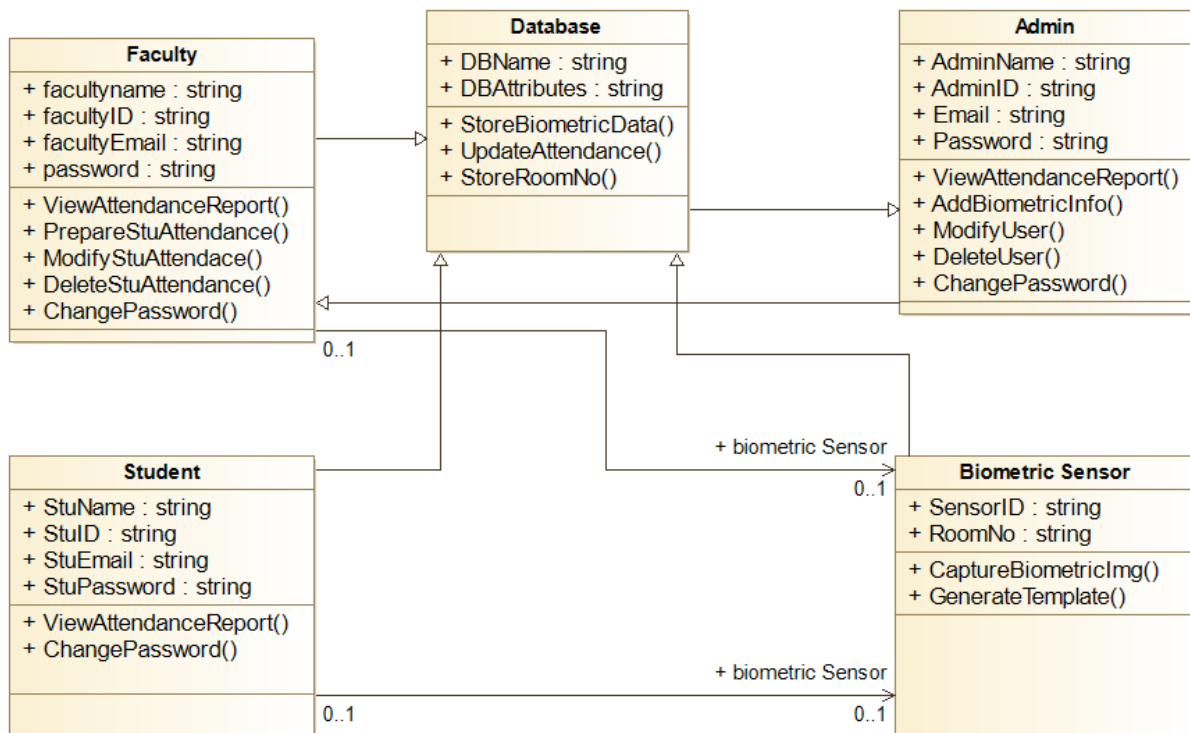3.3.2 System Architecture **OR** Block Diagram

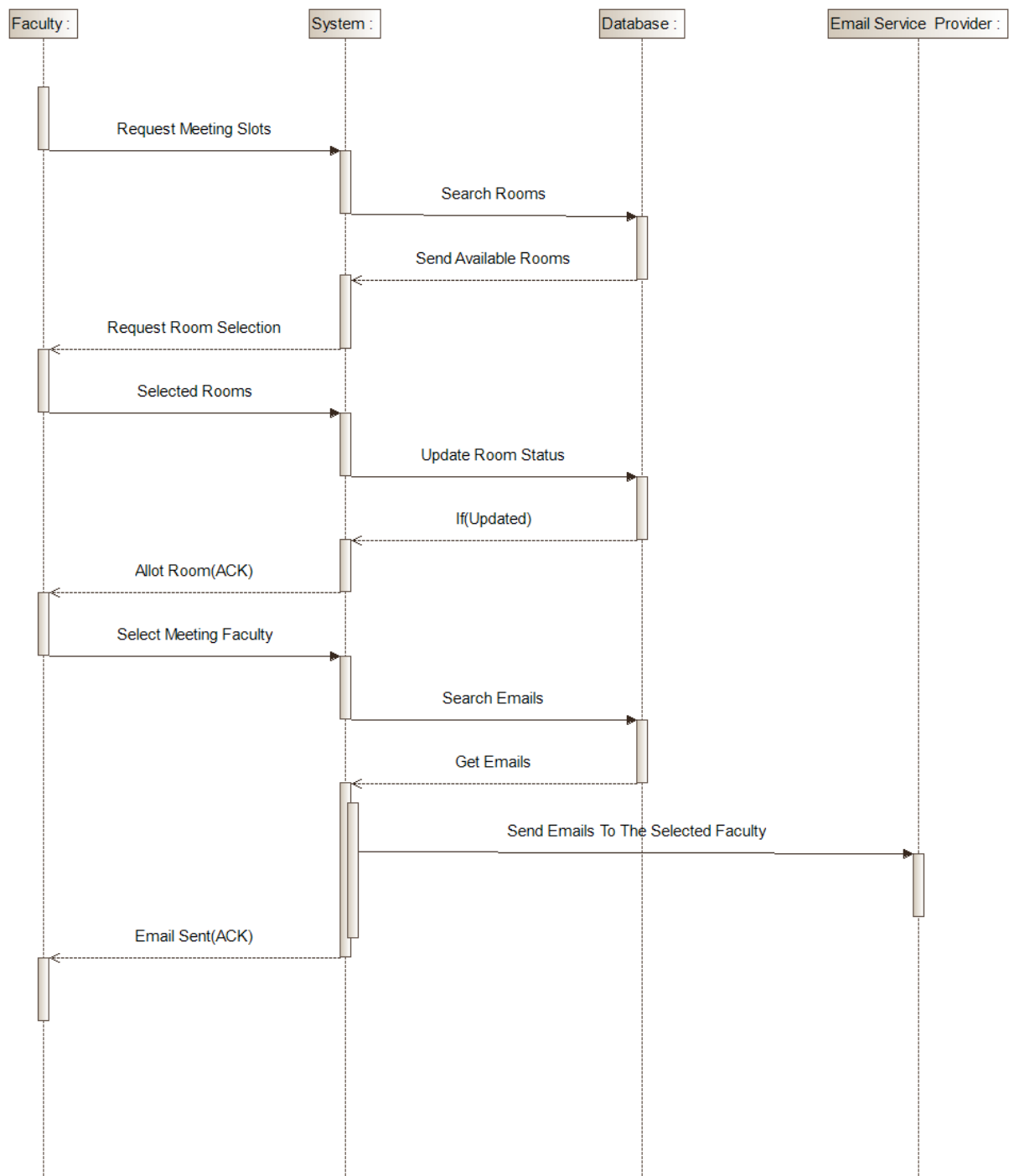**CAS Use Case Diagram:**

Meeting Scheduler Use Case Diagram:

Room Automation Class Diagram:

Sensing System

+ CurrentStatus : string
+ SystemID : string
+ RoomNo. : string

+ GetPresence()
+ GenerateReport()
+ SendReport()
+ SelectMode()

Database

+ DBName : string
+ DBID : string
+ DBAttributes : string

+ StoreData()
+ ViewData()

Admin

+ AdminID : string
+ AdminName : string

+ ViewStatus()
+ ChangeStatus()

Biometric Attendance Class Diagram:

Faculty

+ facultyname : string
+ facultyID : string
+ facultyEmail : string
+ password : string

+ ViewAttendanceReport()
+ PrepareStuAttendance()
+ ModifyStuAttendace()
+ DeleteStuAttendance()
+ ChangePassword()

Database

+ DBName : string
+ DBAttributes : string

+ StoreBiometricData()
+ UpdateAttendance()
+ StoreRoomNo()

Admin

+ AdminName : string
+ AdminID : string
+ Email : string
+ Password : string

+ ViewAttendanceReport()
+ AddBiometricInfo()
+ ModifyUser()
+ DeleteUser()
+ ChangePassword()

Student

+ StuName : string
+ StuID : string
+ StuEmail : string
+ StuPassword : string

+ ViewAttendanceReport()
+ ChangePassword()

Biometric Sensor

+ SensorID : string
+ RoomNo : string

+ CaptureBiometricImg()
+ GenerateTemplate()

0..1

+ biometric Sensor
0..1

+ biometric Sensor
0..1   0..1

Meeting Scheduler Sequence Diagram

Faculty :	System :	Database :	Email Service Provider :

Request Meeting Slots

Search Rooms

Send Available Rooms

Request Room Selection

Selected Rooms

Update Room Status

If(Updated)

Allot Room(ACK)

Select Meeting Faculty

Search Emails

Get Emails

Send Emails To The Selected Faculty

Email Sent(ACK)

Chapter 4

Implementation

4.1 Methodology OR Proposal

The first thing we needed was a central controller for all the applications which has the required processing capacity and the ability to communicate with the internet using wifi or ethernet. So for now we have used the ESP 32 which comes with a dual core 32 bit processor and inbuilt wifi and bluetooth capabilities.

We need a powerful system for facial detection and facial recognition for the automatic attendance system and a sensor to count the number of people entering and leaving the room so that we can control the lights,fans and the AC Units.

4.2 Testing OR Verification Plan

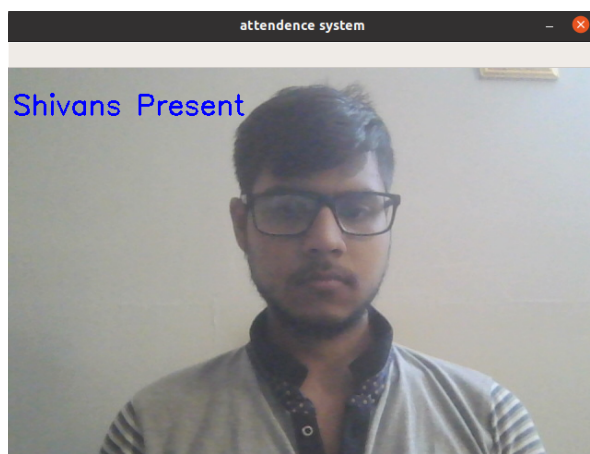Multiple test cases were proposed for testing and verification of the system.
1. The user should be able to switch between manual and automatic modes using the android interface.
2. The person counting should be able to work even after the system is switched to manual mode and continue if the system comes back to automatic mode.
3. The facial recognition system should be able to store the attendance data in the local machine and later sent the data to the cloud platform
4. The facial recognition system should be able to detect and recognize the faces efficiently using a single image of the user which improves the storage efficiency and time complexity. The algorithm should be efficient.

4.3 Result Analysis

Initial testing and working of the system was understood and implemented and the results were tested in the Arduino Iot Dashboard such as whether the system is working properly in offline mode and is also able to communicate with the online system. The results found were positive.
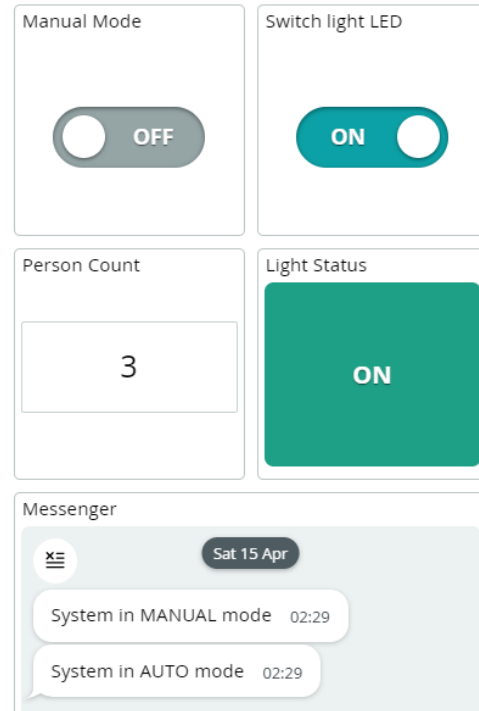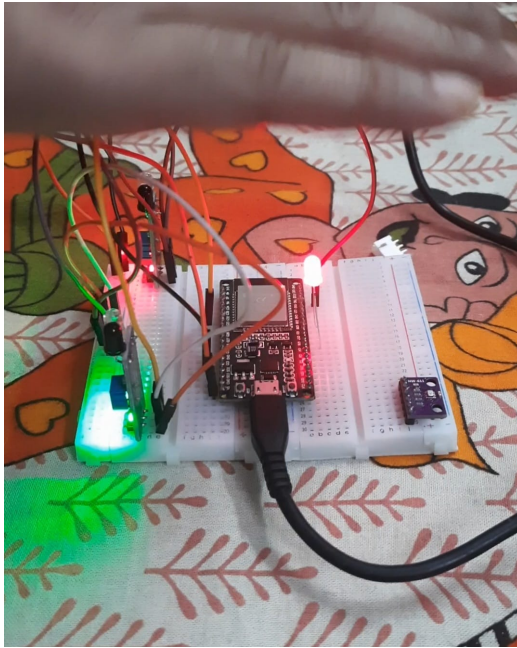
For facial recognition multiple algorithms were tested and the most efficient one was selected and the testing was done and the results were positive. The system was able to detect faces and mark the present attendance in the google sheets

Chapter 5

Standards Adopted

5.1   Design Standards

Here are some recommended practices we opted for the designing of the system which include the following:

1. Use case Model
2. Sequence Diagrams
3. Class Diagrams

5.2   Coding Standards

Few of the coding rules, guidelines, and best practices we used for this project:

1. Write as few lines as possible.
2. Use appropriate naming conventions.
3. Segment blocks of code in the same section into paragraphs.
4. Use indentation to mark the beginning and end of control structures. Clearly specify the code between them.
5. Don't use lengthy functions. Ideally, a single function should carry out a single task.

Chapter 6

Conclusion and Future Scope

6.1   Conclusion:

An Internet based application that aims at providing information to all the levels of management within an organization COLLEGE AUTOMATION SYSTEM (CAS) was implemented using ESP32 as the central microcontroller, relay module and IR sensors as the hardware of the system, Arduino Iot Cloud platform and the google sheets as the software of the system.
A detailed study was done on the concepts involved for understanding and implementation of the problem statement.

6.2 Future Scope:

College Automation System is an ever growing application which can be modified in endless ways to serve the purpose of facilitating the easy interactions of all the functioning departments of a college. Some of the basic features which could be added to our project in the future are as followed :-

I.   Here, we are updating the attendance details in the Excel Sheet, later we can implement this in the cloud while we can make a website where all these details will get updated and anyone with appropriate authority could access the data.

II.   Instead of Wi-Fi we can use Bluetooth Module or Zigbee Module which is for efficient power Consumption or ethernet for faster communication.

III. For now we are using a computer system for facial recognition and an esp32 for the wifi and person counting and controlling the lights. In the future we can integrate both the functions in one system by using a raspberry pi and also using ethernet as the mode of communication which will reduce the power consumption of the system.

References

https://www.electronicshub.org/automatic-room-lights-using-arduino-pir-sensor/#Code

https://youtu.be/535acCxjHCI

Solaimani, S.; Keijzer-Broers, W.; Bouwman, H. What we do—And don't—Know about the Smart Home: An analysis of the Smart Home literature. Indoor Built Environ. 2013, 24, 370–383. [Google Scholar] [CrossRef]

Rossi, M. LEDs and New Technologies for Circadian Lighting. In Research for Development; Springer: Cham, Switzerland, 2019; pp. 157–207.

https://www.youtube.com/watch?v=e5NzBvvyw6A

https://www.youtube.com/watch?v=rcCxGcRwCVk

https://www.youtube.com/watch?v=rcCxGcRwCVk

https://psiborg.in/iot-dashboard-an-iot-control-panel-for-all-your-smart-devices/