


## CUSTOMER REQUIREMENT SPECIFICATION

|                                                                                                                              |                                     |                                |                     |            |
|------------------------------------------------------------------------------------------------------------------------------|-------------------------------------|--------------------------------|---------------------|------------|
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| <b>Project Name:</b>                                                                                                         | Automated Attendance System         |                                |                     |            |
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| <b>IN-TIME PRESENCE</b>                                                                                                      |                                     |                                |                     |            |
| <b>Automated Attendance System using facial recognition for classrooms which still follow traditional attendance methods</b> |                                     |                                |                     |            |
| <b>Prepared By: Karthik, Krishnakumar &amp; Nikhil</b>                                                                       |                                     |                                | <b>Reviewed By:</b> |            |
| <b>Name</b>                                                                                                                  | <b>Date</b>                         | <b>Name</b>                    | <b>Date</b>         |            |
|                                                                                                                              |                                     |                                |                     |            |
|                                                                                                                              |                                     |                                |                     |            |
|                                                                                                                              |                                     | <b>Approved By:</b>            |                     |            |
|                                                                                                                              |                                     | <b>Name</b>                    | <b>Date</b>         |            |
|                                                                                                                              |                                     |                                |                     |            |
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| <b>Distribution List</b>                                                                                                     |                                     |                                |                     |            |
| <b>Project Representative(s)</b>                                                                                             |                                     | <b>Guide Representative(s)</b> |                     |            |
| 1. Karthik R<br><br>2. Krishnakumar Hegde<br><br>3. Nikhil Y Dixit                                                           |                                     | Prof. Dinesh Singh             |                     |            |

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## **Definitions, Acronyms and Abbreviations**

This section provides for definition of all terms, acronyms and abbreviations required for interpreting the CRS. Well known abbreviations need not be stated.

## **References**

This section describes the complete list of documents referred to prepare the CRS. The reference documents shall describe the title, version number, dates, authors and publishers, whatever is applicable.

## Change History

This section describes the details of changes that have resulted in the current CRS document.

| #  | Date | Document<br>Version No. | Change Description | Reason For change |
|----|------|-------------------------|--------------------|-------------------|
| 1. |      |                         |                    |                   |
| 2. |      |                         |                    |                   |
| 3. |      |                         |                    |                   |

## 1.0 Introduction

This documentation stands as a reference guide for the idea, design and implementation details of the automated attendance application that is being developed as a part of the Minor project. The main purpose of the application is to make attendance hassle free task with utmost accuracy without intervention of manual methods.

### 1.1 Scope

Face recognition is an important application of Image processing owing to its use in many fields. Identification of individuals in an organization for the purpose of attendance is one such application of face recognition. Maintenance and monitoring of attendance records plays a vital role in the analysis of performance of any organization. The purpose of developing attendance management system is to computerize the traditional way of taking attendance. Automated Attendance Management System performs the daily activities of attendance marking and analysis with reduced human intervention. The prevalent techniques and methodologies for detecting and recognizing face fail to overcome issues such as scaling, pose, illumination, variations, rotation, and occlusions. The proposed system aims to overcome the pitfalls of the existing systems and provides features such as detection of faces, extraction of the features, detection of extracted features, and analysis of students' attendance. The system integrates techniques such as image contrasts, integral images, color features and cascading classifier for feature detection. The system provides an increased accuracy due to use of a large number of features of the face. Faces are recognized using Euclidean distance and k-nearest neighbor algorithms. Better accuracy is attained in results as the system takes into account the changes that occur in the face over the period of time and employs suitable learning algorithms.

## 2.0 Product Perspective

This product can be made and run independently without any dependency, rather if a college or institution is using this product then would be ease and efficient if this product is given

access to the database, hence would be no duplicate maintenance of data. The hardware requirements for development would be an interface with a application gui running. The attendance stats from the captured image would be sent to the main server to get updated after specific interval of time(after each class).

### 2.1 User Characteristics

The main end-user of this application would be Lecturer.

- end-user may not have the technological expertise that would enable him/her to use the application
- end-user need not know the entire algorithm to use the application.
- Lecturer interact with application through simple user interface that is provided to him/her.
- Lecturer might find this method more convenient and easier than traditional method.

- Lecturer need not carry the attendance record explicitly with him as application will keep that information.

## ***2.2 General Constraints, Assumptions and Dependencies***

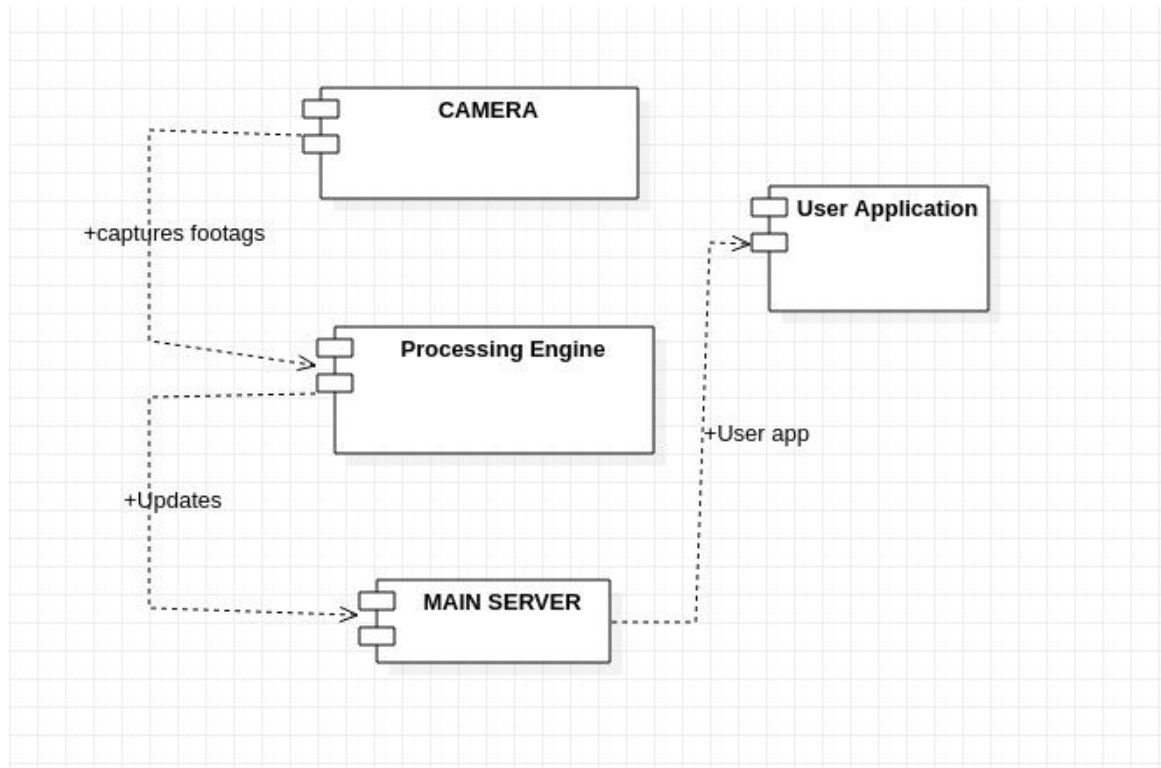
This section of the CRS shall provide a general description of any other item that will limit the developer's option for designing the system. These can include the following:

- Zero power shut-down tolerance
- System capable of handling 5 requests
- Preferable to Linux os
- Clean visuals for the Camera
- Operations and updations should be atomic
- User access only after credential check
- Preveliged access to lecturers to schedule special class/cancel class
- Student restricted only to view and submit request upon wrong marking

## ***2.3 Risks***

The major risk is to maintain high true-positive even a single false-positive could lead to improper attendance , hence should majorly focus on the accuracy rate of our project. Resource DB should be given utmost security as it contains details of each and every students with their related data .The access for the attendance portal should be secured with userid and pass-key to restrict anonymous user access.

### 3.0 System Architecture



Our prime sensor for building the product will be camera , preferable which is capable of taking high resolution images/videos. Once the captured images is sent to processing engine where the algorithm for the face detection and recognition runs and follows the output to the main server , where it updates the attendance in the registry of the database.

### 4.0 Requirements List

#### 4.1 Module / Scenario 1

| Reqmt # | Requirement                                          |
|---------|------------------------------------------------------|
| CRS – 1 | Proper Light illumination<br>No obstacles to visuals |

#### 4.2

| Reqmt # | Requirement                                                             |
|---------|-------------------------------------------------------------------------|
| CRS – 1 | Multiple Servers to handle server break-down and ensure fault-tolerance |



## 5.0 External Interface Requirements

### 5.1 Hardware Requirements

To capture images proper camera with high resolution capacity is necessary.

The device running the application should have a display, High end CPU, proper GUI, adequate RAM and storage.

It should be capable of running applications that perform operations that involve running machine learning algorithm, performing facial recognition, camera activity, media activity, clock and web browsing.

### 5.2 Software Requirements

Desktop computers and laptops should be capable of running a web browser.

Python environment is required to run the algorithms.

Different software packages and python-based modules for facial recognition feature which are helpful to run machine learning algorithms should be installed. Eg: Keras

### 5.3 Communication Interfaces

Communication between camera and application happens over the local network and It is preferred to use the application over internet.

## 6.0 User Interfaces

Web based user interface is provided where lecturer can check the presence of each student according to the day. According to class section and lecturer students name with value for presence of the student will be there.

Log in functionality will be provided so that only lecturer can view the site and access the data to further requirements

The design is meant to be very user friendly and intuitive. Minimal button clicks and maximum information display are the current goals of the design. A simple yet immersive user experience is kept in mind while designing the application.

## 7.0 Performance Requirements

- Storage to store the dataset.
- Recognition of multiple faces in captured images.
- Recognition of face from different angels.
- Storing the features of the datasets.
- Database or file to store attendance details.
- Mapping student name with feature captured.
- Should be compatible across all heterogeneous systems

- Devices MUST be connected to the internet at all times for any tasks to be performed.

## 8.0 Special Characteristics

- Doesn't require human intervention.
- Less infrastructure.
- It doesn't require high speed internet.
- It doesn't have high maintenance issues
- Working module is isolated from actual front-end
- User specific login.
- Certain quantities are re-evaluated for correctness
- It saves time.

## 9.0 Help

The application will be intuitive by itself but a user guide will be published to aid users nevertheless

## 10.0 Other Requirements

We may require camera with specific resolution capacity to capture the image and process it.

### 10.1 Site Adaptation Requirements

- Device should be capable of running machine learning algorithm to work with facial recognition algorithm
- The web browser used to access the application should be able to run html, php and Java script either natively or by support of an external module
- Necessary storage, internet, location and network permissions must be granted on all systems that the application is running on, failing which the application might run incorrectly or fail to run.

### 10.2 Safety Requirements

One should run the algorithm only after making sure of hardware requirements.

The login credentials to the application must be private at all costs.

The user using the app must lecturer or recognized member of the organization.

Any defect or loopholes must be taken care of.

## 11.0 Packaging

Packing will be in terms of series of webpages which can be hosted with the help of servers. Only required pages will be available for the users without revealing the source code of the project and algorithm that builds up the project with the help of this web interface user should be able to perform basic operations that are necessary.

## 12.0 Traceability Matrix

| URS Reference Section No. and Name | CRS Reference Section No. and Name |
|------------------------------------|------------------------------------|
|                                    |                                    |
|                                    |                                    |
|                                    |                                    |

- The CRS is the basis for changes in specifications or requirements of the design in the project. It should be reflected in the Change History section.
- The CRS should state requirements and constraints clearly and concisely. Design details should not be included in the CRS.