A

Project Report

on

Interrogators Identification System

Submitted in partial fulfilment of the

requirement for the award of the

Degree of

BACHELOR OF TECHONOLOGY

in

ELECTRONICS AND COMMUNICATION ENGINEERING

by

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DEPARTMENT OF ELECTRICAL, ELECTRONICS AND COMMUNICATION ENGINEERING

May, 2023

DECLARATION

We declare that the work presented in this report titled "**Interrogators Identification System"**, submitted to the Department of Electrical, Electronics and Communication Engineering, Galgotias University, Greater Noida, for the Bachelor of Technology in Electronics and Communication Engineering is our original work. We have not plagiarized unless cited or the same report has not submitted anywhere for the award of any other degree. We understand that any violation of the above will be cause for disciplinary action by the university against us as per the University rule.

Place:

Date:

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CERTIFICATE

This is to certify that the project titled "**Interrogators Identification System"** is the bonafide work carried out by Ayush Kumar, Ashutosh Gaurav students, during the academic year 2022-2023. We approve this project for submission in partial fulfilment of the requirements for the award of the degree of Bachelor of Technology in Electronics and Communication Engineering, Galgotias University.

D Gnana Jeba Das
Project Guide

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Internal Examiner (s) External Examiner

Approved by

_____

HOD

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ABSTRACT

Real-time facial recognition and RFID attendance systems are new technologies that are revolutionizing the traditional attendance process. The system combines RFID technology with facial recognition technology to provide an accurate and cost-effective tracking solution. RFID technology uses radio waves to identify and track tags or cards affixed to employees or students. The paper or card has a unique identification number used to identify the person. Face recognition, on the other hand, uses algorithms to identify a person's unique face and compare it with previously stored facial information to accurately identify it. When the two technologies are combined, the system can verify a person's presence by comparing their RFID tag or card with their face in the database. The system provides real-time monitoring and reporting, enabling monitoring agencies to participate instantly. The system also eliminates the need for error-prone and time-consuming manual recording. The integration of facial recognition technology ensures the security of attendance information and eliminates the possibility of fraud. This document reviews real-time facial recognition and RFID integration in detail, including its design, materials, and operating procedures. This study also examines the strengths and weaknesses of the system and gives an idea about its effectiveness. Overall, the real-time facial recognition RFID attendance system provides an accurate and efficient attendance solution that can be used in a variety of businesses and organizations. The system provides real-time monitoring and reporting, which can improve attendance management and streamline organizational processes.

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GLOSSARY

RFID	Radio Frequency Identification
OpenCV	Open Source Computer Vision Library
IoT	Internet of things
PC	Personal Computer

1.Introduction to RFID tags & Face recognition

An active RFID technology which attendance can be collected without human intervention during lecture session. The proposed system is aims to simplify the process of collecting class attendance whereby the RFID reader automatically triggered the tags and verify the triggered data in databases., RFID. Having a system that can automatically capture student's attendance by flashing their student card at the RFID reader, this system provides valuable online facilities for easy record maintenance offered not only to lecturers but also to related academic management staffs especially for the purpose of students' progress monitoring. Active RFID is a technology that uses a radio wave to identify a physical object automatically where an active RFID tags have an on-board power source from battery, solar and electronics to perform specific tasks. It has an onboard power supply to transmit it data to a reader. In general, the read range of active RFID transponders is higher than passive RFID, which has a slower read rate due to the lack of internal energy.

	Active RFID	**Passive RFID**
Tag Power Source	Internal to tag	Energy transferred from the reader via RF
Tag Battery	Yes	NO
Availability of Tag Power	Continuous	Only within field of reader
Required Strength	Low	High (must power the tag)
Communication Range	Long range(100m or more)	Short(3m or less)
Signal strength from Tag to Reader	High	Low

Facial recognition has become a very important. Face recognition is effectively applied in various applications like security systems, authentication, entrance control, surveillance system, unlocking of smartphones and social networking systems. Most of the devices do not use facial recognition as the main form of conceding entry. However, with advancement in technology and algorithm, facial recognition system has the potential to replace the standard passwords and fingerprint scanners.

2.1.Face detection:-The primary function of this step is to conclude whether the human faces emerge in each image, and what is the location of these faces. This phase requires a patch that includes all the faces in the input image.

2.2.Face extraction:- Face detection step the extraction of human face patches from images is done. After this step, the face pattern is converted into a vector with fixed coordinates or a set of reference points.

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2.3.Face recognition:- The final stage following the facial representation process involves the identification of the detected faces, thereby completing the face recognition procedure. In order to facilitate automatic recognition, it is necessary to construct a face database. Various images are taken of each person and their features are extracted and stored in the database. Then when an input image is fed the face detection and feature extraction is performed and its feature to each face class is compared and stored in the database.

2.System Description

The system consists of a camera that captures the images of the employee and sends it to the image enhancement module. Once the image is enhanced, it is processed through the Face Detection and Recognition modules. Subsequently, the attendance is recorded on the database server. At the time of enrolment, templates of face images of individual employees are stored in the Face database. In this process, all the faces present in the input image are detected, and the algorithm proceeds to compare each detected face with the entries in the face database one by one. By implementing facial recognition technology, attendance can be automatically recorded and stored on a central server, accessible to authorized individuals for various applications. In this way a lot of time is saved and this is highly secure process no one can mark the attendance of other. Attendance is maintained on the server so anyone can access it for purposes like administration, employees themselves. To avoid the false detection we are using the skin classification technique. Using this technique enhance the efficiency and accuracy of the detection process. Active RFID is a technology that uses a radio wave to identify a physical object automatically where an active RFID tags have an on-board power source from battery, solar and electronics to perform specific tasks. It has an onboard power supply to transmit it data to a reader. Active RFID transponders typically have a much larger read range than passive RFID transponders, which have a smaller read range because they do not have an internal power supply.

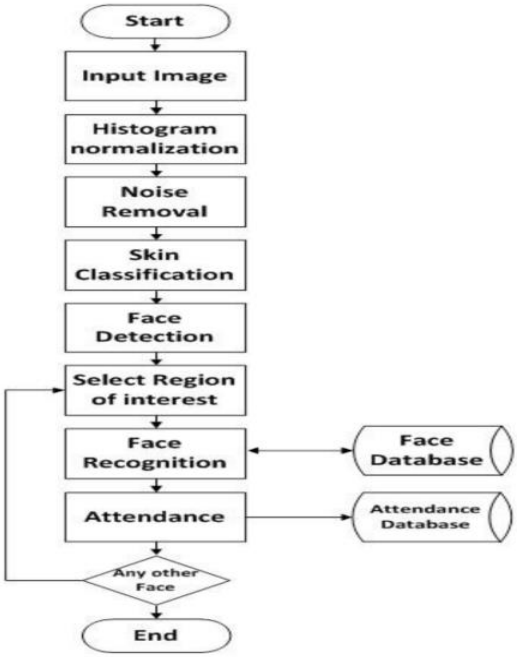

Fig 1:- Block diagram of the face recognition attendance system

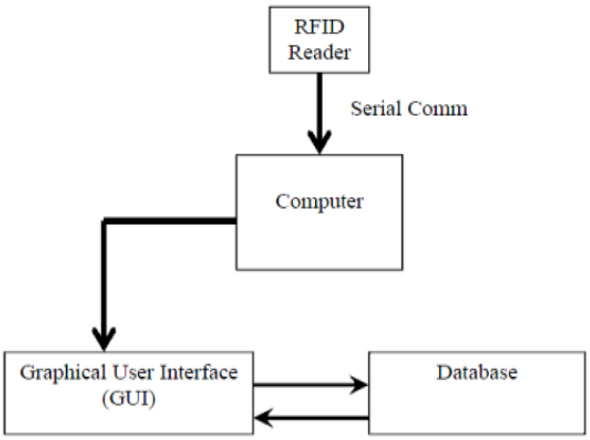

Fig2. Block diagram

2.1.Technical Requirements:-

2.1.1 Hardware Requirements:- A standalone computer needs to be installed in the room where the system is to be deployed. Camera must be positioned in the room to obtain the snapshots. Secondary storage is utilized to store both the images and the face database, ensuring long-term storage and accessibility.

RFID tags, RFID reader(EM18),Arduino UNO R3,LCD Module, Buzzer,Desktop.

2.1.2 Software Requirements:-

- ✓ Windows XP and above.
- ✓ Arduino IDE
- ✓ Spyder IDE Version 5.4.0 or higher.
- ✓ Some of the python packages/modules used in the project are:-

- ✓ NumPy :- A library of computation science, method for multivariable objects, linear algebra and Fourier transform.

3.Simulation

3.1.Code:- For Face recognition

```
import cv2
import face_recognition
import os
import numpy as np
from datetime import datetime
import pickle
path = 'known'
images=[]
classNames = []
mylist = os.listdir(path)
for cl in mylist:
    curImg = cv2.imread(f'{path}/{cl}')
    images.append(curImg)
    classNames.append(os.path.splitext(cl)[0])
    def findEncodings(images):
        encodeList = []
        for img in images:
            img = cv2.cvtColor(img, cv2.COLOR_BGR2RGB)
            encoded_face = face_recognition.face_encodings(img)[0]
            encodeList.append(encoded_face)
        return encodeList
encoded_face_train = findEncodings(images)
def markAttendance(name):
    with open('Attendance.csv','r+') as f:
        myDataList = f.readlines()
```

```
        nameList = []
        for line in myDataList:
            entry = line.split(',')
            nameList.append(entry[0])
        if name not in nameList:
            now = datetime.now()
            dtString = now.strftime('%H:%M:%S')
            f.writelines(f'\n{name},{dtString}')
            # take pictures from webcam
cap = cv2.VideoCapture(0)
while True:
    success, img = cap.read()
    imgS = cv2.resize(img, (0,0), None, 0.25,0.25)
    imgS = cv2.cvtColor(imgS, cv2.COLOR_BGR2RGB)
    faces_in_frame = face_recognition.face_locations(imgS)
    encoded_faces = face_recognition.face_encodings(imgS, faces_in_frame)
    for encode_face, faceloc in zip(encoded_faces,faces_in_frame):
        matches = face_recognition.compare_faces(encoded_face_train, encode_face)
        faceDist = face_recognition.face_distance(encoded_face_train, encode_face)
        matchIndex = np.argmin(faceDist)

        if matches[matchIndex]:
            name = classNames[matchIndex].upper().lower()
            y1,x2,y2,x1 = faceloc
            # since we scaled down by 4 times
            y1, x2,y2,x1 = y1*4,x2*4,y2*4,x1*4
            cv2.rectangle(img,(x1,y1),(x2,y2),(0,255,0),2)
            cv2.rectangle(img, (x1,y2-35),(x2,y2), (0,255,0), cv2.FILLED)
            cv2.putText(img,name, (x1+6,y2-5),
cv2.FONT_HERSHEY_COMPLEX,1,(255,255,255),2)
            markAttendance(name)
    cv2.imshow('webcam', img)
```

```
    if cv2.waitKey(1) & 0xFF == ord('q'):
        break
```

3.2 Input and Output

3.2.1 Input :-

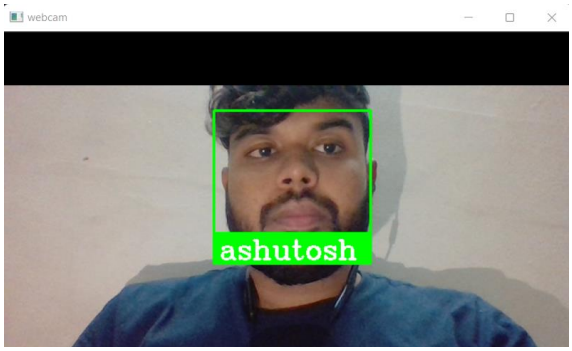

Fig:-3 Input Image

3.2.2 Output:-

	A	B	C	D	E
1	Name	Time			
2					
3	ashutosh	22:37:30			
4					
5					
6					
7					
8					
9					
10					

Fig:-4 Output image

3.3.Code:- For RFID

```
#include <LiquidCrystal.h>
char input[12];
int count = 0;
char tag1[]="1D1111231C8D";
char tag2[]="091122505277";
char tag3[]="090111F45BDEE";
```

```
LiquidCrystal lcd(8,9,10,11,12,13);


void setup() {
  //serial monitor
  Serial.begin(9600);
  // set up the LCD's number of columns and rows:
  lcd.begin(16, 2);
  pinMode(4, OUTPUT);
  pinMode(6, OUTPUT);
   pinMode(5, OUTPUT);
}
void loop() {
    boolean match = 1;
    digitalWrite(2, HIGH);
    lcd.clear();
    lcd.setCursor(0,0);
    lcd.print("Hi, WELCOME");
    lcd.setCursor(0,1);
    lcd.print("SCAN SDUDENT ID");
    delay(1000);
    if(Serial.available())// check serial data ( RFID reader)
          {
                count = 0; // Reset the counter to zero
                /* Keep reading Byte by Byte from the Buffer till the RFID Reader Buffer is
          empty
                   or till 12 Bytes (the ID size of our Tag) is read */
                while(Serial.available() && count < 12)
                {
                      input[count] = Serial.read(); // Read 1 Byte of data and store it in the
input[] variable
                      count++; // increment counter
                      delay(5);
                }
```

```
Serial.println("I received: ");
for(int i=0;i<12;i++)
Serial.print(input[i]);
      Serial.println();
Serial.println();
int j= 0;
while (match==1 && j<12){
   if((tag1[j]==input[j])||(tag2[j]==input[j])||(tag3[j]==input[j])){
     match=1;
     j++;
   }
   else
   match=0;
}
if (match == 1){
  lcd.clear();
        lcd.setCursor(0,1);
  lcd.print("VALID STUDENT");
  lcd.setCursor(0,2);
  lcd.print("You May Enter ");
  delay(1000);
  digitalWrite(4, LOW);
  digitalWrite(6, HIGH);
  delay(2000);
  digitalWrite(6, LOW);
  digitalWrite(4, HIGH);
   delay(1000);
   digitalWrite(4, HIGH);
  digitalWrite(6, LOW);
}
else{
  lcd.clear();
```

```
            lcd.setCursor(0,0);
            lcd.print("Unauthorished");
            lcd.setCursor(0,1);
            lcd.print("STUDENT");
            digitalWrite(5, HIGH);
            delay(2000);
            digitalWrite(5, LOW);
}
}
}
```

4.Results

The final version of the research are two face detection systems, one is based on a dlib library, the second is based on OpenCV. The results of their work submitted to fig.4, which provides an interface of applications, in which we see the detected face.

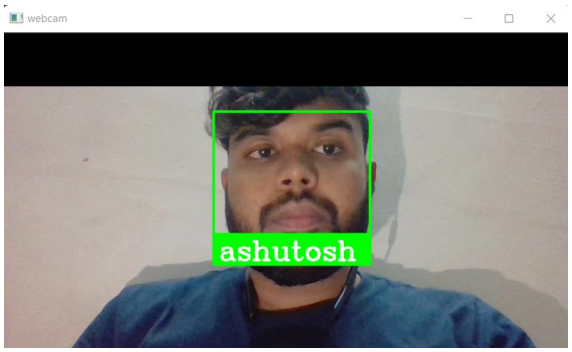

Fig 5:-Face Detection

Applying this project in the real world we can achieve a lot of things such as getting attendance done by the faculty with no proxy, which in turn could help in saving time. This will be beneficial in every university in which there is a problem with attendance. This project will develop the ecosystem of the schools and universities, so the technology is going to revolve around us. This software provides some future scope to develop a device in each class and the developer can provide an application for attendance system for specific

university with the specified subject. This software when exposed to the real world can make a difference in attendance of students and help in time management or reliability among the professors to teach with no attendance marking problems or to carry registers. This software solves the real world issue with schools and universities.

Module testing is one of important phase in this project. The main objective on running this testing is to ensure that all the module are in good condition and working as expected. The module involves are RFID module, MicroSD card module and LCD module.

The results or output of the face recognition system can be displayed and observed on an LCD screen.. When a card that are registered inside the database was swipe, the LCD will display, matric number and name. Please note that cards can only be swiped once per file. Swipe inside the database, LCD will display “Invalid”.

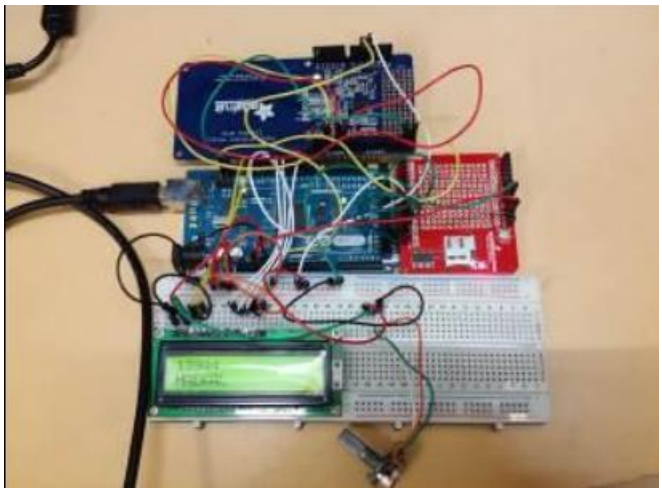

Fig:-6 RFID : Hardware Installation

5.Conclusions

5.1 Conclusion

In summary, real-time face recognition and RFID time attendance are advanced technologies that together provide a safe, efficient and accurate attendance method. The system integrates RFID technology and facial recognition technology to identify people and record their attendance in real time. Use RFID tags or cards to quickly identify and identify people, facial recognition provides added security and accuracy. The system eliminates the need for manual monitoring, reducing errors and saving time. In addition, a real-time monitoring and reporting system allows organizations to track attendance in real time and take appropriate action when discrepancies occur. The system, which can also be integrated with other software systems, makes it easier for organizations to manage their employees. Overall, real-time facial recognition and RFID tag engagement is an excellent solution that can be used in many industries, including education, healthcare, manufacturing and sales. The system provides a safe and effective way to track attendees, improve business processes, and ultimately increase productivity and profitability.

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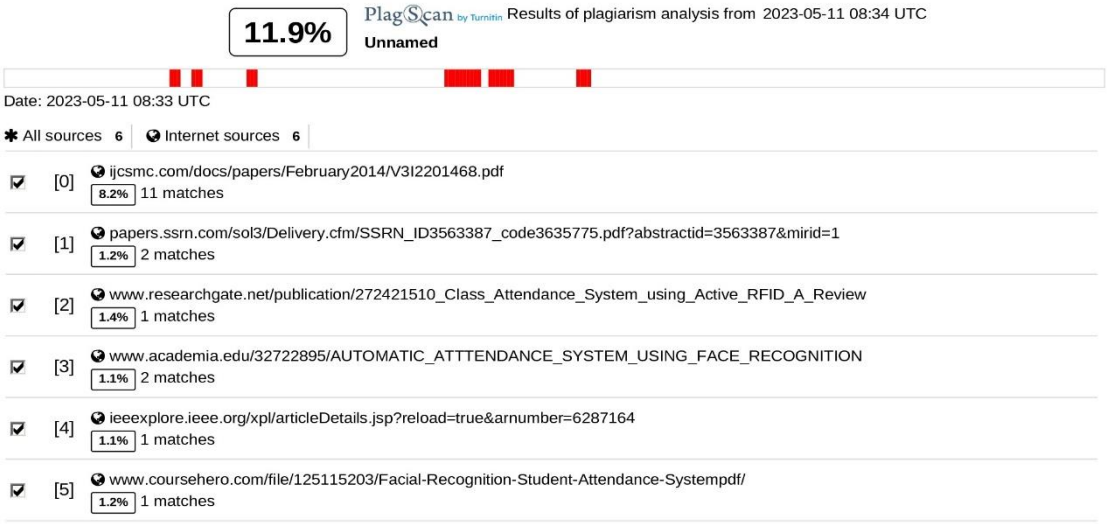

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