

AUTOMATIC ATTENDANCE SYTEM USING FACE RECOGNITON AND RFID

AN INTERNAL FUNDED PROJECT REPORT

Submitted By

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BONAFIDE CERTIFICATE

Certified that this project report titled **AUTOMATIC ATTENDANCE SYSTEM USING FACE RECOGNITION AND RFID** is the *bonafide* work of **Gokhulnath. T (185001051 – II Year)** who carried out the project work under our supervision as an internal funded project in department of CSE during the Academic year 2018-2019.

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ABSTRACT

Attendance in colleges is generally paper based which may sometimes cause errors. Taking attendance manually consumes more time. So, the proposed attendance system uses RFID technology to take attendance. In this system, each student is issued an RFID tag which is used to identify them whenever the reader is switched on, it will take the attendance. This kind of method increases accuracy and time efficient attendance system. Through this method teacher's work of updating attendance in the database is reduced and providing less time in taking attendance during the class hours.

Each student will be provided with a unique RFID tag with a unique number registered to it. This tag will be attached to their identity card. Every class will be attached with a RFID reader (long range reader). The reader will be turned on automatically for first 10 minutes and the last 10 minutes of the period, so the students entering after 10 minutes will be marked absent and the students who are not present in the last 10 minutes will also be marked absent. Through this way we can ensure the presence of students throughout the period. To ensure the maximum accuracy in the data, there will be a camera fixed to the reader which takes a snap of the class and identifies each faces of the students and cross checks with the RFID attendance. This method is important as students may leave their RFID tags in class which may lead to a positive attention beside their physical absence. By this collection of different data, we can take accurate attendance without any deviations.

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CHAPTER 1

Introduction

One of the major concerns in educational institutions like schools and colleges is that the difficulty of manual attendance by the teaching staff. Due to manual attendance there is the risk of proxy, outliers in data, wastage of time in converting it into digital data, time consumption in taking attendance in class hours etc.... So, automating the attendance using different technology would make the institutions an ease to take direct digital attendance without much manual efforts.

1.1 Problem statement

Attendance in colleges is generally paper based which may sometimes cause errors. Taking attendance manually consumes more time. So, the proposed attendance system uses RFID technology and Face Recognition to take attendance. In this system, each student's face is recorded and a unique RFID tag is issued which is used to identify them whenever the reader and the webcam is switched on, student with both positive results will get the attendance. This kind of method increases accuracy and time efficient attendance system. Through this method teacher's work of updating attendance in the database is reduced and providing less time in taking attendance during the class hours.

Each student will be provided with a unique RFID tag with a unique number registered to it and correspondingly the students face is recorded using webcam. This tag will be attached to their identity card. Every class will be attached with a RFID reader (long range reader) and a webcam. The system will

be turned on automatically for first 10 minutes and the last 10 minutes of the period, so the students entering after 10 minutes will be marked absent and the students who are not present in the last 10 minutes will also be marked absent. Through this way we can ensure the presence of students throughout the period.

1.2 Objectives

- Quick attendance with accuracy.
- Time efficient, providing more teaching time to the teachers.
- Reduce the manual errors and time of the teachers while updating the attendance in the database.
- Continuous tracking of the student's state of presence in the class.
- Increase in teaching time than regular teaching hours.
- Could track and record student's activity instantly.
- The errors are considerably very low.

1.3 Existing System

Abstract: Most educational institutions' administrators are concerned about student irregular attendance. Truancies can affect student overall academic performance. The conventional method of taking attendance by calling names or signing on paper is very time consuming and insecure, hence inefficient. Radio Frequency Identification (RFID) based attendance system is one of the solutions to address this problem. This system can be used to take attendance for student in school, college, and university. It also can be used to take attendance for workers in working places. Its ability to uniquely identify each person based on their RFID tag type of ID card make the process of taking the attendance easier, faster and secure as compared to conventional method. Students or workers only need to place their ID card on the reader and their attendance will be taken immediately. With real time clock capability of the system, attendance taken will be more accurate since the time for the attendance taken will be recorded. The system can be connected to the computer through RS232 or Universal Serial Bus (USB) port and store the attendance taken inside database. An alternative way of viewing the recorded attendance is by using HyperTerminal software. A prototype of the system has been successfully fabricated.

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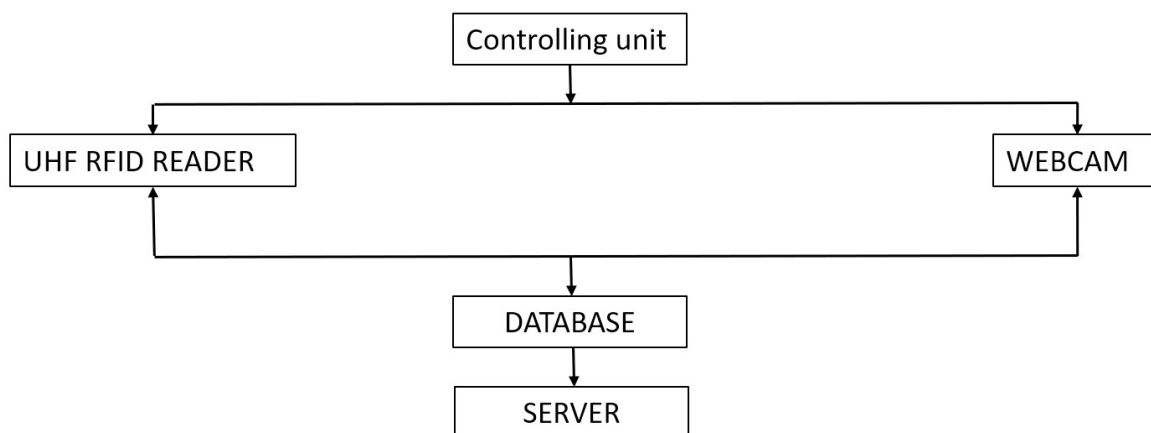
Conference Location: Kuala Lumpur, Malaysia

1.4 Proposed System

RFID attendance and Face recognition system is the replacement of the traditional paper pen-based attendance method. With the latest technologies we can instantly track and record the activity of each student in the class.

This whole process requires RFID tags, RFID readers, Webcam, controlling unit, database management system.

1. Installing the RFID reader and the webcam in a desired place so that the reader range is maximum in all direction and the webcam covers a wide area of the classroom. RFID tag is provided to each student with a unique number.
2. The RFID reader and the webcam module must be programmed in such a way that it is able to communicate effectively with the controlling unit.
3. The database must be created to save the data in an efficient way. It must give accurate data when retrieved i.e. it must be able to display attendance of a single student or the whole class according to the requirement of the user.
4. The reader, Webcam, controlling unit, database must be integrated to complete the process.
5. The system must be tested several times and debugged according to the problem.



- **Controlling unit:**

The controlling unit consist of the python code to take snaps and process it. The UHF RFID READER and the WEBCAM is connected to this unit, using which the data is collected and processed.

- **UHF RFID READER:**

Ultra-High Frequency RFID reader reads the RFID tags in its specified range. This device transfers the data from the RFID tag to the database for storage and data processing purpose.

- **Webcam:**

Snaps picture of the entire class and detects each student and stores the information to the database.

- **Database and server:**

The snaps and the RFID information are processed and stored in the form of database in to the server. This helps in the retrieval of data for future purpose.

S. No	Product name	Justification
1	UHF RFID Reader	It is used to read the tags which has unique number for each student.
2	Passive UHF RFID ID Cards	It is used to store unique number of the student.
3	webcam	It is used to recognise students in the class using facial recognition.

CHAPTER 2

IMPLEMENTATION

2.1 Face Recognition module

Brief of the module:

- At first the students face data are recorded for training the face recognition module.
- The webcam will capture a series of 20 images with an interval of 500ms (which can be altered as per the preference).
- So, each student data will be stored in a specific folder with a unique user id which will be related to the RFID tag of the particular student
- The face images of the student are trained and assigned a unique sequence code which is stored in the database.
- Upon all the face training modules are done, the image of the whole class is taken and each face are identified based on the trained model.
- The face registered to the particular class only is considered and marked in the tentative report spreadsheet.

2.2RFID Detection module

Brief of the module:

- Based on each student unique id, data are written in the RFID tag.
- The RFID reader will be active 10 minutes at the start of the period and at the end of the period.
- The tags registered between that time will stored in the tentative report spreadsheet.

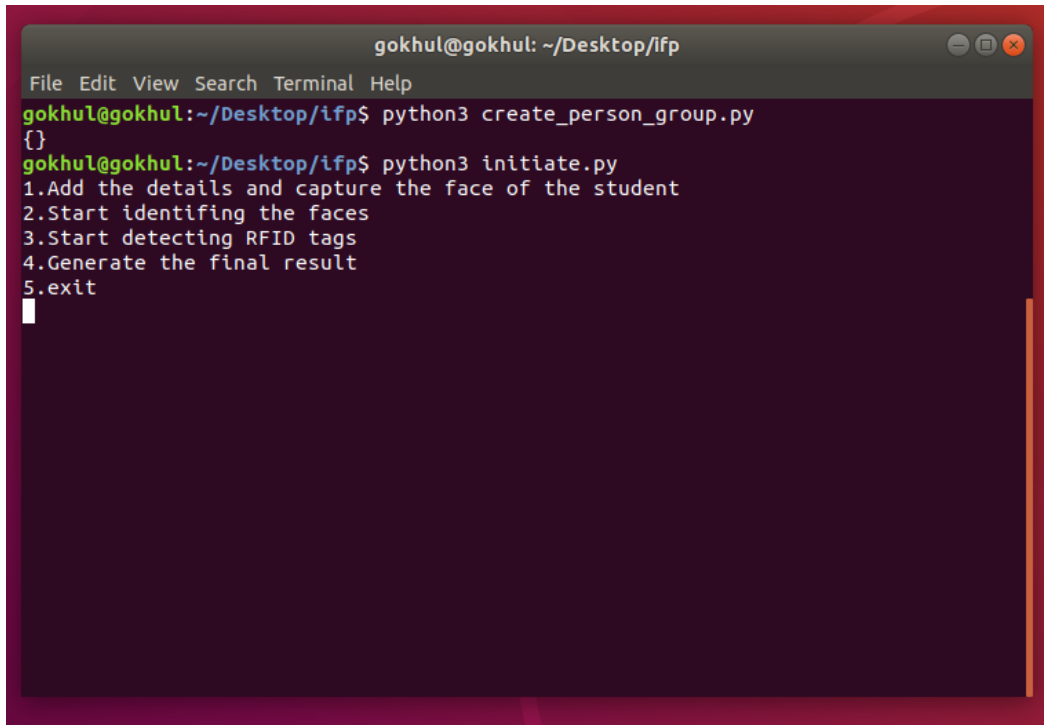
2.3 Integrating of data module

Brief of the module:

- A student gets his/her attendance only when the face and RFID data are correct.
- If any one of the data is not recorded like:
 - The face is not registered i.e. the student doesn't belong to the class.
 - Absence of RFID tags.
 - Any kind of proxies.
- The final report contains the attendance of all the students based on their tentative report.
- The final report appends the daily attendance of the student correspondingly.

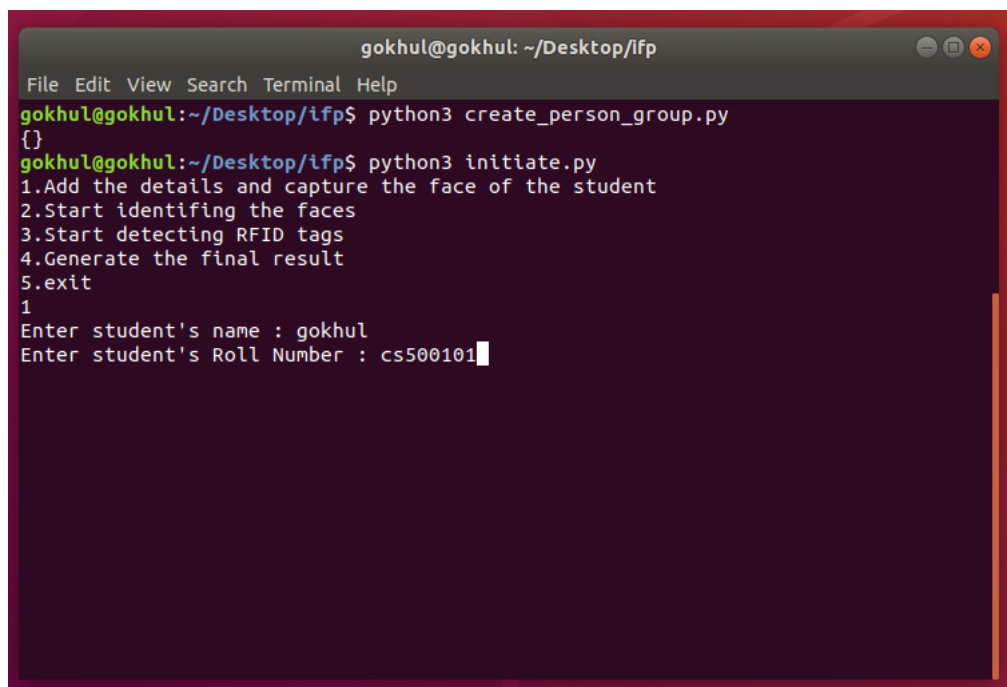
2.4 Detailed Implementation of the System

- A menu with all the required option is displayed.



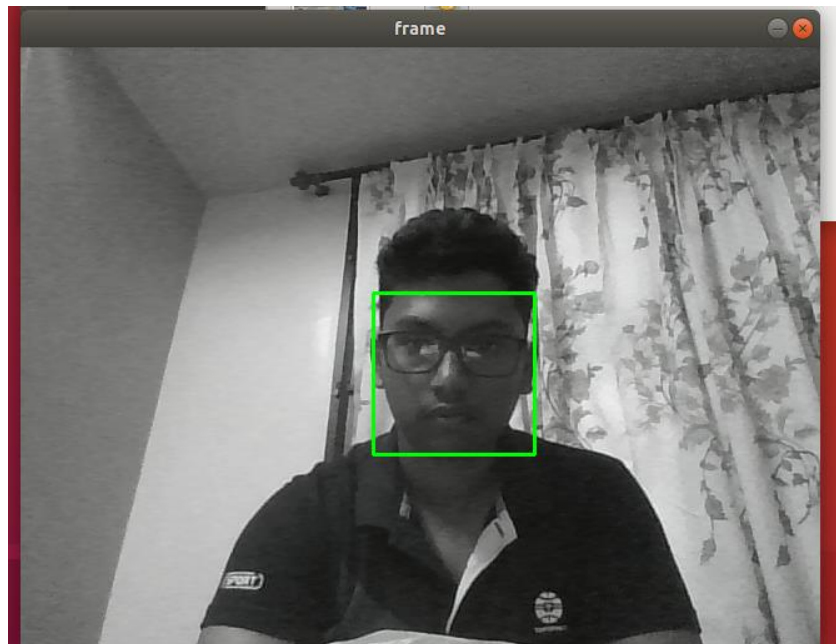
```
gokhul@gokhul: ~/Desktop/ifp
File Edit View Search Terminal Help
gokhul@gokhul:~/Desktop/ifp$ python3 create_person_group.py
{}
gokhul@gokhul:~/Desktop/ifp$ python3 initiate.py
1.Add the details and capture the face of the student
2.Start identifying the faces
3.Start detecting RFID tags
4.Generate the final result
5.exit
█
```

- The first option adds the student details and face data to the database

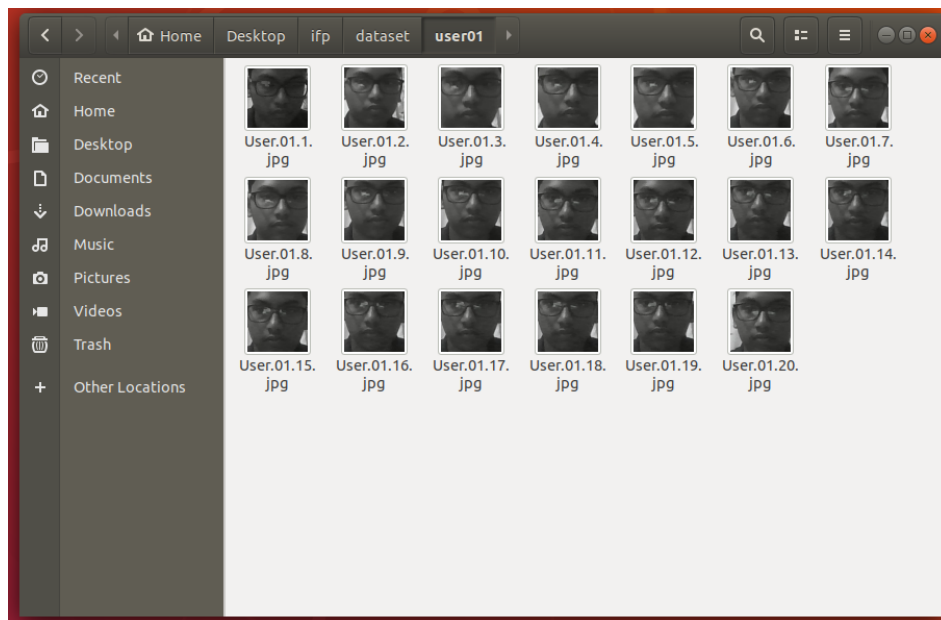


```
gokhul@gokhul: ~/Desktop/ifp
File Edit View Search Terminal Help
gokhul@gokhul:~/Desktop/ifp$ python3 create_person_group.py
{}
gokhul@gokhul:~/Desktop/ifp$ python3 initiate.py
1.Add the details and capture the face of the student
2.Start identifying the faces
3.Start detecting RFID tags
4.Generate the final result
5.exit
1
Enter student's name : gokhul
Enter student's Roll Number : cs500101█
```

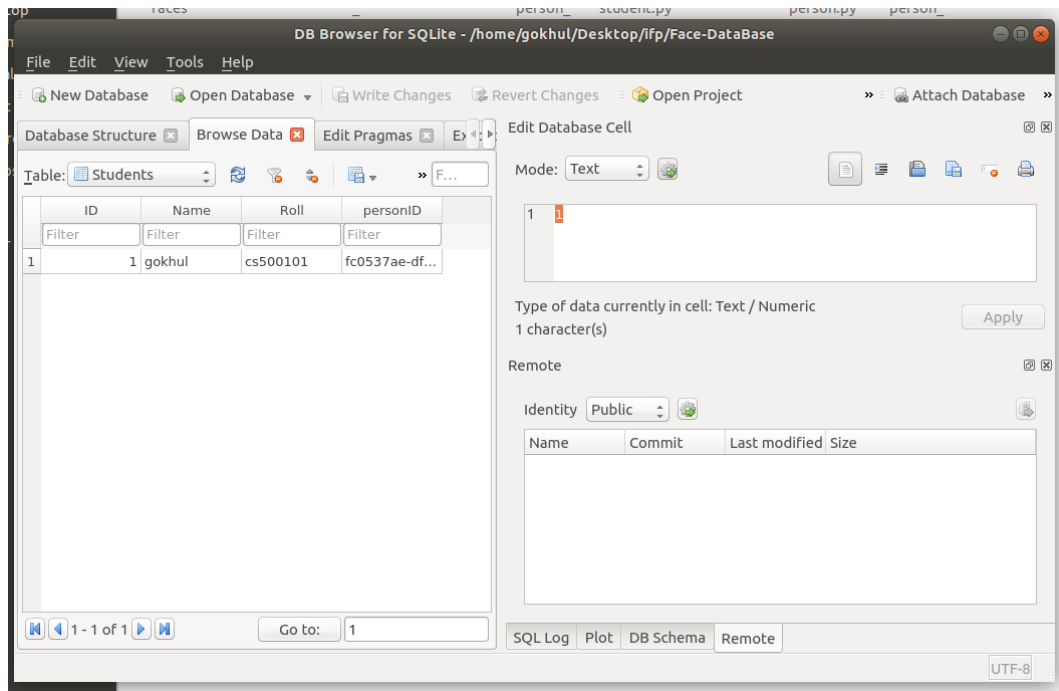
- The face data is captured from webcam.



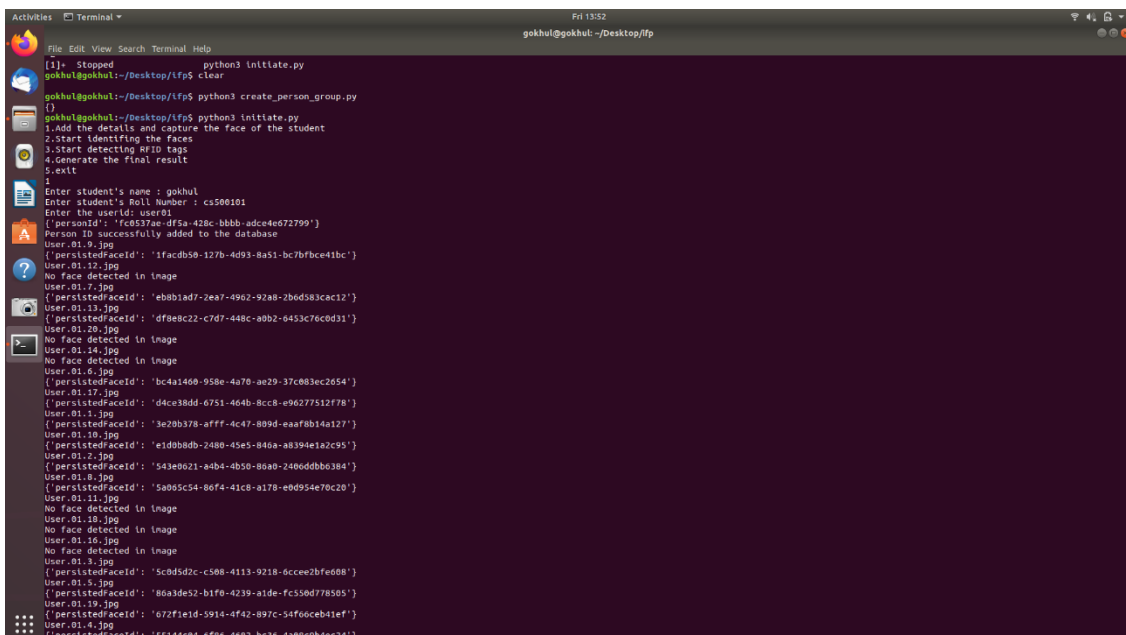
- The face data are stored in a separate directory named after the unique id.



- The Student database consist of data such as Student ID, Student Name, Roll number, Person ID. Person id is the special unique identification number for the user face.



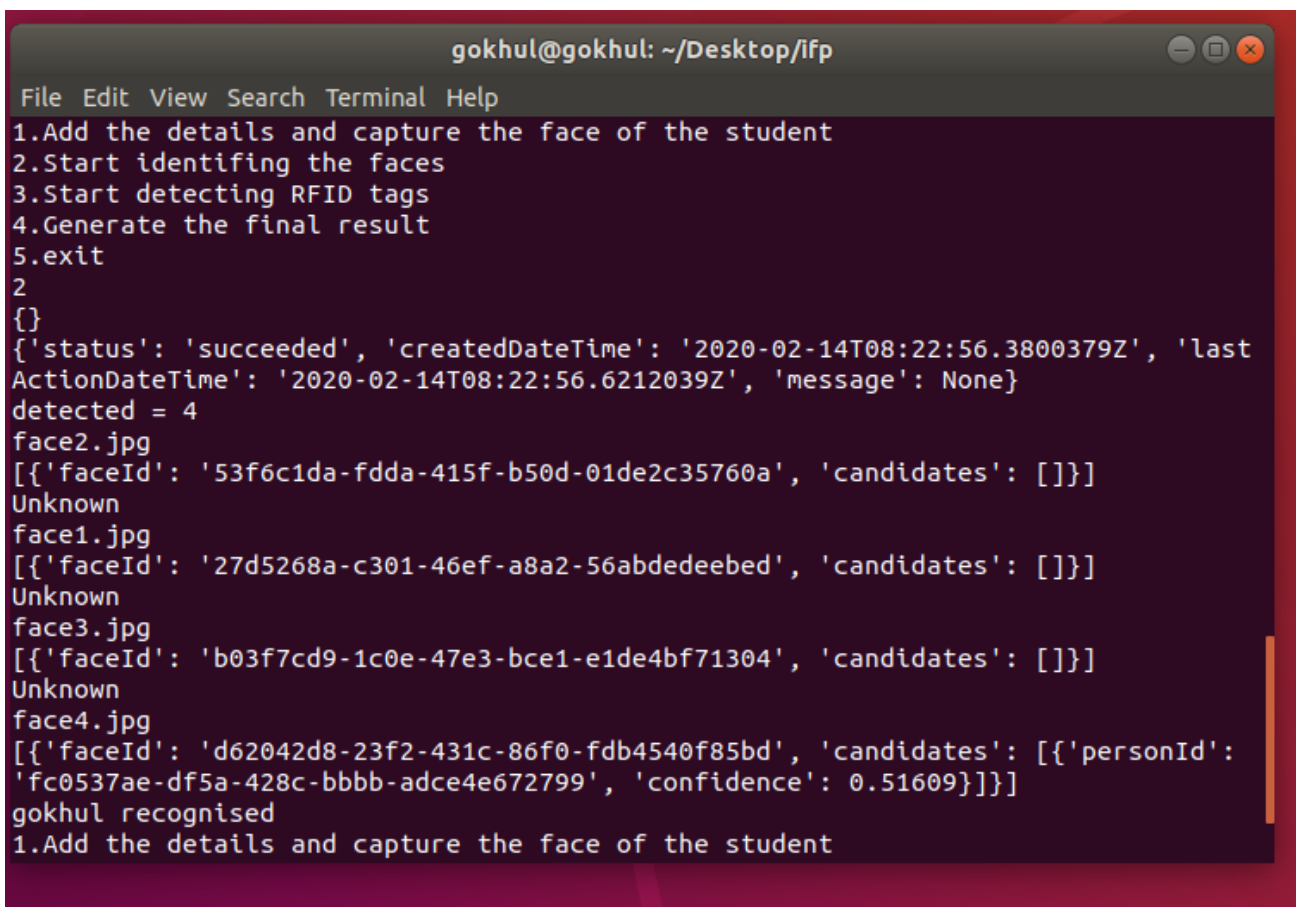
- Each face image gets trained into the cloud.



- Option 2, captures a snap of the class and starts detecting the faces. Only recognized face will get a message as recognized and other faces are declared not recognized face.

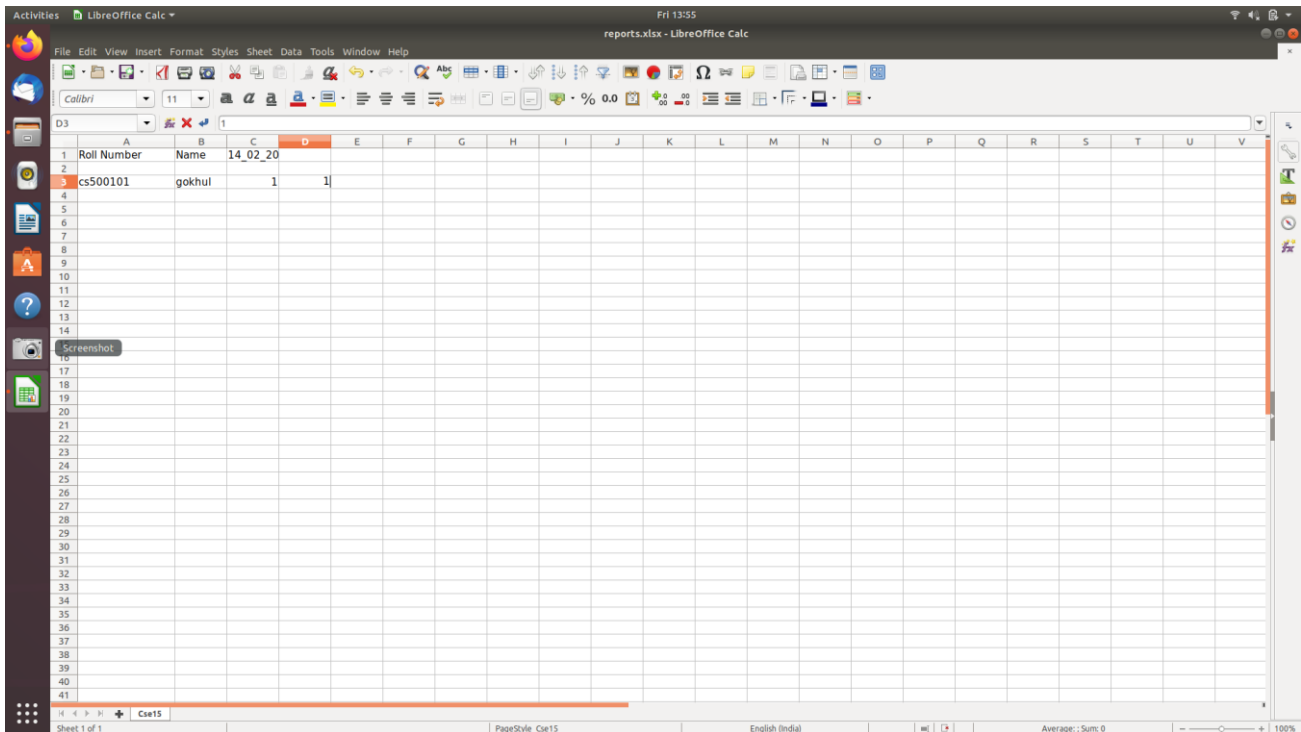
- **Possible condition**

- **Face not detected**
- **Face detected, not recognized**
- **Face detected, recognized**

A terminal window titled 'gokhul@gokhul: ~/Desktop/ifp' with a menu bar (File, Edit, View, Search, Terminal, Help). The terminal shows a script execution with the following output:

```
1.Add the details and capture the face of the student
2.Start identifying the faces
3.Start detecting RFID tags
4.Generate the final result
5.exit
2
{}
{'status': 'succeeded', 'createdDateTime': '2020-02-14T08:22:56.3800379Z', 'last
ActionDateTime': '2020-02-14T08:22:56.6212039Z', 'message': None}
detected = 4
face2.jpg
[{'faceId': '53f6c1da-fdda-415f-b50d-01de2c35760a', 'candidates': []}]
Unknown
face1.jpg
[{'faceId': '27d5268a-c301-46ef-a8a2-56abdedeed', 'candidates': []}]
Unknown
face3.jpg
[{'faceId': 'b03f7cd9-1c0e-47e3-bce1-e1de4bf71304', 'candidates': []}]
Unknown
face4.jpg
[{'faceId': 'd62042d8-23f2-431c-86f0-fdb4540f85bd', 'candidates': [{'personId':
'fc0537ae-df5a-428c-bbbb-adce4e672799', 'confidence': 0.51609}]]]
gokhul recognised
1.Add the details and capture the face of the student
```

- Option 3 recognizes passive UHF RFID tag of each student and stores the data onto a database. Each student is provided with a unique identification key.
- Each student user id is corresponded to two attendance column per day which decides the attendance of the student.



- Possibility of the student attendance
 - Getting an attendance
 - Face attendance and RFID attendance detected correctly
 - Not getting attendance
 - Detected face and not detecting RFID
 - Detecting RFID and not detecting Face

- The attendance data will be consolidated and get updates to the final attendance database.

Activities LibreOffice Calc

File Edit View Insert Format Styles Sheet Data Tools Window Help

Calibri 11

	A	B	C	D	E	F	G	H
1	Roll Number	Name	14_02_20	15_02_20				
2								
3	cs500101	gokhul	1	1				
4	cs500102	maran	1					
5								
6								
7								
8								
9								
10								
11								
12								
13								
14								
15								
16								
17								
18								
19								
20								

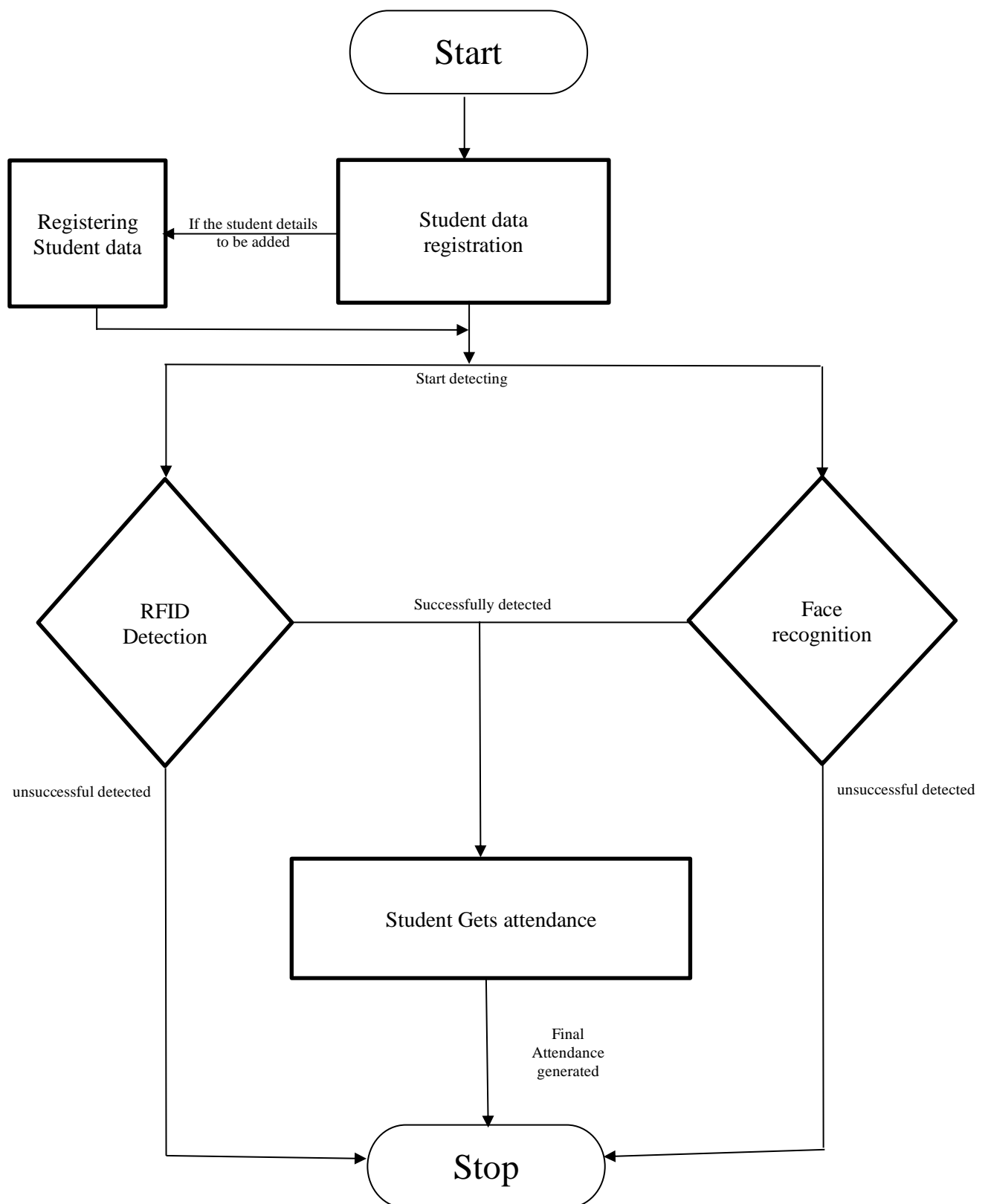
Activities LibreOffice Calc

File Edit View Insert Format Styles Sheet Data Tools Window Help

Calibri 11

	A	B	C	D	E	F	G	H
1	Roll Number	Name	14_02_20					
2								
3	cs500101	gokhul		1				
4								
5								
6								
7								
8								
9								
10								
11								
12								
13								
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16								
17								
18								
19								
20								

2.5 Data flowchart



CHAPTER 3

CONCLUSION AND RESULT

To conclude, we have discussed, in this report, the detailed design and implementation of the project to automate the attendance system using face recognition and RFID technology. By combining these two technologies we can increase the accuracy of the system outcome with high confidence level without outlier such as proxy.

As a part of our future work, we could develop this technology by changing the face recognition platform from picture to video feed. By this technique we could monitor the emotional state of a student in the class. This technology could help the educational intuition to review their standards of teaching.

Appendix A

Account Statement

Amount Received from College : Rs.20000

S.No.	Description	Quantity	Unit price	Amount
1	UHF RFID reader	1	17700	17700
2	WebCam	1	1200	1200
	Total amount Spent			18900

TABLE A.1: Account Settlement